Final report of the accident investigation, Flash Airlines Fight 604, Boeing 737-300 SU-ZCF, Red Sea off Sharm El-Sheikh, Egypt, January 3, 2004

Micro-summary: **This Boeing 737-300 crashed into the Red Sea shortly after takeoff.**

Event Date: **2004-01-03 at 0245 UTC**

Investigative Body: **Ministry of Civil Aviation, Central Administration for Aviation Accidents, Egypt**

Investigative Body's Web Site: **http://www.faa.gov/ats/aat/ifim/ifimegai.htm**

Cautions:

1. Accident reports can be and sometimes are revised. Be sure to consult the investigative agency for the latest version before basing anything significant on content (e.g., thesis, research, etc).

2. Readers are advised that each report is a glimpse of events at specific points in time. While broad themes permeate the causal events leading up to crashes, and we can learn from those, the specific regulatory and technological environments can and do change. ***Your company's flight operations manual is the final authority as to the safe operation of your aircraft!***

3. Reports may or may not represent reality. Many many non-scientific factors go into an investigation, including the magnitude of the event, the experience of the investigator, the political climate, relationship with the regulatory authority, technological and recovery capabilities, etc. It is recommended that the reader review all reports analytically. Even a "bad" report can be a very useful launching point for learning.

4. Contact us before reproducing or redistributing a report from this anthology. Individual countries have very differing views on copyright! We can advise you on the steps to follow.

EGYPTIAN MINISTRY OF CIVIL AVIATION

FINAL REPORT
OF
THE ACCIDENT INVESTIGATION

Flash Airlines flight 604

January 3, 2004

Boeing 737-300 SU-ZCF

Red Sea off Sharm El-Sheikh, Egypt

Occurrence Summary:

On January 3, 2004, about 02:45:06 UTC, 04:45:06 Local time, Flash Airlines flight FSH604, a Boeing 737-300, Egyptian registration SU-ZCF, crashed into the Red Sea shortly after takeoff from Sharm el-Sheikh International Airport (SSH) in South Sinai, Egypt. The flight was a passenger charter flight to Charles de Gaulle Airport (CDG), France with a stopover in Cairo international Airport (CAI) for refueling. Flight 604 departed from Sharm el-Sheikh airport with 2 pilots (Captain and First Officer), 1 observer, 4 cabin crew, 6 off-duty crew members and 135 passengers on board. The airplane was destroyed due to impact forces with the Red Sea with no survivals.

The airplane had departed from Sharm el-Sheikh runway 22R and was air born at 02:42:33 UTC, approximately 2½ minutes prior to the crash, and had been cleared for a climbing left turn intercept the 306 radial from the Sharm el-Sheikh VOR station located just north of runway 22R. This climbing turn allows departing flights to gain sufficient altitude before proceeding over higher terrain located along the flight path to Cairo. Flight 604 was operating in Egyptian airspace as a charter flight operating under the provisions of Egyptian Civil Aviation Regulations Part 121

CONTENTS

- Flash Airlines chief pilot view regarding the departure procedure from SSH, based on company procedures.
- Number of departures from SSH previously made by the captain (day and night)
- The captain's time on Russian aircraft (MiG-21). (Dates and number of hours). ADI display configuration in comparison with B737-300 ADI display.
- The captain's time on American military transport aircrafts (C130). (Dates and number of hours). ADI display configuration in comparison with B737-300 ADI display.

1.5.2 The F/O

1.5.2.1 General

1.5.2.2 Background Information

i- Beginning of his flying career.

ii- All airlines worked for prior to Flash Air .

iii- "All" F/O training records at Flash (including his last recurrent training.

iv- Personal situation.

1.5.2.3 (72-hour) history of the F/O

1.5.2.4 Interviewing the individuals who trained and flew with the F/O (including ground and simulator instructors)

1.5.2.5 Interviewing CAA inspectors who flew with F/O.

1.5.2.6 Interviewing former head of operations at Flash Airlines

1.5.2.7 Additional factual documentation:(F/O)

- Number of days the F/O had been working since his last day off.
- F/O interpersonal characteristics, including perceptions of fellow pilots regarding their capability for assertiveness.
- Reported proficiency information. Outcome and comments from training records and proficiency check forms.
- Spatial disorientation or upset recovery training received at Flash Air
- F/O's flying proficiency and cockpit style from fellow pilots, instructors, and/or check pilots.

1.5.3 The Observer

General

Beginning of his flying career

Interview with brother of observer pilot

CAA regulations regarding observation time

Flash Airline policy regarding observation time

1.5.4 Maintenance Engineer

1.6 Airplane Information

- HEA_PQ294_prevfltSIM.pdf (26 Feb 2004, base lines, FDR-Kincon-Sim prvious flight)
- HEA_PQ294_baselineSIM.pdf (26 Feb 2004, base lines, FDR-Kincon-Sim)
- HEA_PQ294_FDR_data.pdf (FDR Data accident flight - Boeing -26 Feb 04 Fig's 1, 2)
- HEA_PQ294_kincon (includes roll rate).pdf (FDR Data accident flight - plotted by Boeing (some selected parameters)-26 Feb 04 Fig's 3, 4
- HEA_PQ294_WindsSIM29402to29442.pdf (26 Feb 04 Fig's 23- 25)
- 17871 encl 4 (B-H200-17871-ASI 31 March 2004).pdf (enclosure 4 (B-H200-17871-ASI 31 March 2004). Boeing plots
- M Cab Recovery (Piloted Recovery.xls)
- Simulation Scenario (Simulation Scenario Status20 Sep.,04.xls)
- Simulation Scenario (Simulation Scenario Status 27-30 Sep, 04.xls)

1.16.1.4. Simulated Failures:

- HEA_PQ294_Simulated_Failures Spoilers, LE Slats.pdf (FDR-norm simulation-simulation with spoilers failures)
  - Right outboard flight spoilers (#7) Hardover simulation (hardover starts at 92391)
  - Left outboard flight spoilers (#2) Hardover simulation (hardover starts at 92391)
  - Right outboard flight spoilers (#7) Float simulation (floats starts at 92391)
  - Left outboard flight spoilers (#2) Float simulation (floats starts at 92391)
  - Critical right wing leading edge slat # 6 extends
  - Critical left wing leading edge slat # 1 extends
  - Fig 40-43 Lateral Control Jams.pdf (FDR, normal simulation, simulation with spoilers fault)
  - Longitudinal Axis, simulated right wing spoiler cable jam
  - Longitudinal Axis, simulated F/O’s wheel jam
  - Hypothetical Scenario, Right Side Cable Jam Induces Right Roll (Right Side Cable Jam Effects.ppt)

1.16.1.5. FDR 25 Hour Data- Observations
(CairoMarch04Slides (March Progress Meeting - Cairo).pdf)

1.16.1.6. FDR-CVR Overlay
FDR-CVROverlay.pdf, FDR-CVR Overlay 3R2.pdf (21-June 2004)
CVR- FDR Correlation (CVRFDRCorrelation-1 NTSB.xls)

1.16.1.7. Ailerons system
- IPC wheel posn xducer PW.pdf (Details about the wheel posn xducer- Part Catalog Maintenance)
- CairoMarch04Slides (March Progress Meeting - Cairo).pdf
- Aileron PCU Control Valve.ppt
- ControlWheelBias.pdf, CairoMarch04Slides (March Progress Meeting - Cairo).pdf
- AileronFloat.pdf (PQ294 FDR Aileron Position, Aileron Float from Airload)
- M-Cab Wheel (Flight Director Results Boeing.xls)
- Force vs Wheel.ppt
- Cor8tmp PCU correction.ppt
- Aileron PCU EQA Field Note Summary (Aileron PCU EQA Field Note Summary.ppt)
- Aileron PCU EQA Report (Aileron PCU EQA Report.pdf)

1.16.1.8. Master Caution:
CairoMarch04Slides (March Progress Meeting - Cairo).pdf

1.16.1.9. Auto Flight Systems
- 17833 (B-H200-17833-ASI 12 Feb 2004).pdf
- CairoMarch04Slides (March Progress Meeting - Cairo).pdf
  - Relevant Figures
  - 737-300 (PQ294) Flight Director Control Law (see also FDControlLaw.pdf file)
  - HSI Display
  - Times of Example Display Photos
- M-Cab Flight Director Commands (Flight Director Results Boeing.xls)
- Display Architecture (Display Architecture.ppt)
- Cairo March 04 Autopilot Flash 737 March Progress Meeting Flash 737 March Progress Meeting - Cairo.pdf
  - Autopilot Engagement
    - Observation
    - Autopilot Engage Logic

1. Factual Information

1.1. History of Flight

Summary

On January 3, 2004, about 02:45:06 UTC, 04:45:06 Local time, Flash Airlines flight FSH604, a Boeing 737-300, Egyptian registration SU-ZCF, crashed into the Red Sea shortly after takeoff from Sharm el-Sheikh International Airport (SSH) in South Sinai, Egypt. The flight was a passenger charter flight to Charles de Gaulle Airport (CDG), France with a stopover in Cairo international Airport (CAI) for refueling. Flight 604 departed from Sharm el-Sheikh airport with 2 pilots (Captain and First Officer), 1 observer, 4 cabin crew, 6 off-duty crew members and 135 passengers on board. The airplane was destroyed due to impact forces with the Red Sea with no survivals.

The airplane had departed from Sharm el-Sheikh runway 22R and was air born at 02:42:33 UTC, approximately 2½ minutes prior to the crash, and had been cleared for a climbing left turn intercept the 306 radial from the Sharm el-Sheikh VOR station located just north of runway 22R. This climbing turn allows departing flights to gain sufficient altitude before proceeding over higher terrain located along the flight path to Cairo. Flight 604 was operating in Egyptian airspace as a charter flight operating under the provisions of Egyptian Civil Aviation Regulations Part 121

History of Flight

In the following history, comments originally in Arabic are translated in to English and appear in *italics*. A complete transcription of the CVR is contained in Exhibit C, CVR Group Factual Report

- Flash Airlines flight 604 Boeing 737-300 scheduling to depart Sharm El Sheikh at 0230 GMT 0430 local time.
- From Cockpit Voice Recorder information the first officer and observer were in the Cockpit at 02:14:30 the Captain was in the cockpit at 02:18:14.
- Load information and flight information were exchanged between the Flight Deck and Cabin Attendants.
- At 02:18:58 before start check list was requested by the Captain and was read by the F/O and responded by Captain and F/O completed at 02:20:17.
- The Cleared to Start checklist was carried out at 02:32:19, the After Start checklist at 02:35:36, and the Taxi checklist at 02:39:55.
- The ATC clearance was delivered at 02:38:15 and read back by F/O as follows:
- ATC Flash 604 destination Cairo as filed climb initially flight level 140 1673 on the squawk.
- F/O Our clear to destination via flight plan route 140 initially 1673 on the squawk Flash 604 we have total pax135 *God willing.*
- 02 h 39 min 54 s, A/T engaged (through the whole flight),
- The Take Off checklist was completed at 02:40:05.
- 02 h 40 min 38 s, F/O : “Flash 604 ready for departure”,
- 02 h 40 min 46 s, TWR : “Flash 604 surface wind 280/13 kts left turn to intercept radial 306 clear for take off 22R”,
- 02 h 40 min 55 s, F/O : “Clear for take off runway 22R with left turn to establish 306 Sharm VOR, our Flash 604 clear for take off”,
- 02 h 41 min 19 s, F/O : “Left turn to establish radial 306”,
- 02 h 41 min 30 s, Captain : “Initially 140”,
- 02 h 41 min 34 s, Captain : “Confirm initially 140”,
- 02 h 41 min 35 s, F/O : “And Flash 604 confirm to the left to establish 306”,
- 02 h 41 min 40 s, Captain : “Initial 140”,
- 02 h 41 min 43 s, TWR : “Inch Allah”,
- 02 h 41 min 44 s, F/O : “And initially 140”,
- Take off was initiated at 02:41:59 with standard call outs.
- At time 02:42:02 TOGA mode engaged and then disengaged at 02:42:04.
- Aileron movements during T/O roll and lift off were consistent with crosswind.
- 02 h 42 min 10 s, F/O : “Take off power set speed building up 80 kts throttle hold”,
- 02 h 42 min 26 s to 02 h 42 min 33 s, Take off phase, Co-pilot : “V1 rotate, positive rate”,
- 02 h 42 min 36 s, Captain : “Gears up”,
- 02 h 42 min 38 s, gears are up (FDR), CAS 169,5 kts
- 02 h 42 min 43 s, Captain : “400 heading select”,
- 02 h 42 min 44 s, F/O : “400 heading select” (FDR heading select engaged),
- At time 02:42:48, Captain requested "Level Change"
- At time 02:42:49 the F/O announced "Level Change, MCP speed, N1 armed Sir".
- At time 02:42:59 the F/O announced "one thousand". At the same time, ATC reported the departure time and confirmed left turn clearance. The clearance was acknowledged by the F/O. This was the last ATC transmission from the flight crew. The aircraft rolled to 20˚left bank and began a climbing turn.

- 02 h 43 min 00 s, Captain : “N1 speed 210 flaps 1”,
- 02 h 43 min 04 s, Captain : “Left turn”,
- 02 h 43 min 05 s, TWR : “Flash 604 airborne time 44 when you ready to the left to intercept 306 radial report on course”, (Aircraft at 1268 ft),
- 02 h 43 min 11 s, Captain : “Left turn”, (1528 ft, beft)
- 02 h 43 min 12 s, F/O : “Roger when ready inch Allah”,
- 02 h 43 min 18 s, F/O : “left turn to establish 306 Sharm VOR”, (maximum recorded left roll is 21,8° within that phase at 02:43:21),
- The turn continued as the magnetic heading approached 140˚(at an altitude of 3600 ft), at which point the bank angle decreased to approximately 5˚left bank.
- At time 02:43:19, EgyptAir Flight (MSR 227), a flight from Hurgada inbound to Sharm el-Sheikh called ATC. Conversations between ATC and MSR 227 continue for approximately 60 seconds.
- 02 h 43 min 21 s, MCP selected speed recorded 219 kts,
- 02 h 43 min 23 s, Captain : “Flaps up”,
- 02 h 43 min 33 s, Selected heading recorded 106,8°,
- 02 h 43 min 35 s, Co-pilot : “Flaps up no light”, (2196 ft, CAS 209 kts, Hdg 168, Pitch 10.9°, Roll 20,74° left),
- At time 02:43:37, the Captain called for the After Takeoff checklist. There was not audible response from the F/O.
- 02 h 43 min 53 s, CAS 216,5 kts decreasing (reached a minimum value of 184.5 Kts at 2:44:23 and then started increasing),
- At time 02:43:55, the Captain called "Autopilot". There was no immediate response from any crew member. (3124 ft, CAS 216 kts, Hdg 142.7, Pitch 15.3°, Roll 7.7° left)
- At time 02:43:58, the Captain stated "*Not yet*".(3320 ft, CAS 213.5 kts, Hdg 141.3°, Pitch 16.3°, Roll 6.6° left)
- At time 02:43:59, the FDR recorded the autopilot was engaged, and that the roll mode transition to CWS-R mode. This transition would have resulted in loss of Heading Select Mode (3392 ft, CAS 212 kts, Hdg 140.6°, Pitch 17.5°, Roll 6.6° left)
- At time 02:44:00, the F/O stated "Autopilot in command sir". (3468 ft, CAS 209.5 kts, Hdg 140.2°, Pitch 18.4°, Roll 6.6° left)
- At time 02:44:01, the captain stated "EDEELO", (an Arabic exclamation expressing a sharp response of some kind). At the same time, the FDR records momentary aileron surfaces movements. The right aileron deflected to 7.2 degree TEU for one second
- At time 02:44:02, the CVR records the autopilot disconnect warning and the FDR recorded the autopilot disengaged. The aural warning lasted for 2.136 seconds. (3624 ft, CAS 207 kts, Hdg 139.9°, Pitch 19.3°, Roll 5.6° left)
- During this time, an increase in pitch and decay in airspeed were observed
- At time 02:44:05, the Captain requested heading select. (3880 ft, CAS 203 kts, Hdg 139.5°, Pitch 20.5°, Roll 0.0° left)
- At time 02:44:07, the F/O states "heading select" and the FDR records heading select mode engaging. This mode transition would have resulted in the reappearance of the flight director roll command bar. During this sequence, the aircraft’ left-bank continued to decrease at a slow rate until the airplane was briefly wings level. (4056 ft, CAS 199 kts, Hdg 139.5°, Pitch 19.8°, Roll 0.35° right)
- Beginning at this time, the FDR records a series of aileron motions that command a right bank and subsequent right turn.
- At time 02:44:18, the captain states "*See what the aircraft did*". At this point the aircraft bank angle was approximately 12° to the right. (4824 ft, CAS 186.5 kts, Hdg 149.4°, Pitch 15.4°, Roll 12.6° right)

- 02 h 44 min 23 s, CAS 184,5 kts and will increase to the end of the flight,
- 02 h 44 min 25 s, last recorded speed selected 220 kts,
- At time 02:44:27, the F/O states "Turning right, sir". Three seconds later, the captain responses "*What*". At the same time, bank angle is 17° to the right and the FDR records the aileron motions to increase the right bank (5172 ft, CAS 186 kts, Hdg 160.6°, Pitch 13.3°, Roll 16.8° right)
- At time 02:44:31, the F/O states "*Aircraft is* turning right". One second later, the captain response "*Ah*"
- At time 02:44:35, the Captain states "Turning right", at this point, the bank angle was 23.6° to the right (5396 ft, CAS 192 kts, Hdg 174.7°, Pitch 11,7° Roll 23,5° right), last selected heading 84,9°)
- At time 02:44:37, the Captain states – "*how* turning right" (5436 ft, CAS 195 kts, Hdg 179.6, Pitch 10.7°, Roll 27.7°)
- At time 02:44:41, the Captain states "OK come out". (5468 ft, CAS 202.5 kts, Hdg 194.7°, Pitch 6.5°, Roll 41.8° right) At this point, the bank angle was slightly more than 40° right bank and the FDR records the ailerons returning to just beyond neutral, the high right roll rate stopped and a momentary left roll rate occurred resulting in a slight decrease in the right bank from 43.2° at 2:44:40 to 41.8° at 2:44:41 before additional aileron movements command an increase in the right bank.
- At time 02:44:41.5, the F/O states "Overbank. The bank angle at this time was just beyond 50° right bank. The airplane reaches its maximum altitude of just over 5460 feet.
- At time 02:44:41.7, the Captain states "Autopilot". He repeats the statement at 02:44:43.4.
- At time 02:44:44, the F/O states "Autopilot in command". No autopilot engagement was recorded on the FDR.(5432 ft, CAS 209.5 kts, Hdg 210.5°, Pitch 3.5°, Roll 53.0° right)
- At time 02:44:46, the Captain again states "Autopilot".
- At time 02:44:48, the F/O states "Overbank, Overbank, Overbank".(5276 ft, CAS 222 kts, Hdg 235.9°, Pitch 3.5° nose down, Roll 68.9° right).
- 02 h 44 min 51 s, Master caution recorded,
- At time 02:44:52.8, the F/O again states "Overbank". (At 02:44:53, 4628 ft, CAS 254 kts, Hdg 265°, Pitch 25.14° nose down, Roll 91.4° right)
- At time 02:44:53.4, the Captain responds "OK, come out".
- 02 h 44 min 54 s, aileron motion to the left during 9 s (4388 ft, CAS 264.5 kts, Hdg 270°, Pitch 29.7° nose down, Roll 95.2° right)
- At time 02:44:56, the F/O states "No autopilot commander".(3820 ft, CAS 289.5 kts, Hdg 277°, Pitch 37° nose down, Roll 103.0° right)
- At time 02:44:58, the captain states "Autopilot". At the same time, the FDR records a large aileron motion to the left and the airplane begins rolling back towards wings level.(3068 ft, CAS 317.5 kts, Hdg 281°, Pitch 43.2° nose down, Roll 111° right)
- At time 02:44:58.8, the observer states "Retard power, retard power, retard power"
- At time 02:45.01.5, the captain states "Retard power", and the FDR records both engine throttles being moved to idle.(Pitch 42.4° nose down, Roll 39.2° right)
- At time 02:45:02, the CVR records the sound of the overspeed warning.(1320 ft, CAS 382.5 kts, Hdg 306.9°, Pitch 40.6° nose down, Roll 30.2° right)
- Recovery from severe Right Bank and nose down pitch continued
- At time 02:45:04.3, the captain states "Come out". Bank angle was 15.6° right, pitch attitude was 30.5° nose down, altitude was 421 ft, and airspeed was 411.8 KIAS

- At time 02:45:05, the CVR records a sound similar to ground proximity warning (180 ft, CAS 416 kts, heading 315.7°, pitch 25.4° nose down, right roll 19.3°),
- A/C impacted the water at about 02:45:06 with last recorded data:
  - Bank Angle 19.3˚to the right
  - Pitch Angle 25.4˚Nose down
  - Vertical G. Load 3.96 (2.7)
  - Speed 416 Kts

Correlated FDR- CVR Data:

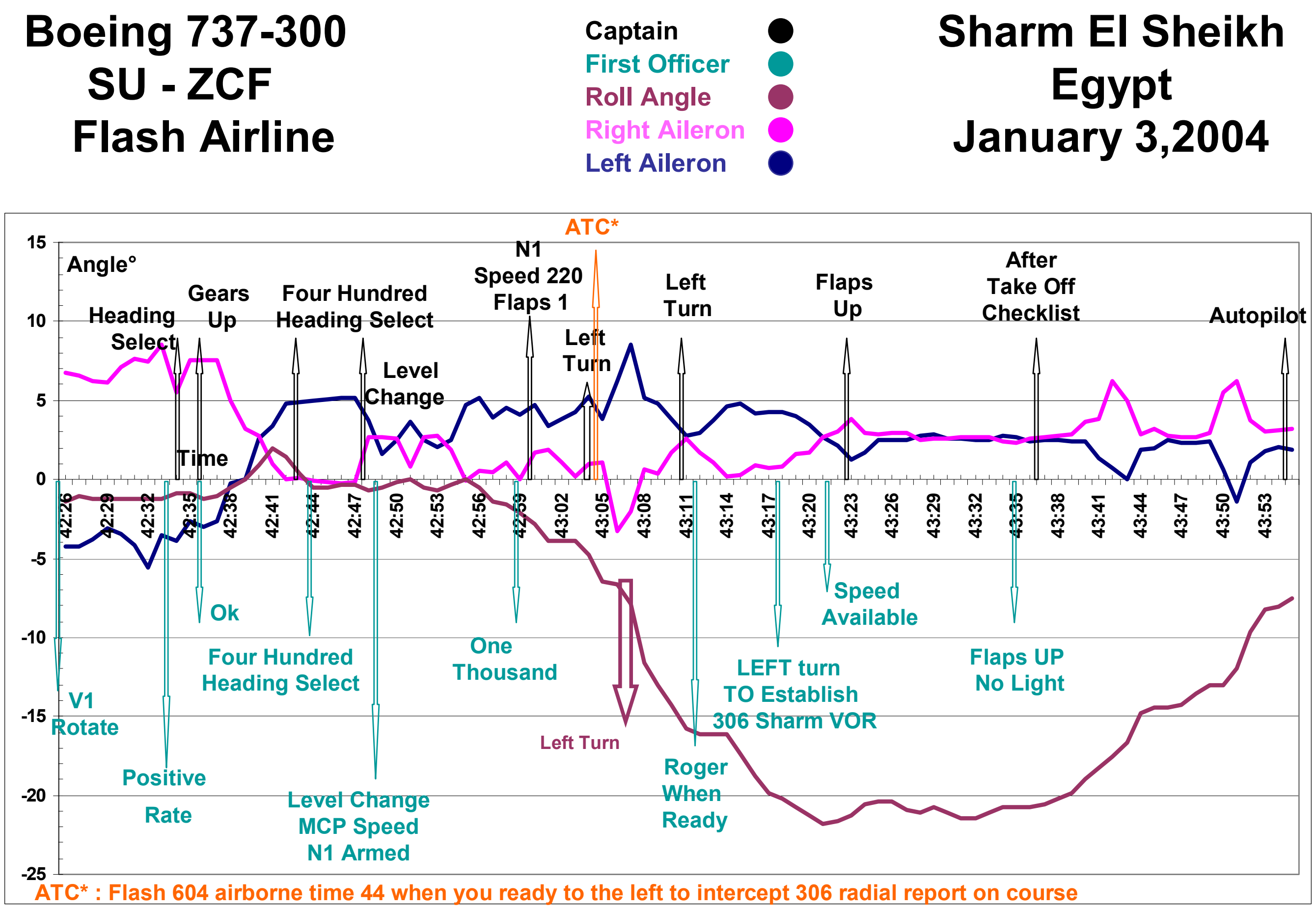


Figure 1.1-1 Correlated FDR- CVR Data

Correlated FDR- CVR Data:

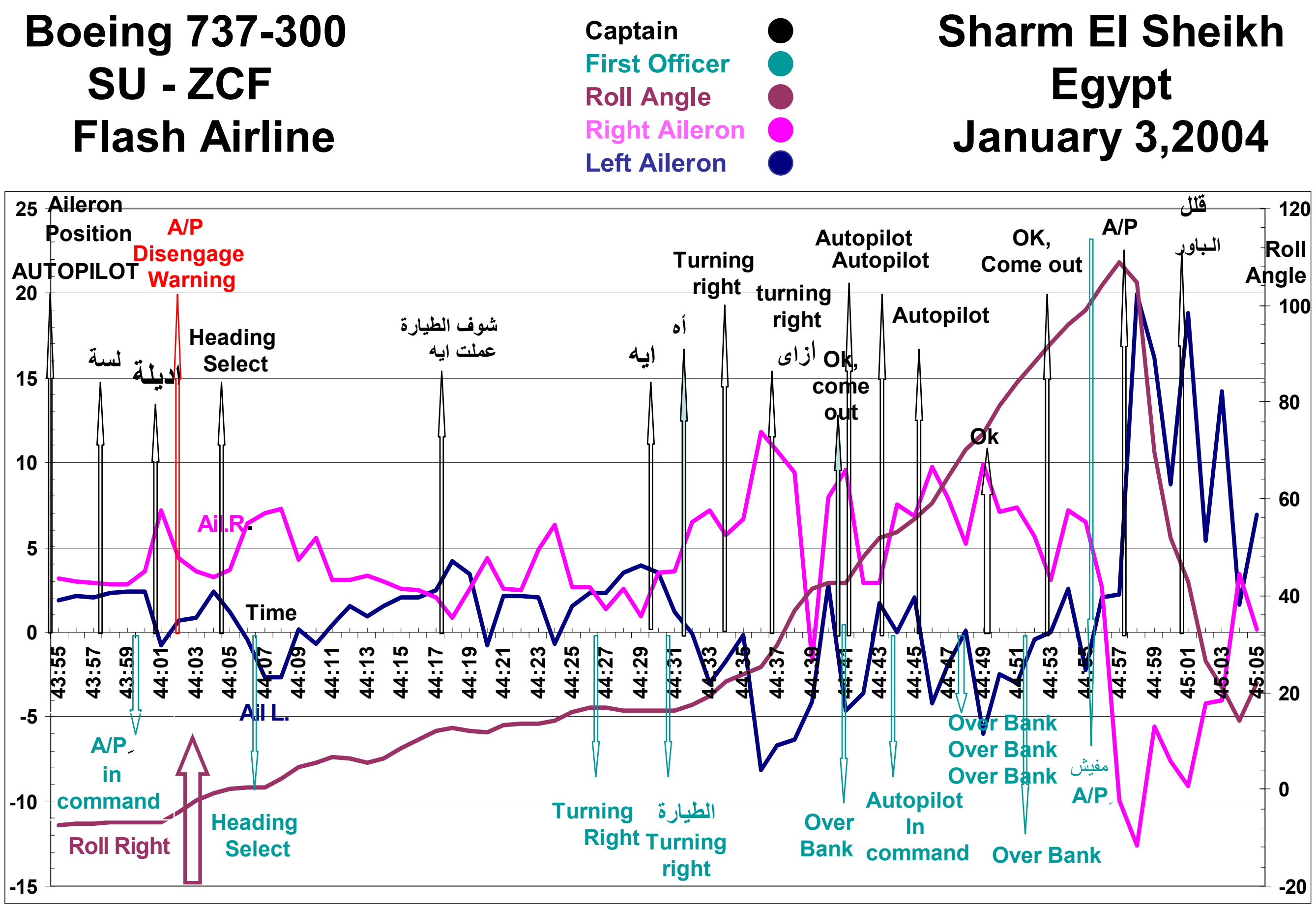


Figure 1.1-2 Correlated FDR- CVR Data

1.2. Injuries to Persons

There were no survivors.

Injuries	Flight Crew	Cabin Crew	Passengers	Off-Duty Crew	Total
Fatal	3	4	135	6	148
Serious	0	0	0	0	0
Minor	0	0	0	0	0
None	0	0	0	0	0
Total	3	4	135	6	148

Table 1: Injury chart.

1.3. Damage to Airplane

The airplane was destroyed by impact with the water.

1.4. Other Damage

There was no other damage. Most of the wreckage remains on the floor of the Red Sea at a depth of approximately 1000 meters.

1.5. Personnel Information

Both the Captain and the First Officer were certified under Egyptian Civil Aviation Authority (ECAA).

1.5.1 The Captain

1.5.1.1. Summary (personal and training information)

Date of birth: February 26, 1950
Date of hire with Flash Airlines: February 16, 2003
Airline Transport Pilot Egyptian Certificate Number 561(issued December 15, 1984)
Airplane Multi-Engine Land
Airplane Single Engine Land/Commercial Pilot
Limitations: None
Type Ratings: ATR-42, B-737/300/400/500 (issued May 27, 2003), DHC-5 Buffalo, C-130 and Gomhoria
Medical: First Class (issued November 19, 2003)
Limitations: None

Initial Ground School Training:	Written Test April 9, 2003 Oral Test May 22, 2003
Initial Simulator Training	B-737-300/400/500: April 28- May 12, 2003
Initial Proficiency Check	B-737-300/400/500: May 12, 2003
Last Proficiency Check	B-737-300/400/500: May 12, 2003
Last Line Check:	July 23, 2003
Last Recurrent Training:	December 16, 2003

FLIGHT TIMES:

Total flight time (hrs/min)[1]:	7,443:45
Total flight time on B-737:	474:15
Total flight time PIC:	5,473:35
Military Instructor Flight time:	1,967:55
Total flight time last 24 hours[2]:	7:15
Total flying time last 30 days:	83:51
Total flying Time 90 days:	244:43

---

[1] Times are calculated for the captain up until December 31, 2003.

[2] Times do not include the accident flight.

1.5.1.2. Background information.

i- Beginning of his flying career.
Refer to captain CV, and his training records item 1.5.1.2 (vi)

ii- All airlines worked for prior to Flash Air

- The captain joined the A.R.E. Military Aviation College on September 1968, and was graduated on May 1970
- He continued working as military pilot at A.R.E. Air Force since that date flying the L29, MIG17, MIG21, Buffalo (Dash 5), C130 types until he retired from the A.R.E. Air Force at the beginning of 2000
- He joined Scorpio Aviation working as a civil pilot on ATR 42 from March, 2000 up to December, 2001.

- He joined Flash Airline working as a civil pilot on B737-300 from February 2003 until *3 January 2004 (accident date)*

(All his flying hours were flown as PIC)

iii- History of military and civilian employment as pilot
The captain flew as a fighter pilot on L29, Mig17, Mig21 since his graduation until 1983. He then flew as a military transport pilot from that date on Buffalo and C130 until his retirement from the Air Force at the beginning of 2000.
(Refer to previous item)

iv- Retirement dates from A.R.E Air Force.
Captain has retired from A.R.E. Air Force beginning of 2000

v- History of position flown for specific aircraft, and dates of upgrades (i.e., copilot to captain)
Refer to page 14 of the Factual Report
(All his flying hours were flown as PIC)

vi- "All" captain's training records (including his last recurrent training).

وزارة الطيران المدني
سلطة الطيران المدني المصري
الإدارة المركزية للتفتيش الجوي

السيد الطيار/ رئيس الإدارة المركزية للعمليات الجوية

تحية طيبة... وبعد

بالإحالة لكتاب شركة فلاش للطيران بتاريخ ٢٠٠٣/٥/٢٢ ومرفقه أمر التدريب رقم ٣ لسنة ٢٠٠٣ بشأن عقد فرقة BASIC INDOCTORINTION بواقع (٢١ ساعة) في المدة من ٢٠٠٣/٥/٢٤ إلى ٢٠٠٣/٥/٢٦ للآتي أسماؤهم بعد:-

١-الطيار/ خضر عبد الله محمد — ٢-الطيار/ عارف بالله محمد السيد

٣-الطيار/ محمد جهاد شعراوي — ٤-مضيف جوي/ حامد محمد الشرشابي

يرجى التكرم بالإحاطة بأنه تم متابعة الفرقة بواسطة الإدارة المركزية للتفتيش الجوي ولا مانع لدينا من اعتماد الفرقة لسيادتهم.

وتفضلوا بقبول فائق الاحترام ...

التوقيع /
طيار / بدران زكي السيد
رئيس الإدارة المركزية للتفتيش الجوي

صورة السيد الطيار/ مدير عام عمليات شركة فلاش للطيران

رقم التليفون/ الفاكس : ٣٦٨١٣٤٩ — الداخلي : ٢٦٧

Letter issued by ECAA approving Flash Airline Basic Indoctrination Course for 4 trainees including Captain/ Khedr Abdallah Lasting 21 hrs from 24 May 2003 to 26 May 2003

Curriculum Vitae:

(7)

C.V.

'ersonal information:

Name:	Khedr abdalla saad said
Nationality:	Egyptian
Data of Birth:	February 26th ,1950.
place of Birth:	Cairo

ilot Qualifications & Certificates:

B.Sc. In aviation. Air Force Academy

AL.T by Egyptian Civil Aviation Organization

R/T Communication License

ilot Courses:

Ground Courses:		Flight Courses	Experience
ilitary	Civil	Gomhoria	Pilot
L29	Gomhoria	L-29	Pilot
Mig-17	Dash-5	Mig-17	Pilot
Mig-21	C-130	Mig-21	Instructor
	ATR-42	Dash-5	Captain
		C-130	Captain and Instructor to all international route
		ATR-42	Captain

lying Hours:

Total Flying Hours:	6967.05
Total on jet A / C:	1009 hrs
Total Civil Time:	5958.05
Total Flying Hours as Instructor:	1967.54 hrs

All the documents are available upon request.

Certificate, A.R.E. Air Force Head Quarter, Training Department

(16)

A. R. E.
AIR FORCE H. Q.
TRAINING DRPARTMENT

CERTIFICATE

Cate : 14-12-1999

Air training Department Certifics That : A-C/ Khedr Abd Allah Saad ____ H as P Loaur
on That types of A/Cs Gamhoria/ L29/ Mig15/ 17/ 21K Boflo/ C130

Single Engine Aircraft								Total hours of the single engine		Multi Engine Aircraft												Total hours of multi Engines .		Total Time		Instrument Flying		Link Simulator	
Day				Night						Day						Night													
Eual		Solo		Eual		Solo				Dual		Solo		2 and pilot		Dual		Solo		2 and pilot									
HR.	Min	HR.	Min	HR.	Min	HR.	Min	HR.	Min	HR.	Min	HR.	Min	HR.	Min	HR.	Min	HR.	Min	HR.	Min	HR.	Min	HR.	Min	HR.	Min	HR.	Min
213	10	810	40	79	10	28	25	1091	25	83	–	3649	75	655	15	29	20	738	15	157	55	5343	20	6434	45	347	05	73	30

	HR .	Min
Total Flying Hours On Jet Alrcraft .	1009	–
"" "" "" "" Prop Engine .	5425	45
Total Flying Hourse .	6434	45
"" "" "" instruction .	1417	45

Chief of Registering Branch
A.C. Raoof Abd Elraof.
GAMAL

Chief of Training Dept .
Air Vice Marshal : Hosni Mohmad K

Number of Training Flying Hours for Captain/ Khedr Abdallah at Scorpio Aviation (15 June 2000)

عدد ساعات الطيران التدريبي للطيار/

Date	FLT. .No	From	To	Block Time				No. of landings	Instructor
				Day		Night			
				H	M	H	M		
13 APR. 2000	335	AST	AST	03	00	–	–	8	GEO
3 APR 2000	336	AST	CAI	00	20	00	50	1	GEO
18 APR 2000	112	ASW	CAI	01	55	–	–	1	GEO
16.MAY 2000	333	CAI	AST	01	35	–	–	1	GEO
16 MAY 2000	335	AST	CAI	01	10	–	–	1	GEO
13 JUN 2000	112	ASW	CAI	02	05	–	–	1	GEO
28 APR 2000	131	CAI	HRG	01	15	–	–	1	POP
28 APR 2000	101	CAI	LXR	01	25	–	–	1	POP
15 JUN 2000	301	HRG	LXR	00	50	–	–	1	GEO
15 JUN 2000	301	LXR	LXR	00	30	–	–	2	GEO
				14	05	0	50		
TOTAL	14.55			14.55				18	GEO

15. JUN. 2000
CPT GEORGESCU

شركة الطيران الدولية
سكوربيو

Proficiency Checks at Scorpio Aviation:
17 June 2000

Egyptian Civil Aviation Authority
Flight Safety Standards Sector
"Operations Inspectorate"

الهيئة المصرية العامة للطيران المدني
قطاع السلامة الجوية
، التفتيش الجوي ،

PROFICIENCY /QUALIFICATION CHECKLIST

REF. NO. ....
NAME OF PILOT/~~E.E~~ KHEDR ABDALLA
EMPLOYED BY SCORPIO AVIATION
BASE CAIRO
TYPE AIRCRAFT ATR-42
TYPE SIMULATION —

DATE OF CHECK 17 JUN. 2000
TYPE OF CHECK PROFICIENCY
~~INSPECTOR~~ OR CHECK AIRMAN
NAME GEORGESCU
FLIGHT TIME 01 hrs 35 mins
SIMULATOR TIME — hrs — mins —

FLIGHT MANOEUVRES (S = Satisfactory, U = Unsatisfactory)

PILOT

	Air craft	Simu lator
PREFLIGHT		
Equipment examination (oral or written)	S	
pre-flight inspection	S	
Taxiing	S	
Powerplant checks	S	
TAKE-OFFS		
Normal	S	
Instrument	S	
Cross-wind	S	
With simulated powerplant failure	S	
Rejected take-off	S	
INSTRUMENT PROCEDURES		
Area departure	S	
Holding	S	
Area Arrival	S	
ILS approaches	S	
Other instrument approaches	S	
Circling approaches	S	
Missed approaches	S	
IN-FLIGHT MANOEUVRES		
Steep turns	S	
Approaches to stalls	S	
Specific flight characteristics	S	
Powerplant failure	S	
LANDINGS		
Normal	S	
From an ILS	S	
Cross-wind	S	
With simulated powerplant (s) failure	S	
Rejected landing	S	
From circling approach	S	
Normal and abnormal procedures	S	
Emergency procedures	S	
Judgement	S	

FLIGHT ENGINEER

ITEM	S	U
Equipment exam (oral or written)		
pre-flightcheck of aircraft		
Computation of fuel load and fuel loading procedure		
Completion of company approved forms		
Starting, taxi, and runup		
Powerplant control		
Cruise control and computations		
Aircraft/powerplant operation analysis		
Fuel system management		
Air condition and pressurization control		
Electrical system operation		
Powerplant fire control		
Emergency gear and flap extension		
Heater fire and cargo compartment fire		
Smoke evacuation		
Emergency depressurization		
Fuel dumping procedure		
Powerplant shutdown and restart		
De-icing and anti-icing		
Location and use of emergency equipment		
Emergencies Hydraulic,pressurization, etc.		
Crew co-ordination and monitoring		

REMARKS:
TYPE RATING AS
PILOT IN COMMAND
ATR-42
GEORGESCU
17-JUN-2000
INSPECTOR OR CHECK AIRMAN SIGNATURE

ECAA - INSPECTION FORM (5/96) ICAO - DOC 8335 / C1

Approved
ECAA Capt
Inspector
17/6/2000

شركة الطيران الدولية
سكوربيو

8 December 2000

SCORPIO AVIATION

FLIGHT OPERATION DEPARTMENT — **PROFICIENCY CHECK/QUALIFICATION FORM**

AIRMAN: KIDR ABD

A/C REGISTER MARK: SUBMK — SEAT POSITION: CM1 ☒ CM2 ☐

CHECK PILOT: MAGDy Khaled ALLA

DATE: 8-12-2000 — AIRPORT: CAI

SIMULAT — SIMULATOR TIME…………

LOCAL FLIGHT — AC ☐ STICK TIME……… T/O……LND……GA…… VIS.SIM. ☐ SIM TIME……

LINE FLIGHT — NUMBER OF LEGS……… AP…………………………

RECURMENT CHECK

1' CK SEMEST	☐	2' CK SEMEST	☐
LICENCE(IFR)	☐	NIL	
TYPE(ABILIT)	☐	NIL	
THEOR.EXAMIN	☐	NIL	
EMERG.EQUIPM.	☒	NIL	
PROFICIENCY	☒	PROFICIENCY	☐
CAT II QUALIF.	☐	CAT II QUALIF.	☐

QUALIFICATION CHECK

TYPE RATING	☐
LINE QUALIFICATION	☐
CAT II (DH…………RVR……….)	☐
IFR QUALIFICATION	☐

AIRMAN SELF-CERTIFICATION:

Nr. OF T/O and LDN last 3 months ☐

Nr. OF IFR APP. last 6 months ☐

Nr. OF Cat. II APP. last 6 months ☐

Airman signature ________

SPECIFIC ITEMS: S-SATISFACTORY U-UNSATISFACTORY	SIMULAT S	SIMULAT U	LOCAL FLIGHT S	LOCAL FLIGHT U	LINE FLIGHT S	LINE FLIGHT U
TECHNICAL KNOWLEDGE					✓	
FLIGHT PREPARATION & FUEL PLANNING					✓	
AIRCRAFT AND COCKPIT PREPARATION					✓	
NORMAL ENGINE START PROCEDURE					✓	
ENGINE START MALFUNCTIONS					✓	
GROUND OPERATION AND TAXING					✓	
TAKE OFF PROCEDURES					✓	
REJECTED TAKE OFF					✓	
ENGINE FAILURE AT V V1						
ENGINE OUT APPROACH AND LANDING					✓	
ENGINE OUT GO AROUND						
ABNORMAL CONFIGURATION APP. &LAN.					✓	
ABNORMAL PROCEDURES					✓	
CONDITIONAL PROCEDURES					✓	
EMERGENCY PROCEDURES					✓	
EMERGENCY EVALUATION						
DEPARTURE AREA COORDINATION					✓	
USE OF NAVIGATION SYSTEM					✓	
USE OF RADIO-AIDS ROUTE DOCUM.						
RADIO COMMUNICATIONS					✓	
IN FLIGHT NORMAL PROCEDURES					✓	
ENGINES AND FUEL MANAGEMENT					✓	
DESCENT PLANNING					✓	
MINIMUM SAFE ALTITUDE AWARENESS					✓	
TERMINAL AREA COORDINATION					✓	
INSTRUMENT APPROACH					✓	
VISUAL APPROACH						
LANDING TECHNIQUE						
GO-AROUND TECHNIQUE						
TIME AND POSITIVENESS OF REACTION					✓	
CREW COORDINATION					✓	
SUPER VISION OF CABIN ACTIVITY						
PUPLIC RELATIONS AND INFORMATION						
ECONOMIC AND COMMERCIAL ASPECTS						

REMARKS Proficiency Check on ATR 42.320

SatisfaEtory

SATISFACTORY ☑

UNSATISFACTORT ☐

CHECK PILOT SIGNATURE: MAGDY Khaled No.724

شركة الطيران الدولية سكوربيو

[illegible handwriting and signatures] 12/12

17 June 2001

SCORPIO AVIATION

Flight Operation Department **Proficiency Check/Qualification Form**

PROFICIENCY CHECKLIST

REF.NO	DATE OF CHECK 17-06-01
NAME OF PILOT/F.E. KHEDR SAID	TYPE OF CHECK PROFICIENCY Check
EMPLOYED BY S.Corpio Aviation	INSPECTOR OR CHECK AIRMAN
BASE CAIRO	NAME ESSAM I. BRHEEM
TYPE AIRCRAFT ATR 42	FLIGHT TIME 1:40 hrs 1 mins 40
TYPE SIMULATION —	Simulator time — hrs — mins —

FLIGHT MANOEUVERS (S= Satisfactory , U = Unsatisfactory)

PILOT

	Air craft	Simu lator
PRELIGHT		
Equipment examination(oral or written)	S	
Preflight inspection	S	
Taxiing	S	
Powerplant Checks	S	
TAKE- OFFS		
Normal	S	
Instrument	S	
Cross - Wind	S	
With simslated powerplant failure	S	
Rejected take- off	S	
INSTRUMENT PROCEDURES		
Area departure	S	
Holding	S	
Area Arrival	S	
H.S approaches	S	
Other instrument approaches	S	
Circling approaches	S	
Missed approaches	S	
IN- FLIGHT MANOEUVERS	S	
Steep turns	S	
Approaches to stalls	S	
Specific flight characteristics	S	
Powerplant failure	S	
LANDINGS		
Normal	S	
From an H.S	S	
Cross - wind	S	
With simulated powerplant (s) failure	S	
Rejected landing		
From circuling approach	S	
Normal and abnormal procedures	S	
Emergency procedures	S	
Judgement	S	

FLIGHT ENGINEER

ITEM	S	U
Equipment exam (oral or written)		
Preflight check of aircraft		
Computation of fuel load and fuel loading procedure		
Completion of company approved forms		
Starting taxi and run up		
Powerplant control		
Cruise control and computations		
Aircrft/powerplant operation analysis		
Fuel system management		
Aircondition and pressurization control		
Electricl system operation		
Powerplant fire control		
Emergency gear and flap extension		
Heater fire and cargo compartment fire		
Smoke evacuation		
Emergency depressurization		
Fuel dumping procedure		
Powerplant shutdown and restart		
De- icing and anti- icing		
Location and use of emergency equipment		
Emergencies - Hydraulic pressurization, etc.		
Crew co- ordination and monitoring		

Remarks :

PRoficiENcy Check

Satisfactory ✓

INSPECTOR OR CHECK AIRMAN SIGNATURE

ESSAM IBRHEEM 17 2001

lic 655

SCORPIO AVIATION

Flight Operation Department **Proficiency Check/Qualification Form**

PROFICIENCY CHECKLIST

REF.NO....................................
NAME OF PILOT/F.E. KHEDR ABDALL
EMPLOYED BY... SCORPIO AVIATION
BASE....................................
TYPE AIRCRAFT........ ATR 42
TYPE SIMULATION....................................

DATE OF CHECK.... 12-12-2001
TYPE OF CHECK.................... PROFICIENCY CHECK
INSPECTOR OR CHECK AIRMAN
NAME........ MAGDY KHALED
FLIGHT TIME... 1.20 ...hrs... 1 ...mins... 20
Simulator time.......... hrs..... mins.....

FLIGHT MANOEUVERS (S= Satisfactory , U = Unsatisfactory)

PILOT	Air craft	Simu lator
LIGHT		
uipment examination(oral or written)	S	
flight inspection	S	
xiing	S	
werplant Checks	S	
AKE- OFFS	S	
ormal	S	
nstrument	S	
ross - Wind	S	
With simslated powerplant failure	S	
elected take- off	S	
NSTRUMENT PROCEDURES		
Area departure	S	
Holding	S	
Area Arrival	S	
H.S approaches	S	
Other instrument approaches	S	
Circling approaches	S	
Missed approaches	S	
IN- FLIGHT MANOEUVERS		
Steep tums	S	
Approaches to stalls	S	
Specific flight characteristics	S	
Powerplant failure	S	
ANDINGS		
ormal	S	
rom an H.S	S	
ross - wind	S	
With simulated powerplant (s) failure	S	
elected landing	S	
rom circuling approach	S	
ormal and abnormal procedures	S	
mergency procedures	S	
udgement	S	

FLIGHT ENGINEER ITEM	S	U
Equipment exam (oral or written)		
Preflight check of aircraft		
Computation of fuel load and fuel loading procedure		
Completion of company approved forms		
Starting taxi and run up		
Powerplant control		
Cruise control and computations		
Aircrft/powerplant operation analysis		
Fuel system management		
Aircondition and pressurization control		
Electricl system operation		
Powerplant fire control		
Emergency gear and flap extension		
Heater fire and cargo compartment fire		
Smoke evacuation		
Emergency depressurization		
Fuel dumping procedure		
Powerplant shutdown and restart		
De- icing and anti- icing		
Location and use of emergency equipment		
Emergencies - Hydraulic pressurization, etc.		
Crew co- ordination and monitoring		

Remarks :

PROFICIENCY CHECK
ON ATR 42-320
SATISFACTORY

INSPECTOR OR CHECK AIRMAN SIGNATURE

MAGDY KHALED
NO 724

Fixed Base Simulator Training:

(14)

FLASH

TRAINING RECORD FBS

LESSON 1

NAME: KHEDR ABDALAA

CREW POSITION: CAPTAIN

A/C TYPE: B 737-300/400/500

BRIFING		**Cruse**	
NORMAL PROCEDURES	S / US	Normal procedures	S / US
PREFLIGHT		**Descent & Approach**	
Practice AFDS preflight	S / US	Normal procedures	S / US
Practice FMC/CDU preflight	S / US		
Practice IRS Full alignment	S / US		
ENGIN START		**Landing**	
Normal procedures	S / US	Normal procedures	S / US
Taxi-out & takeoff		**Taxi - in & park**	
Normal procedures	S / US	Normal procedures	S / US
Climb			
Normal procedures	S / US		

REMARKS:

CAPTAIN KHEDR NEEDS TO IMPROVE

COCKPIT PEREPERATION

(NORMAL PROCEDURES)

INSTRUCTOR NAME: IHAB EL SONBATY

INSTRUCTOR SIGNATURE:

DATE: 28-04-03

TRENIY SIGNATURE:

OPERATIONS

TRAINING MANUAL

TRAINING RECORD FBS

LESSON 2

NAME: KHEDR ABDALAA

CREW POSITION: CAPTAIN

A/C TYPE: B 737-300/400/500

BRIFING		**Cruse**	
NORMAL PROCEDURES	S / US	Normal procedures	S / US
Supplementary Normal procedures			
FM alerting &advisory messages		**Descent & Approach**	
MCP controls and FMA		Normal procedures	S / US
FMC LNAV operation			
PREFLIGHT		**Landing**	
Normal procedures	S / US	Normal procedures	S / US
Supplementary Normal procedures	S / US		
ENGINE START		**Taxi - in & park**	
Normal procedures	S / US	Normal procedures	S / US
Taxi-out & takeoff			
Normal procedures	S / US		
Climb			
Normal procedures	S / US		
Demonstration flight	S / US		

REMARKS: PROGRESSING BUT STILL NEEDS TO IMPROVE COCKPIT PREPERATION

INSTRUCTOR NAME: IHAB EL SONBATY	INSTRUCTOR SIGNATURE:
DATE: 29-04-03	TRENIY SIGNATURE:

TRAINING MANUAL

FLASH

TRAINING RECORD FBS

LESSON 3

ME: KHEDR ABDALAB	CREW POSITION: CAPTAIN A/C TYPE: B 737-300/400/500
IFING IC LNAV OPERATION S / US	**Cruse** Normal procedures S / US
FLIGHT mal procedures S / US plementary Normal procedures S / US	**Descent & Approach** Normal procedures S / US MISSED APPROACH S / US
GIN START n-Normal procedures S / US	**Landing** Normal procedures S / US MISSED APPROACH S / US
xi-out & takeoff IC LNAV & VNAV OPERATION S / US	**Taxi - in & park** Normal procedures S / US Supplementary normal procedures S / US
imb rmal procedures S / US	

REMARKS: PROGRESSING.

INSTRUCTOR NAME: IHAB EL SONBATY	INSTRUCTOR SIGNATURE:
DATE: 30 - 04 - 03	TRENIY SIGNATURE:

OPERATIONS

TRAINING MANUAL

TRAINING RECORD FBS

LESSON 4

AME: KHEDR ABDALAA	CREW POSITION: CAPTAIN A/C TYPE: B 737-300/400/500

RIFING		**Cruse**	
IORMAL PROCEDURES	S / US	Normal procedures	S / US
		Fix position	S / US
Non-normal procedures	S / US	Fix position & abeam	S / US
eview system & FMC / CDU	S / US		
		Descent & Approach	
REFLIGHT		Normal procedures	S / US
		Holding	S / US
ormal procedures	S / US		
		Landing	
NGI TART		Normal procedures	S / US
		Missed approach procedures	S / US
Iormal procedures	S / US	Non - normal procedures	S / US
Ion-normal procedures	S / US		
		Taxi - in & park	
Taxi-out & takeoff		Normal procedures	S / US
Iormal procedures	S / US	Non-normal procedures	S / US
Climb			
Normal procedures	S / US		
Runaway stab. (demo)	S / US		
W/ W fire (demo)	S / US		

REM RKS: GOOD PROGRESS
REDY FOR FULL FLIGHT
SIMULATOR

INSTRUCTOR NAME: IHAB EL SONBATY	INSTRUCTOR SIGNATURE:
DATE: 1-05-03	TRENIY SIGNATURE:

TRAINING MANUAL

Full Flight Simulator Training:

(15)

TRAINING RECORD FFS — LESSON-1

NAME KHEDR ABDALAA	CREW POSITION: CAPTAIN / F/O
AIRCRAFT TYPE BOIEN 737-300/400/500	DATE OF COPELETION 03-05-03

Briefing		**Cruise 1.**	
Training plan		Normal procedures	S / US
Operation philosophy	S / US		
Preflight		**Descent & approach**	
Normal procedures	S / US	Normal procedures	S / US
Supplementary normal procedures	S / US		
Engine start		**Landing**	
Normal procedures	S / US	Normal procedures	S / US
Additional training item	S / US		
Taxi-out & Takeoff		**Taxi -in & park**	
Normal procedures	S / US	Normal procedures	S / US
Climb			
Normal procedures	S / US		
Demonstration flight	S / US		

REMARKES:

CAPTAIN KHEDR

NEEDS TO MOR- EFFORT

TO REHMEPER RECALL ITEM'S

INSTRUCTOR NAME: EHAB EL SONRATY	SIGNATURE:

TRAINING MANUAL

TRAINING RECORD FFS

LESSON-2

NAME KHEDR ABDALAA	CREW POSITION:CAPTAIN ~~LFO~~
AIRCRAFT TYPE BOIEN 737-300/400/500	DATE OF COPELETION 4-05-03

			2.
Briefing		**Cruise , DESCENT**	
Set up MCP , CDU		Hydraulic system A loss	S / US
Engine inoperative characteristics	S / US		
Preflight		**Approach , Landing**	
Set up MCP , CDU	S / US	One engine inop manual, F/D ILS Approach	S / US
After start checklist	S / US	One engine inop visual traffic Patterns full stop.	S / US
Engine start		Wind shear training	
Normal procedures	S / US	Wind shear flight path control hold	S / US
Taxi-out & Takeoff		A/P , A/T , F/D VOR approach Full stop landing	S / US
Rejected T / O	S / US	**Taxi -in & park**	
T/O engine failure after V 11	S / US	Normal procedures	S / US
T/O engine failure after V 1	S / US		
Wind shear near VR	S / US		
Climb			
Normal procedures	S / US		

REMARKES:

PROGRESSING.

HE is TENSS NEED'S

To RELAX

INSTRUCTOR NAME: ZHAR EL SONBATY	SIGNATURE:

TRAINING MANUAL

TRAINING RECORD FFS

LESSON 3 1

NAME KHEDR ABDALAA	CREW POSITION: CAPTAIN / ~~F/O~~
AIRCRAFT TYPE BOIEN 737-300/400/500	DATE OF COPELETION 6-05-03

Briefing Review item in phase of flight S / ~~US~~ **Preflight** Normal procedures S / ~~US~~ **Engine start** Aborted engine starts S / ~~US~~ **Taxi-out & Takeoff** Normal procedures S / ~~US~~ Rejected T/O S / ~~US~~ T/O engine failure after V 1 S / ~~US~~ Normal T/O S / ~~US~~ **Climb** Wheel well fire S / ~~US~~ Runaway stabilizer Buss off Loss of both engine driven gen.	**Cruise , DESCENT** Rapid depressurization S / ~~US~~ Emergency descent S / ~~US~~ Steep turns. S / ~~US~~ Approach to stall recovery S / ~~US~~ **Approach , Landing** One engine inop A/P , F/D VOR Approach , circle to land , full S / ~~US~~ One engine inop . ILS approach Missed approach S / ~~US~~ Hold S / ~~US~~ **Taxi -in & park** Normal procedures S / ~~US~~

REMARKES:

STILL PROGRESSING.

STILL NEED'S TO BE

RELAX.

INSTRUCTOR NAME: IHAB EL SONBATY	SIGNATURE:

OPERATIONS TRAINING MANUAL

TRAINING RECORD FFS

LESSON 4 | 1

NAME KHEDR ABDALAA	CREW POSITION: CAPTAIN / ~~F/O~~
AIRCRAFT TYPE BOIEN 737-300/400/500	DATE OF COPELETION 8-05-03

Briefing		Cruise	
Full auto flight for precision app	S / ~~US~~	Steep turns.	S / ~~US~~
Review item in phase of light		Approach to stall recovery	S / ~~US~~
Preflight		**Descent,**	
Normal procedures	S / ~~US~~	Normal procedures	S / ~~US~~
Reduced thrust computation	S / ~~US~~	Econ path descent	S / ~~US~~
		Arrival procedures	S / ~~US~~
Engine start		**Approach , Landing**	
Aborted engine starts	S / ~~US~~	Normal procedures	
Taxi-out & Takeoff		A / P , A/T , (no F/D) AUTOLAND	
Normal procedures	S / ~~US~~	ILS approach	S / ~~US~~
N0 autopilot & F/D	S / ~~US~~	Touch & go landing	
Reduced thrust takeoff	S / ~~US~~	Row data F/D ILS , T & GO.	S / ~~US~~
Flap retraction	S / ~~US~~	A/P , A/T , F/D VOR approach	S / ~~US~~
		Touch & go landing	S / ~~US~~
Climb		**Taxi -in & park**	
Normal procedures	S / ~~US~~	Normal procedures	S / ~~US~~
Max angle climb			
Econ climb			

REMARKES:

STILL IMPROVING.

, PUT HE NEED'S TO

IMPROVE SINGLE ENG

HANDLING.

INSTRUCTOR NAME: KHAIR ELSONBATY	SIGNATURE: [signature]

TRAINING MANUAL

OPERATIONS

m. mona
447
8.5.03

TRAINING RECORD FFS

LESSON 5

NAME KHEDR ABDALAA	CREW POSITION: CAPTAIN / ~~F/O~~
AIRCRAFT TYPE BOIEN 737-300/400/500	DATE OF COPELETION 09-05-03

Briefing
Set up MCP , CDU S / ~~US~~
Engine inoperative flight characteristic S / ~~US~~

Preflight
Set up MCP , CDU S / ~~US~~
After start checklist S / ~~US~~

Engine start
Normal procedures S / ~~US~~

Taxi-out & Takeoff
T/O engine failure after V1 (1) S / ~~US~~
T /O engine failure after V1(2) S / ~~US~~
T/O engine failure after V1 (3) S / ~~US~~

Climb
Normal procedures S / ~~US~~

Econ climb

Cruise
Steep turns. S / ~~US~~
Approach to stall recovery S / ~~US~~

Descent,
Normal procedures S / ~~US~~
Econ path descent S / ~~US~~
Arrival procedures S / ~~US~~

Approach , Landing
One engine inop A/P , F/D NO
A/T ILS approach S / ~~US~~
Missed approach S / ~~US~~
One engine inop. Manual. F/D
NOA/T ILS approach S / ~~US~~
Full stop landing S / ~~US~~
Normal T/O .manual Row data
F/D ILS, T&GO S / ~~US~~
Loss of both engine driven gen S / ~~US~~
A/P , A/T , F/D VOR approach S / ~~US~~
Circle to land rejected landing S / ~~US~~
A/P , A/T , F/D ILS approach S / ~~US~~
VISUAL TRAFFIC PATTERNS S / ~~US~~

Taxi -in & park
Normal procedures S / ~~US~~

REMARKES:

PROGRESSING.

INSTRUCTOR NAME: IHAB EL SONBATY	SIGNATURE: [signature]

TRAINING MANUAL 2

TRAINING RECORD FFS

LESSON 6

NAME KHEDR ABDALAA	CREW POSITION: CAPTAIN / ~~F/O~~
AIRCRAFT TYPE BOIEN 737-300/400/500	DATE OF COPELETION 10-05-03

Briefing	
Set up MCP , CDU	S / ~~US~~
Engine inoperative flight characteristic	S / ~~US~~
Preflight	
Set up MCP , CDU	S / ~~US~~
After start checklist	S / ~~US~~
Engine start	
Normal procedures	S / ~~US~~
Taxi-out & Takeoff	
Rejected T/O	
T/O engine failure after VII	S / ~~US~~
T /O engine failure after V1	S / ~~US~~
Wind shear near VR	S / ~~US~~
Climb	
Normal procedures	S / ~~US~~
Cruise&Descent	
Hydraulic system A loss	S / ~~US~~
Approach , Landing	
One engine inop manual , F/D ILS approach	S / ~~US~~
One engine inop. Visual traffic Pattern full stop .	S / ~~US~~
One engine inop , landing	S / ~~US~~
Wind shear training	S / ~~US~~
Wind shear flight path control hold +	S / ~~US~~
A/P , A/T , F/D VOR APPROACH Full stop landing	S / ~~US~~
Taxi -in & park	
Normal procedures	S / ~~US~~

REMARKES:

GOOD PROGRESS

INSTRUCTOR NAME: IHAB EL SONRATY	SIGNATURE: [signature]

TRAINING MANUAL

M. morad 442 10.3.05

TRAINING RECORD FFS

LESSON 7 1

NAME KHEDR ABDALAA	CREW POSITION: CAPTAIN / ~~F/O~~
AIRCRAFT TYPE BOIEN 737-300/400/500	DATE OF COPELETION 11-05-03

Briefing		**Cruise&Descent**	
Review item in phase of flight	S / ~~US~~	Hydraulic system A loss	S / ~~US~~
Set up MCP , CDU	S / ~~US~~		
		Approach , Landing	
		A/P , A/T ,no F/D VOR approach	
Preflight		Full stop landing	S / ~~US~~
Set up MCP , CDU	S / ~~US~~	HOLD	S / ~~US~~
After start checklist	S / ~~US~~	Jammed stabilizer visual traffic	
		Pattern full stop landing	S / ~~US~~
Engine start		ASS . FLAPS	S / ~~US~~
FAST START	S / ~~US~~	Hydrolic system A&B FAILURE	
		MANUAL REVERGIN	S / ~~US~~
Taxi-out & Takeoff		Visual traffic patern all flap up	S / ~~US~~
Normal procedures		**Taxi -in & park**	
Normal T/O	S / ~~US~~	APU fire	S / ~~US~~
		Engine fire on 400	S / ~~US~~
		PASSENGER EVACUATION	S / ~~US~~
Climb			
Normal procedures	S / ~~US~~		

REMARKES:

GOOD PROGRESS

REDY FOR CHECK

RID

INSTRUCTOR NAME: IHAB EL SONBATY | SIGNATURE:

FLASH AIRLINES
OPERATIONS
TRAINING MANUAL

M. Morad
442
11.5.03

TRAINING RECORD FFS LESSON 8

NAME KHEIDR ABDALAA	CREW POSITION: CAPTAIN / ~~F/O~~
AIRCRAFT TYPE BOIEN 737-300/400/500	DATE OF COPELETION 12-05-03

Briefing		**Cruise&Descent**	
Review item in phase of flight	S / ~~US~~	Steep turns	S / ~~US~~
		Approach to stall recovery	S / ~~US~~
		Holding	S / ~~US~~
Preflight		Engine fire	S / ~~US~~
Normal procedures	S / ~~US~~	Wing / body over heat	S / ~~US~~
		Bleed trip of	S / ~~US~~
		Rapid depressurization	S / ~~US~~
Engine start		Emergency descent	S / ~~US~~
Normal procedures	S / ~~US~~		
		Approach , Landing	
Taxi-out & Takeoff		One engine inop F/D , VOR	
...jected T/O		Approach,circul to land	S / ~~US~~
T. engine failure after VI	S / ~~US~~	V1 cut one engin inop . ILS approach	
Normal T/O	S / ~~US~~	Missed approach.	S / ~~US~~
Climb		**Taxi -in & park**	
Wheel well fire	S / ~~US~~	Normal procedures	S / ~~US~~
Runaway stabilizer	S / ~~US~~		

REMARKES:

HE HAS PASSED
HES CHECK
SATESFACTORY
REDY FOR BASE TRAINING.

INSTRUCTOR NAME: THAIR EL SONBATY	SIGNATURE:

1

... AIRLINES
OPERATIONS
TRAINING MANUAL

M. Morad
442
12.05.03

Proficiency Check:

(9)

FLASH AIRLINES

PROFICINCY CHECK FORM

Name KHEDR ABDALAA	ID No. 106	CAPTAIN-PIC
Simulator Owned by ROYAL AIR MAROC	Location MAROC	Simulator Level
Flight Training Time 04:00 | Time pf | Time PNF	Date 12-05-0	O

This form is based on ECARS 121 Appendix F.

Write (S or U) indicating Satisfactory or Unsatisfactory of each item.

1. ORAL TEST (operational oriented	
• Airplane Systems	S
• Airplane performance	S
• Normal and non-normal procedures**	S
• Appropriate Provisions of AFM	S
• Company flight operations manual	S
• Use of checklists	S
2. FLIGHT CHECK	
PRE FLIGHT AND TAXING	
• Pre flight and cockpit preparation	S
• Engine start	S
• Taxing	S
TAKE-OFFS	
• Normal	S
• Instrument(100' ceiling or 400 m RVR)	S
• Cross wind	S
• With simulated Engine failure	S
• Rejected	S
INSTRUMENT PROCEDURES	
• Area departure	S
• Area arrival and Holding	S
• ILS approach (Coupled)	S
• Second ILS approach (Manual)	S
• Missed approach	S
• Non-precision approach	S
• Second Non-precision approach	S
• Circling approach	S
• Engine failure missed approach	S

2. FLIGHT CHECK(cont'd)	
INFLIGHT MANOUVERS	
• Steep turns (Min. 180° -Max. 360°)1	S
• Approach to stalls (Two may be waived)2	S
Take-off configuration	
Clean configuration	
Landing configuration	S
Note : one stall must be performed with bank angle 25°	
LANDINGS	
• Normal landing	S
• From ILS	S
• Cross wind	S
• Visual approach	S
• With 50% power plant failure	S
(2 Engines on one side for 4 Engines airplanes)	
• From circling approach	
• Rejected at 50 FT.	
NORMAL AND NON-NORMAL PROCEDURES	
• Anti icing and de-icing	S
• Hydraulics	S
• Electrical	S
• Pneumatic	S
• Gears	S
• Flaps	S
• Flight Controls	S
• Nav/comm. Equipment	S
EMERGENCY PROCEDURES	
• Inflight fire and smoke control	S
• Decompression	S
• Emergency descent	S
Emergency Landing(partial ldg,no flaps,etc.)	S
• Emergency Evacuation	S

OTHER EMERGENCY PROCEDURES RELATED TO SPECIFIC TYPE

* Non-Normal procedures : are Abnormal, Additional, Alternate and Emergency Procedures.
** For Captains only.
*** The applicant must demonstrate the proper use, and apply the correct procedures, of as many of the listed items
1 in direction may be waived 2. two may be waived

OPERATIONS

PROFICIENCY CHECK FORM (cont'd)

RHS TRAINING FOR INSTRUCTORS		RHS TRAINING FOR CAPTAINS	
• Error recovery		• Normal take Off	S
Lateral offsets		• Manual ILS (CAT I minima)	S
Vertical Offsets		• Non-Precision approach and landing	S
• Minimum 3 Touch and Go		• Simulated Engine failure – Take off	S
		• One Engine Out-Approach and landing	S

EVALUATION

KNOWLEDGE	US	S
FLIGHT OPERATION MANUAL (FOM)and Relevant ECARs		
A/C Systems, Limitations and Performance		✓
Normal, Non-Normal Procedures*		
PHARAOH AIR Operations Specifications		
FLYING SKILLS	**US**	**S**
Compliance with SOP (Flight operations Manual & FCOM)		
Attitude flying and correct trim technique		
Use of FMC, PMS, FMGS, etc...		✓
Aeroplane configuration, Attitude & Speed control		
Flying accuracy & Smoothness		
MANAGMENT	**US**	**S**
Compliance with FLIGHT OPERATION MANUAL (FOM)		
Planning ahead and use of FMC, PMS, FMGS, etc...		
Crew co-ordination and use of available resources		✓
Adherence to clearances and safe heights		
Situational awareness		
Cabin crew safety briefing		

COMMENTS:

GOOD HANDLING
GOOD STANDRIZATION

Satisfactory and Ready for Base Training

Base Month (through Last day of):	Licence Valid (through Last day of):		Next Event
Month Year	Month	Year	
Date of last 3 take-offs & Landings**:	1. / /	2. / /	3. / /
Name*** CP IP	ID No.		Check Airman's Signature
IHAB ELSONBATY	100		
Training Result Previous: US Current: S	Trainee's Signature		Training Manager

Base Flight Training:

BASE FLIGHT TRAINING FORM

Name	ID No.	Crew position
KHEDR ABDALAA	106	CAPTAIN

A/C Type	A/C Registration	Sim. Level (ZFT)	Location	Date
B 737/500	SIMULATOR	C or D	MAROC	13-05-05

R/W	GA	TG	FS	Weather
				CAVOK
Flight type		Hours 02	Minutes 00	

Flight Maneuvers

	Sim	A/C
Exterior Inspection	S	
Cockpit preparation	S	
Engines start	S	
Taxi	S	
Flex/reduced Thrust Take-Off	S	
ILS pattern	S	
Automatic approach	S	

	Sim	A/C
Visual approach (ILS supported)-T/Go	S	
Visual approach (No ILS)-T/Go	S	
Visual approach – (ILS supported) -T/Go	S	
Visual approach-No ILS-No/ATH-T/Go	S	
Simulated engine failure after Take-Off	S	
One Engine out visual approach	S	
Engine(s) out landing	S	

Remarks

HE HAS PERFORMED
REJECTED LANDING AT 50'
WITH ONE ENGIN INOP
Satisfactory, Ready for Line Training 20 Sector
with not less than 40 H and up to proficiency

This to certify that:
CAPT / Ed.. is ready for A/C type rating
Base Check.

13.5.05

CP Name: IHAB ELSOMRATY	IP CP Signature
ID No. 106	Trainee's Signature
ECAA Notified / Inspector Name: M. MORAD	Training Manager

OPERATIONS

Company Oral Test

(12)

FLASH AIRLINES

COMPANY ORAL TEST

Name KHEDR ABDALAH	ID No. 106	Crew position CAPTAIN
A/C Type B 737-300/400/500	Date 02-05-03	Location MAROCO

The Company Oral Is Oriented to Check the outcoms of all the practical phases of the training program and the knowledge of the operational aspects of the aircraft systems. The trainee must demonstrate knowledge of, but not limited to the items listed below.

Enter : S Satisfactory U Unsatisfactory N/A Not Applicable

Aircraft Limitations	S	Non-Normal and Emergency Procedures	S
• All A/C systems limitation	S	• Ability to perform or state immediate action items	S
• Weight limitation	S	• Ability to locate Non-Normal Check list	S
• Performance	S	• Communication Between Cockpit and Cabin	S
• Knowledge of, and ability to compute		• Emergency Evacuation Procedures	S
-Takeoff data card	S	• Prepared / Unprepared emergency	S
-Landing data card	S	**Aircraft systems**	
-Cruise performance	S	• Electrical – Hydraulic – Pneumatic – Fuel	S
• Effect of MEL on Performance	S	• Powerplant EFIS Air conditioning Pressurisation	S
• High speed Vs low speed Phases of takeoff	S	• Autopilot, F/D– FMS, FMGS Navigation systems	S
• Wet and Contaminated Run Ways	S	• Flight controls-Flight instruments-Landing gears	S
• Flight Level selection, Specific Range and OPT.ALT	S	**Flight operation Manual**	S
• Step Climb and Fuel Saving	S	• Weather minima Limitation(operations Manual)	S
• Cruise mach No. and manouvre capability	S	• Fuel policy	S
Normal Procedures	S	• Windshear, thunderstorms and turbulence	S
• Flight Crew operations Manual (FCOM) SOP	S	• Fueling with PAX on board	S
• Flight operations Manual (FCOM) SOP	S	• Dangerous goods	S
• Flight patterns	S	• Shoulder harness, seat belt policy and cockpit door	S
• Flight Control comm. Procedures (Stokholm radio)	S	• First officer T.O. and landing	S

Remarks

GOOD KNOLEDGE.

Instructor Name	Code#	Result	Instructor Signature
IHAB EL SONBATY	100	S	[signature]
	Average		Passing Grade 70%

Test Result S	Trainee Signature [signature]	Training Manager Signature [signature]

OPERATIONS

M. morad 442

CERTIFICATION ORAL

Crew position : ☑ Capt. ☐ F/O	☐ CPT ☐ CSS ☐ FBS
Name : KHEDR ABDALLAH	☑ Sim
Code No. : 106	A/C Type : B 737-300/400/500
Date : 12-05-03	Location : MAROC

The Certification Oral may be conducted at the end of CPT-CSS-FBS or before the Sim.Type Rating Check Ride.

The Certification Oral is oriented to the knowledge of the operational aspects of the systems. The trainee must demonstrate a knowledge of the items listed below :	NA	US (U)	S-	S (S)	S+
1. Knowledge of,and ability to compute : - Takeoff Data Card. - Landing Data Card. - Cruise Performance.		☐	☐	☑	☐
2. Ability to compute or validate weight and balance.		☐	☐	☑	☐
3. Preliminary Cockpit preparation : - Emergency equipment check - Cockpit safety check - APU start - Before start Cockpit preparation.		☐	☐	☑	☐
4. Knowledge of flight Engineer Station : N/A Sufficient for safe operation of airplane if the F/E is incapacitated or absent from the flight deck.	☐	☐	☐	☐	☐
5. Ability to perform or state immediate action items.		☐	☐	☑	☐
6. Knowledge of,and ability to,state operating limitations.		☐	☐	☑	☐
7. Knowledge of MEL.		☐	☐	☑	☐
8. Knowledge of the following aircraft systems : - Hydraulic - Pneumatic - Flight Instruments - Landing gears - EFIS,FMS,FMGS. - Fuel - Electrical - Powerplants - Flight controls - Autopilot, F/D - Navigation systems - Air conditioning and pressurization		☐	☐	☑	☐

Result :	US ☐	S- ☐	S ☑	S+ ☐	Trainee Signature :
Examiner Name : IHAB EL SANBATY					Examiner Signature :
Examiner Code : 106					GMFT :

Line Training:

(13)

FLASH AIRLINES

Ch.: 10

FORMS AND RECORDS

LINE TRAINING FORM (IOE)

Crew Position : CAPTAIN

Name : KHEDR ABDALAA

ID No. : 106

A/C Type : B 73-3

Date : 28-05-03

Date	Route	Time: Previous Today	Time: Total	Sectors: Previous Today	Sectors: Total
26-05-03	SSH - LXR	00:50	00:50	1	1
28-05-03	LXR - SSH - CAI	01:40	02:30	2	3
26-06-03	CAI - ABS - ASN	02:15	04:45	2	5
07-06-03	CAI - LXR	01:10	05:55	1	6
07-06-03	LXR - SSH	00:45	06:40	1	7
02-07-03	CAI - BUS	05:10	11:50	1	8

Date	Comments	Instructor Name	Signature
06-06-03	GOOD PROGRESS	IHAB EL SONBATY	[signature]
07-06-03	GOOD PROGRESS	IHAB EL SONBATY	[signature]
02-07-03	GOOD PROGRESS	IHAB EL SONBATY	[signature]

LINE TRAINING FORM (IOE)

Crew Position : CAPTAIN
Name KHEDR ABDALAA........ A/C Type :...B 737-3...
ID No. :......106...... Date :........

Date	Route	Time		Sectors	
		Previous	11:50	Previous	8
		Today	Total	Today	Total
02-07-03	BVA - CAI	04:35	16:25	1	9
03-07-03	CAI - HRG	01:10	17:35	1	10
04-07-03	HRG - WAW	04:25	22:00	1	11
04-07-03	WAW - HRG	04:20	26:20	1	12
05-07-03	HRG - CAI	00:55	27:15	1	13
09-07-03	CAI - BVA	04:30	32:45	1	14

Date	Comments	Instructor Name	Signature
04-07-03	PROGRESSING BUT STILL NEED TO IMPROVE P.N.F. DUTIES.	IHAB EL SONBATY	[signature]
09-07-03	GOOD PROGRESS BUT STILL HE HAS ALOT TO DO AT HOME	IHAB EL SONBATY	[signature]

LINE TRAINING FORM (IOE) (cont'd)

Date	Route	Time		Sectors	
		Previous	32:45	Previous	14
		Today	Total	Today	Total
09-7-03	BVA - CAI	04:00	36:45	1	15
10-07-03	SAW - CAP	02:05	38:50	1	16
16-07-03	CAI - SSH	01:00	39:50	1	17
17-07-03	SSH - CAI	01:00	40:50	1	18
23-07-03	SSH - LXR	00:45	41:35	1	19
23-07-03	LXR - SSH	00:45	42:20	1	20

Date	Comments	Instructor Name	Signature
10-07-03	GOOD PROGRESS.	IHAB EL SONBATY	[signature]
17-07-03	STILL PROGRESSING	IHAB EL SONBATY	[signature]
23-07/03	GOOD PROGRESS RGDY FOR CHECK RID	IHAB EL SONBATY	[signature]

Trainee's Signature :....................................	Training Manager: [signature]

Note : 2 Sectors must be conducted from right hand seat (RHS) for Captains (one sector PF and one Sector PNF)

Line Check:

(11)

FLASH AIRLINES

LINE CHECK FORM

THE FOLLOWING ITEMS MUST BE COVERD DURING LINE CHECK

( ) Indicates that item has been checked

1. FLIGHT CHCK	
PRE FLIGHT	
Dispatch	
• Reporting for duty	✓
• Computerised and ATC flight plan	✓
• Weather briefing, T.O. and landing min.	✓
• Alternate planing Wx min	✓
• NAT. Operations Specifications*	✓
• NOTAM briefing and "B" snags	✓
• Cabin crew safety briefing	✓
Cockpit	
• Technical log and B snags	✓
• MEL-CDL and the effect on T.O/Landing	✓
• Performance	✓
• Aircraft library and documentation	✓
• Cockpit perparation-FMS/FMGS/PMS	✓
• TAKE OFF BRIEFING	✓
• Load, trim sheet and NOTOC	✓
• Cold Wx operation* Hot Wx operation	✓
• T.O Performance, T.O speeds and C.G	✓
• Engine start procedures	✓
TAXI, TAKE-OFF AND INITIAL CLIMB	
• Push back procedures	✓
• Taxi speed and braking technique	✓
• T.O roll and V1 concept	✓
• Noise abatement procedure and initial climb	✓
• Best angle, best rate and turbulence speeds	✓
• Area departure, SID and holding	✓
CRUISE	
• Flight level selection, specific range and OPT.ALT	✓
• Step climb and fuel saving	✓
• Cruise match no. and manoeuver capability	✓
• Use of weather radar and weather avoidance	✓
• MNPS and MORA (Special routes)	✓
• Drift down procedures	✓
• Enroute alternate and Emergency Proc. (NAT)*	✓
• Alternate Weather minima	✓
• Minimum fuel for diversion(Alternate+Holding)	✓
• Communication failure procedures	✓
• Flight control comm. Procedures (Stockholm radio)	✓

DESCENT AND APPROACH	
ATIS, SNOWTAM and braking action*	✓
• Descent planing	✓
• Approach briefing, stars and	✓
• Approaches: ☑ Precision ☑ N.precision ☑ Visual	✓
• Destination and alternate weather minima	
LANDING AND TAXI IN	
• Landing technique	✓
• Use of auto breaks and reverse trust	✓
• After landing and taxi in procedure	✓
2.KNOWLEDGE CHECK	
A) Flight operation manual	
• IOE, Initial release, USV and Command Responsibility	✓
• Crew luggage content	✓
• The difference between planing and actual Weather min. and Wx min. for new captain.	✓
• Fuel policy	✓
• Windshear, thunderstorms and turbulence	✓
• Fueling with PAX on board	✓
• Dangerous goods	✓
• Shoulder harness, seat belt policy and cockpit door	✓
• First officer T.O. and landing	✓
• ECARS 121	✓
• Flight operations manuals & answers	✓
B) Aircraft performance and technical knowledge	
• Operational system knowledge	✓
• T.O performance limits	✓
• Wet and contaminated runways	✓
• Reduced (flex) thrust	✓
• Approach and landing climb performance	✓
• Normal, non normal and emergency procedure	✓
• Flight patterns	✓
c) Safety procedure	
• Communication between cockpit and cabin	✓
• Emergency evaluation procedure	✓
• Prepared/unprepared emergency	✓
• Bomb on board and least risk location	✓
• Crew in INCAPACITATION	✓

* if applicable

LINE CHECK FORM (cont'd)

Crew position : ☑ Capt. ☐ F/O ☐ F/E Name : KHIDR ABDALLAH Code No......126..............		A/c Type : BOEING 737-300
☑ Final line check	☐ Recurrent Line Check	☐ Route check*
Route	No. of sectors	Flight Time
SSH - LXR - LXR - SSH	2	01:30

PERFORMANCE EVALUATION		
KNOWLEDGE	US	S
A/C Systems, Limitations and Performance		✓
Normal Procedures		✓
Operation manual and ECARS		✓
Non-Normal Procedures*		✓
FLYING SKILLS	US	S
Attitude flying and correct trim technique		✓
Use of FMC, PMS, FMGS, etc…		✓
Complying with SOP (Normal, Abnormal & Emerg.)		✓
Aeroplane configuration, Attitude & Speed control		✓
Flying accuracy & Smoothness		✓
MANAGMENT	US	S
Planning ahead and use of FMC, PMS, FMGS, etc…		✓
Crew co-ordination and use of available resources		✓
Adherence to clearances and safe heights		✓
Situational awareness		✓

COMMENTS :

GOOD STANDARD

SATISFACTORY

he can proced as capt in command Y. ZAKI
23/07/03

Check Air man Name: ..IHAB EL SADATY ID No. :..........100............... Check Result : Satisfactory ✓ Unsatisfactory	Check Airman's signature: .... Trainee's signature .... Training Manager: ....

* Route qualification is mandatory before conducting a route check.
** Non-Normal Procedure: Are Abnormal, Additional, Alternate and Emergency Procedures.

OPERATIONS

Recurrent Training:

PILOT'S RECURRENT TRAINING FORM

Name *KHEDR ABDALLA*		ID No.	*BOIENG 737-300/400*
Simulator Owned by *RoyAL AiR MARoCo*		Location *CAZA*	Simulator Level
Flight Training Time *04:00*	Time PF *02* / Time PNF *02*	Date *16-12-03*	*D*

PART ONE : GROUND TRAINING SEGMENT

[ ] Indicates that item has been covered.

a) OPEN BOOK QUIZ (Q&A)*		b) Briefings	
• Airplane Systems	✓	• Use of chklists	✓
• Airplane performance	✓	• Review of normal training Scenario:	✓
• Normal and non-normal procedures**	✓	-Normal and Non-normal procedures**	✓
• Appropriate Provisions of AFM	✓	-LOFT	✓
• Company flight operations and route	✓	-Windshear	✓
• PharaohAir Operation Specifications	✓	• CRM	✓

PART TWO : FLIGHT TRAINING SEGMENT

Scenario :

PRE FLIGHT AND TAXING		LANDINGS	
• Pre flight and cockpit preparation	✓	• Normal landing	✓
• Engine start	✓	• From ILS	✓
• Taxing	✓	• Cross wind	✓
TAKE-OFFS		• Visual approach	✓
• Normal	✓	• With 50% power plant failure	✓
• Instrument(100' ceiling)	✓	• (2 Engines on one side for 4 Engines airplanes)	
• Cross wind	✓	• From circling approach	✓
• With simulated engine failure	✓	• In Windshear conditions	✓
• Rejected	✓	• Rejected at 50 FT.	✓
• Windshear during take-off	✓	**NORMAL AND NON-NORMAL PROCEDURES**	
INSTRUMENT PROCEDURES		• Anti icing and de-icing	✓
• Area departure	✓	• Hydraulics	✓
• Area arrival and Holding	✓	• Electrical	✓
• ILS approach (Coupled)	✓	• Pneumatic	✓
• Second ILS approach (Manual)	✓	• Gears	✓
• Missed approach	✓	• Flaps	✓
• Non-precision approach	✓	• Flight Controls	✓
• Second Non-precision approach	✓	• Nav/comm. Equipment	✓
• Circling approach	✓	**EMERGENCY PROCEDURES**	
• Engine failure missed approach	✓	• Inflight fire and smoke control	✓
INFLIGHT MANEUVERS		• Decompression	✓
• Steep turns (Min. 180° -Max. 360°)	✓	• Emergency descent	✓
• Approach to stalls	✓	• Emergency Landing(partial l/g,no flaps,etc.)	✓
• Specific flight characteristics	✓	• Emergency Evacuation	✓

OTHER EMERGENCY PROCEDURES

TCAS RESEPCOTION	✓		
RVSM	✓		

* Q&A :question and answers.
** Non-Normal procedures : are Abnormal, Additional, Alternate and Emergency Procedures.
*** For Captains only.

PILOT'S RECURRENT TRAINING FORM (cont'd)

RHS TRAINING FOR INSTRUCTORS		RHS TRAINING FOR CAPTAINS	
• Error recovery		• Normal take Off	
Lateral offsets		• Simulated Engine failure – Take off	
Vertical Offsets		• One Engine Out-Approach and landing	
• Minimum 3 Touch and Go		• Minimum 3 Touch and Go's	

EVALUATION

KNOWLEDGE	US	S
FLIGHT OPERATION MANUAL (FOM)and Relevant ECARs		✓
A/C systems Limitations and Performance		✓
Normal Non-Normal Procedures*		✓
PHARAOH AIR Operations Specifications		✓
FLYING SKILLS	**US**	**S**
Compliance with SOP (Flight operations Manual & FCOM)		✓
Attitude flying and correct trim technique		✓
Use of FMC, PMS, FMGS, etc...		✓
Aeroplane configuration, Attitude &S speed control		✓
Flying accuracy & Smoothness		✓
MANAGMENT	**US**	**S**
Compliance with FLIGHT OPERATION MANUAL (FOM)		✓
Planning ahead and use of FMC, PMS, FMGS, etc...		✓
Crew coordination and use of available resources		✓
Adherence to clearances and safe heights		✓
Situational awareness		✓
Cabin crew safety briefing		✓

COMMENTS :

SATISFACTORY

Base Month (through Last day of) : Month Year	License Valid (through Last day of) : Month Year	Next Event: ☐ Proficiency check
Date of last 3 take-offs & Landings** :	1. / / 2. / /	3. / /
Name*** CP IP: IHAB EL SONBATY	ID No. 107	Check Airman's Signature
Training Result: Previous: US (S); Current: US (S)	Trainee's Signature	Safety & Training Manager

* Non-Normal procedures : are Abnormal, Additional, Alternate and Emergency Procedures.
** Trainee is responsible for the accuracy of this data, and he must sign the form.
*** CP: CheckAirman, IP :Instructor Pilot.

vii- Personal situation

The captain was married and had 3 children ages 29, 25 and 18 years. The eldest son is married and is doing post graduate studies in USA. The second son is an engineer. The youngest daughter is still studying in university.
The captain has no known problems of any kind. He is known to be devoted to his family. He did not suffer from any abnormal health or social problem.
(Refer also to page 72 of the Factual Report (Interviews regarding Captain Kheider Abdullah)

1.5.1.3. 72-hour history of the captain:

Refer to interviews on page 73 of the FR.
The captain and F/O left Cairo to SSH on January 1st, 2004 as passengers on Flash Airline flight departing Cairo at 15:00 GMT
No more factual information could be obtained regarding the 72-hour history.

1.5.1.4. Interviewing the individuals who trained and flew with the captain (including ground and simulator instructors)

Interview with Captain/ Essam Eldin Brahmin Chief Pilot and instructor ATR 42 Scorpio Airlines during the period of employment of Captain/ Khedr in this Airline.

- ***How well did you know Captain/ Khedr?***
  He was a colleague during work at the Egyptian Air force and when he joined Scorpio, we worked together as I was Chief Pilot. I was in charge of organizing his flying schedule and monitoring his standard through line checks.
  He was a well disciplined pilot, observed his flying schedule without any problems, was always careful to observe duty time limitation and rest periods, had good relations with his colleagues, was cheerful with his crew and always prepared his flight carefully.
  During line check he performed well. He was attentive to his work, communicated well with his crew and was not tense. His previous experience on military air transport made him comfortable in flying commercial air transport with relation to route experience and airway flying requirements.

- ***What routes were flown at this time?***
  Mainly domestic flights.

- ***Was Sharm El Sheikh one of your common destinations?***
  Yes.

- ***What was the common departure procedure Followed out of Sharm El Sheikh?***
  The standard procedure followed was depending on the runway in use a turn was initiated towards the sea while climbing in a wide pattern to cross the VOR 11000 Ft to proceed on the 306 Radial to Cairo.

- ***Did you as chief pilot and instructor see or have any report of any kind about Captain/ Khedr?***
  All comment and observations were good Captain and comfortable to work, always well prepared for his flight and kept his cockpit organized.

- ***Why did he leave Scorpio?***
  He left when the company stopped operations.

Interview with Captain/ Emad Sallam Instructor Pilot on C130
In the Egyptian Air force
At the time Captain/ Khedr started to fly in the military air transport.

- ***How well did you know Captain/ Khedr?***

  As a pilot in the Air force we were colleagues although he was more senior than I, when he moved from the fighter squadrons to the air transport and when assigned to the C 130 I was an instructor and when he was assigned to training flights under my command was very willing and had no attitude about my being instructor with less seniority, he was always eager to learn and very attentive in the cockpit had no problem in asking for information from the crew with him and did not exercise unnecessary authority due to his rank, listened well to comments and observations of all the crew members without regard to rank and seniority was cheerful but well disciplined his training progress was standard.

Interview with Captain/ Essam Eldin Ibrahim Chief Pilot and instructor ATR 42 Scorpio Airlines during the period of employment of Captain/ Khedr in this airline.

- ***How well did you know Captain/ Khedr?***

He was a colleague during work at the Egyptian Air force and when he joined Scorpio we worked together as I was Chief Pilot I was in charge of organizing his flying schedule and monitoring his standard through line checks.

He was a well disciplined pilot observed his fighting schedule without any problems was always careful to observe duty time limitation and rest periods had good relations with his colleagues was cheerful with his crew and always prepared his flight carefully.

During line check he performed well was attentive to his work communicated well with his crew and was not tense his previous experience on military air transport made him comfortable in flying commercial air transport with relation to route experience and airway flying requirements.

- ***What routes were flown at this time?***

Mainly domestic flights.

- ***Was Sharm El Sheikh one of your common destinations?***

Yes.

- ***What was the common departure procedure Followed out of Sharm El Sheikh?***

The standard procedure followed was depending on the runway in use a turn was initiated towards the sea while climbing in a wide pattern to cross the VOR 11000 Ft to proceed on the 306Radial to Cairo.

- ***Did you as chief pilot and instructor see or have any report of any kind about Captain/ Khedr?***

All comment and observations were good Captain and comfortable to work, always well prepared for his flight and kept his cockpit organized.

- ***Why did he leave Scorpio?***

He left when the company stopped operations.

1.5.1.5. Interviewing CAA inspectors who flew with captain.
Interviews to be carried out by OPS group

1.5.1.6. Interviewing former head of operations in Flash Airlines
(No official former head of operation in Flash Airlines)

1.5.1.7. Additional factual documentation (Captain)

Number of days the captain had been working since his last day off.

1.0 CAPT: KHIDR

DATE	A/C	FLT	CAPT	REMARKS
1/12/03	ZCD	CAI/BCN BCN/MAD MAD/LXR	PIC D.H D.H	HE RETURNED TO CAI AS A PAX ON FSH 8883 LXR/CAI T/O
2/12/03		OFF		
3/12/03	1.2 ZCF	CAI/LYS LYS/CHG CHG/HRG	D.H IC PIC	
4/12/03	1.3	OFF		
5/12/03	1.4	HRG/LXR	PIC	
6/12/03	1.5	LXR/CAI	PIC	
7/12/03	1.6	CAI/SSH SSH/NAP NAP/BRI BRI/SSH	D.H D.H PIC PIC	
8/12	1.7	OFF		
9/12	1.8	SSH/CAI	PIC	
10/12 TO 17/12	1.9	OFF		
18/12	1.10	CAI/SSH SSH/CAI	PIC PIC	
19/12	1.11	OFF		HE TRAVELLED AS A PAX FROM CAI TO HRG
20/12	1.12	CDG/LXR	PIC	HE WAS PAX ON FSH 606 HRG/CDG
21/12	1.13	LXR/SSH SSH/NAP NAP/BRI BRI/SSH	PIC PIC H.D H.D	HE RETURNED TO CAI AS A PAX ON MSR FLT
22/12	1.14	CAI/BCN BCN/MAD MAD/LXR	H.D PIC PIC	HE RETURNED TO CAI ON FSH 8883 AS A PAX

23/12	1.15	SSH/AOI AOI/BRI BRI/SSH	PIC PIC PIC	HE TRAVELLED FROM LXR TO SSH ON FSH 313 AS A PAX
24/12	1.16	SSH/LXR LXR/SSH	PIC PIC	
25/12	1.17	SSH/CAI	PIC	
26/12	1.18	BCN/MAD MAD/ASW	PIC PIC	HE TRAVELLED AS A PAX ON FSH884 CAI/BCN& RETURNED AS A PAX ON FSH 8885 ASW/CAI
27/12	1.19	LXR/CDG	PIC	HE TRAVLLED ON MSR TO LXR& RETURNED AS A PAX ON FSH 603 LXR/CAI
28/12	1.20	OFF		
29/12	D	CAI/BCN BCN/MAD MAD/LXR	H.D PIC PIC	HE RETURNED AS A PAX ON FSH 8883 LXR/CAI

2.0
D.H: DEAD HEADING
PIC: PILOT IN- COMMAND

DATE	A/C	FLT	CAPT	REMARKS
30/12		OFF		
31/12	2.2	CAI/ CDG CDG/CAI	IC PIC	
1/1/04	2.3	OFF		HE TRAVELLED TO SSH AS A PAX ON FSH 314 CAI/SSH
2/1/04	2.4	SSH/TRN TRN/SSH	PIC PIC	
3/1/04	2.5	SSH/CAI	PIC	CRASH

Note:
The captain and F/O left Cairo to SSH on January 1st, 2004 as passengers on Flash Airline flight departing Cairo at 15:00 GMT

Captain interpersonal characteristics, including perceptions of fellow pilots regarding their capability for assertiveness.
All available information is available in pages 72-73 Factual Report

Familiarity of the two flight crew members with each other. (Including number of legs flown together this trip, number of legs flown together in the last 30 days.
According to the available information, the accident flight was the 3rd sector in the last 24 hours.

Description of how well the flying crew got along. No information available

Reported proficiency information. Outcome and comments from training records and proficiency check forms.
Refer to 1.5.1.2 (vi)

Spatial disorientation or upset recovery training received at Flash Air or in the military. *AI196*
According to CAA regulations, Spatial Disorientation training is not mandatory
No available documents from Flash Airline concerning SD training.
Some verbal reports from the Egyptian Air Force are available concerning the captain SD training the time he was serving in the Egyptian Air Force as a military fighter pilot.
Inputs from different investigation partners are needed.
According to and CAA regulations, Upset Recovery training is not mandatory
Upset Recovery Training recommendation should be included in the Recommendations Chapter.

Captain’s flying proficiency and cockpit style from fellow pilots, instructors, and/or check pilots.
Refer to 1.5.1.4 and 1.5.1.2 (vi)

Flash Airlines chief pilot view regarding the departure procedure from SSH, based on company procedures
According to Chief Captain Flash Airline and all other pilots questioned about departure procedure from SSH, all agree that a turn towards the sea is initiated with a bank angle depending on available rate of climb and captain’s discretion to cross the VOR on course radial 306 at or above 10500 ft.

Number of departures from SSH previously made by the captain (day and night)

Within the last month, the captain has made five departures from SSH including the accident flight.
(SAT 03-Jan-04 (night), FRI 02-Jan-04 (night), THU 25-Dec-03 (night), WED 24-Dec-03 (day) and TUE 23-Dec-03 (day))

The captain's time on Russian aircraft (MiG-21). Hercules transport aircrafts C130 (dates and number of hours). ADI display configuration in comparison with B737-300 ADI display.

Refer to captain CV, and item 1.5.1.2 (vi)

Captain flew approximately:

Russian Mig: 1000 flying hours (Russian ADI display)
C130: 5000 hours (Conventional ADI display)
ATR: 700 hours (Conventional ADI display)
Boeing 737: 700 hours (Conventional ADI display)

For B737-300 ADI refer to 1.16.1.9 (reference CairoMarch04Slides (March Progress Meeting - Cairo).pdf file)

Comparison with ADI Displays for other airplanes types might be made by the OPS group if needed

1.5.2 The First Officer

1.5.2.1. Summary: (Personal, training information)

Date of birth: January 1, 1979
Date of hire with Flash Airlines: May 22, 2002

Egyptian Commercial Pilot License Number 3284 (issued April 12, 1997)
TYPE RATINGS: CESSNA (ISSUED April, 12, 1997) I
B737-200 (ISSUED July, 22, 1998) II
B737-300/400/500 (ISSUED July, 18, 2002) II
Commercial Pilot License issued by the Federal Aviation Administration (FAA) Certificate Number 2546582 (issued July 31, 1996)
Airplane Multi-Engine Land Instrument Airplane
Private Privileges
Airplane Single Engine Land
Limitations: None
Medical: First Class last check (May 5, 2003)
Limitations: None, valid till May 4, 2004

Initial Ground School Training:	Written Test June 10, 2002	
	Oral Test May 22, 2002	
Initial Simulator Training	B-737-300/400/500:	June 22–June 30, 2002
Initial Proficiency Check	B-737-300/400/500:	June 30, 2002
Line Check:	July 11, 2002	
Last Proficiency Check:	May 15, 2003	
Last Recurrent Training:	December 12, 2003	

FLIGHT TIMES:

Total flight time (hrs/min)[3]:	788:53
Total flight time B-737:	242:28
Total flying time last 24 hours[4]:	7:15
Total flying time last 30 days:	43:45
Total flying Time 90 days:	61:10

---

[3] Times are calculated for the first officer up until December 31, 2003.

[4] Times do not include the accident flight.

1.5.2.2. Background information.

i- Beginning of his flying career.

- The F/O began his ground training on the aircraft type 737-300 at Luxor Airway from 4 May 2002 to 16 May 2002
- The F/O completed the Full Flight Simulator Training and the Flight Training at Flash Airline on 30 June 02

Note:
Luxor Air training forms are approved training syllabus by ECAA. The audit of Flash Airline carried on January 2003 comment that Flash was still using training forms under the name of the previous operator who was also ECAA approved but they should change the forms to the name of Flash.

ii- All airlines worked for prior to Flash Air
Refer to previous item

iii- "All" F/O training records at Flash (including his last recurrent training).
All flying hours before Flash were different training phases

License Renewal Form (Boeing 737-500):

(17)

وزارة الطيران المدنى
قطاع العمليات والنقل الجوى
الإدارة المركزية للعمليات الجوية
الإدارة العامة لإجازات الطيران

إخطار تجديد إجازة طيار

السيد الطيار / مدير عام العمليات

مؤسسة / شركة بلا سن للطيران

تحية طيبة وبعد ..

بالإحالة إلى الطلب المقدم من السيد / عمرو محمود عبد الحليم شاهين

بخصوص تجديد إجازة / طيار تجاري رقم ٣٢٨٤ الحاصل عليها

نتشرف بالإفادة بأنه تم تجديدها من ٣٠ / ١٢ / ٢٠٠٣ إلى ٤ / ٥ / ٢٠٠٤

على طراز : B 737-500

علمًا بأن GM 30 / 6 /2004 BM 31 / 5 /2004

وانتهاء اللياقة الطبية فى ٤ / ٥ / ٢٠٠٤

وتفضلوا بقبول فائق الاحترام ..

مدير عام إجازات الطيران

الهيئة العامة لشئون المطابع الأميرية ٢٤٥٠ س ٢٠٠٢ – ١٥٠٠٠

Certificate of Validity of a license:

جمهورية مصر العربية
وزارة الطيران المدنى
قطاع العمليات والنقل الجوى

شهادة سريان مفعول إجازة طيار

١ - حالة هذه الشهادة بالنسبة للإجازة .

هذه الشهادة جزء من إجازة طيار تجارى

رقم ٣٢٨٤ ويجب وجودها دائمًا بالإجازة .

٢ - سريان مفعول الإجازة .

حامل الإجازة التى تعتبر هذه الشهادة جزءًا منها كشف عليه طبيًا بتاريخ ٥ / ٥ / ٢٠٠٣ وجد لائقًا للعمل وفقًا للاشتراطات الموضحة بالإجازة كما إنه قد أتم جميع الإجراءات لتجديدها وعليه فهى سارية المفعول للمدة من ٣٠ / ١٢ / ٢٠٠٣

إلى ٤ / ٥ / ٢٠٠٤ على طراز II B737-500

إلى —/—/— على طراز —

الشهر الأساسى	فترة السماح
مايو ٢٠٠٤	يونيو ٢٠٠٤

ARAB REPUBLIC OF EGYPT
MINISTRY OF CIVIL AVIATION
SECTOR OF OPERATIONS AND AIR TRANSPORT
CERTIFICATE OF VALIDITY OF A LICENCE FOR PILOT's OF FLYING MACHINES

1 - Status of this certificate .

This certificate forms part of Com pilot's licence flying machines number 3284 and must always be carried with the licence .

2 - Validity of the licence

The holder of the licence of which this certificate forms part was medically examined on 5/5/03 and was assessed as fit to act in the capacity, and subject to the conditions, stated in the licence; he has also satisfied all the other requirements for the renewal of the licence , the licence is therefore; Valid :

from 30/12/03, to 4/5/04 Type II B

from —/—/— to —/—/ Type —

BM	GM
May 2004	Jun 2004

Copy of the Commercial Pilot license:

— ٢ —

صدرت هذه الإجازة بموجب المرسوم بقانون رقم ٢٨ بتاريخ ٢٣ مايو سنة ١٩٨١ والملحق رقم ١ لمعاهدة الطيران المدني الدولية الموقعة في ٧ ديسمبر سنة ١٩٤٤ .

DATE OF BIRTH: ١ /٠١ /١٩٦٩

يصرح لحامل هذه الإجازة بقيادة الطائرات الآلية الأثقل من الهواء طبقا للشروط والمواصفات المبينة بالإجازة على أن يكون حاصلا على استمارة رقم ٢٨ (ط.م.و.) سارية المفعول .

— ٣ —

(استمارة رقم ٣٩ ط.م.و مكررا)

إجازة طيار تجاري

COMMERCIAL

ILOT'S LICENCE

(تمغة)

الاسم عمرو محمود عبد الحليم شافعي

IV. *Name* Amr-Mahmoud-Shafie

V. *Address* العنوان ٢٠ بالاسراء المعلمين المهندسين

20-Belesraa-elmoalmeen-elmohandse

VI. *Nationality* EGYPTIAN الجنسية

XII. *Signature of Holder* توقيع حامل الإجازة

X. *Signature of Issuing Officer* توقيع المرخص له بإصدار الإجازة

الختم والتاريخ

Date and Stamp

بترخيص من رئيس مجلس إدارة الهيئة المصرية العامة للطيران المدني

XI. *By Authority of the C.A.A.*

12 - 6 - 97

جمهورية مصر العربية
وزارة الطيران المدنى
نطاع العمليات والنقل الجوى.

شهادة سريان مفعول إجازة طيار

١- حالة هذه الشهادة بالنسبة للإجازة.

هذه الشهادة جزء من إجازة طيار ......تجاري......

رقم ......[illegible]......ويجب وجودها دائما بالإجازة

٢- سريـان مفعـول الإجـازة

حامل الإجازة التى تعتبر هذه الشهادة جزءا منها كشف

عليه طبيا بتاريخ ١١ / ٥ / ٢٠٠٢

وجد لائقا للعمل وفقا للاشتراطات الموضحة بالإجازة

كما أنه قد أتم جميع الإجراءات لتجديدها وعليه فهى

سارية المفعول للمدة من ١٨/ ٧ / ٢٠٠٢

إلى ٢٨/ ٢ / ٢٠٠٣ على طراز B737-3,4,5

إلى / / على طراز

الشهر الأساسى
يناير ٢٠٠٢

فترة السماح
فبراير ٢٠٠٣

أهلية طراز الطائرات :

التوقيع والختم والتاريخ Signature, Stamp and Date	Class Rating – أهلية النوع
12-4-97	Single & Multi ENG LAND PLANES
التوقيع والختم والتاريخ Signature, Stamp and Date	**أهلية الطراز (المجموعة ١) Type Rating (Group 1)**
12-4-97	CESSNA – 172

- ٥١ -

XII. The Aircraft Rating :

التوقيع والختم والتاريخ Signature, Stamp and Date	أهلية الطراز (المجموعة ٢) Type Rating (Group 2)
REPUBLIC OF EGYPT PERSONNEL LICENCES 22/7/98	B.737/200
18.07.02	B.737/3,4,5

ARAB REPUBLIC OF EGYPT
MINISTRY CIVIL AVIATION
SECTOR OF OPERATIONS AND AIR TRANSPORT
CERTIFICATE OF VALIDITY OF A LICENCE FOR PILOT's OF FLYING MACHINES

1- Status of this certificate.

This certificate forms part of ..... Senior .... pilot's licence flying machines number .... 3251 ... and must always be carried with the licence.

2- Validity of the licence

The holder of the licence of which this certificate forms part was medically examined on 11/05/02 and was assessed as fit to act in the capacity, and subject to the conditions, stated in the licence; he has also satisfied all the other requirements for the renewal of the licence, the licence is therefore; Valid:

from 18/07/02 to 28/02/03 Type B737/3
from ---/ to ---/ Type

BM JAN-03 GM FEB-03

Rating Contained in Licence is Valid

a / / Type —

The Privileges of an Instrument rating contained in the licence may be exercised as pilot in charge or as co-pilot (where one is required to be carried) of a flying machine.

From 18 / 07 / 02

TO 31 / 07 / 03

CERTIFICATE

I the undersigned, a person fully authorized for this purpose by the chariman of SECTOR OF OPERATIONS AND TRANSPORT of the Arab Republic of Egypt hereby certify the Facts stated in Paragraphs 2,3,4

Signature
Date 22 / 7 / 02
Stamp

٣- أهلية مدرب المعتمدة بهذه الإجازة سارية

المفعول إلى / / طراز —

٤- أهلية الطيران الآلى المعتمدة بالإجازة تخول لحاملها الحق فى العمل كقائد طائرة أو كطيار مساعد (كما تقضى الحالة) على الطائرات الآلية.

من ١٨ / ٧ / ٢٠٠٢

إلى ٢١ / ٧ / ٢٠٠٣

شهادة

أنا الموقع أدناه بمقتضى السلطة المخولة لى من رئيس قطاع العمليات والنقل الجوى بوزارة الطيران المدنى بجمهورية مصر العربية أقر بصحة ما جاء بالبنود ١، ٢، ٣، ٤ من هذا المستند.

التوقيع :

التاريخ : ٢٢ / ٧ / ٢٠٠٢

الختم :

B737-500 Transition Training:

18

GYPTIAN CIVIL AVIATION SUPERVISORY AUTHORITY ECASA) DOC. 1230
OLICY AND PROCEDURES MANUAL

FORM 1230 – 10P

ORDER OF TRANING NO 6 / 2002 / 1

EVEL	:	F/O
LACE	:	Luxor Air
PECIALITY	:	Transition Course
/_ TYPE	:	B737 300
RAINEES	:	1- Amr Mahmoud Shafie
TART	:	Saturday May 4th, 02
ND	:	Thursday May 16th, 02
URATION	:	12 Days / 80 hours
RAINEES	:	ENCLOSURE (A)
ROGRAM	:	ENCLOSURE (B)
ISTRUCTORS	:	1- Capt / Ehab El-Sanbaty 2- Eng. / Mohamed Khalil 3. Eng / Youssif Hassan
NDERTRANING	:	
JPERVISOR	:	

IGATUR

SUPERVISOR

2/5/02

General Operation

FLASH AIRLINES

OPERATIONS

ISION I DATED OCTOBER 2001 PAGE 31

(19)

Member of FLASH GROUP

FLASH AIRLINES

Boeing 737-300

Ground Training Syllabus

SYSTEM	HOURS REQUIRED
Weight& Balance	4 HRS
Air conditioning,presurization	5 HRS
Flight Controls	8 HRS
Hydraulic	3 HRS
Landing Gear	3 HRS
Navigation	5 HRS
Auto Flight	10 HRS
F.M.C	10 HRS
Pneumatic	3 HRS
Electric	4 HRS
Anti –ice	3 HRS
Oxygen	3 HRS
Engine	5 HRS
Fuel & APU	3 HRS
Performance	10 HRS
Total	80 HRS

FLASH AIRLINES
OPERATIONS

58, Joseph Tito St., El-Nozha El-Gedidah, Cairo,Egypt.
Tel. : 202-2944700-800-550 Fax : 202-2941300
SITA : CAIHPCR
٥٨ شارع جوزيف تيتو النزهة الجديدة - القاهرة ج م ع
تليفون : ٥٥٠ - ٨٠٠ - ٢٠٢-٢٩٤٤٧٠٠ فاكس : ٢٠٢-٢٩٤١٣٠٠
E-mail:hpline@internetegypt.com

Proficiency Check (June 30, 02):

FLASH AIRLINES

(20)

Member of FLASH GROUP

Form No. 02 – 2/2

PROFICIENCY CHECK FORM (cont'd)

This Training is an AIR T.M requirement and should be covered during Training day

RHS TRAINING FOR INSTRUCTORS		RHS TRAINING FOR CAPTAINS	
• Error recovery		• Normal take Off	
Lateral offsets		• Manual ILS (CAT I minima)	
Vertical Offsets		• Non-Precision approach and landing	
• Minimum 3 Touch and Go		• Simulated Engine failure – Take off	
		• One Engine Out-Approach and landing	

EVALUATION

KNOWLEDGE	US	S
FLIGHT OPERATION MANUAL (FOM)and Relevant ECARs	[ ]	[x]
A/C Systems, Limitations and Performance	[ ]	[x]
Normal, Non-Normal Procedures*	[ ]	[x]
PHARAOH AIR Operations Specifications	[ ]	[x]
FLYING SKILLS	**US**	**S**
Compliance with SOP (Flight operations Manual & FCOM)	[ ]	[x]
Attitude flying and correct trim technique	[ ]	[x]
Use of FMC, PMS, FMGS, etc...	[ ]	[x]
Aeroplane configuration, Attitude & Speed control	[ ]	[x]
Flying accuracy & Smoothness	[ ]	[x]
MANAGMENT	**US**	**S**
Compliance with FLIGHT OPERATION MANUAL (FOM)	[ ]	[x]
Planning ahead and use of FMC, PMS, FMGS, etc...	[ ]	[x]
Crew co-ordination and use of available resources	[ ]	[x]
Adherence to clearances and safe heights	[ ]	[x]
Situational awareness	[ ]	[x]
Cabin crew safety briefing	[ ]	[x]

COMMENTS :

HE HAS PASSED HIS FINAL CHECK SATISFACTORY WITH GOOD PERFORMANC.

ACP 447 [signature]

Base Month (through Last day of) : Month Year	Licensee Valid (through Last day of) : Month Year	Next Event [ ] PC [ ] Rec. Trg.
Date of last 3 take-offs & Landings** :	1. / / 2. / /	3. / /
Name*** [ ] CP [x] IP IHABEL SONBATY	ID No. 1007	Check Airman's Signature [signature]
Training Result Previous [ ] US [ ] S Current [ ] US [x] S	Trainee's Signature [signature]	Safty & Training Manager

FLASH AIRLINES

Member of FLASH GROUP

(21)

Form No. 02 – 1/2

PROFICINCY CHECK FORM

Name AMR EL SHAFI	ID No.
Simulator Owned by OL/HB/C	Location CUAVir
Flight Training Time 32 hrs / Time pf 16 / Time PNF 16	Date 30-06-02
UCapt. / ✓F/O / U F/E	Simulator Level: U A / U B / ✓C / U
This form is based on ECARS 121 Appendix F.	AIRCRAFT TYPE: B 737 – 300/400/500

Write (S or U) indicating Satisfactory or Unsatisfactory of each item.

1. ORAL TEST (operational oriented	
• Airplane Systems	S
• Airplane performance	S
• Normal and non-normal procedures**	S
• Appropriate Provisions of AFM	S
• Company flight operations manual	S
• Use of checklists	S
2. FLIGHT CHECK	
PRE FLIGHT AND TAXING	
• Pre flight and cockpit preparation	S
• Engine start	S
• Taxing	S
TAKE-OFFS	
• Normal	S
• Instrument(100' ceiling or 400 m RVR)	S
• Cross wind	S
• With simulated Engine failure	S
• Rejected	S
INSTRUMENT PROCEDURES	
• Area departure	S
• Area arrival and Holding	S
• ILS approach (Coupled)	S
• Second ILS approach (Manual)	S
• Missed approach	S
• Non-precision approach	S
• Second Non-precision approach	S
• Circling approach	S
• Engine failure missed approach	S
	S

2. FLIGHT CHECK(cont'd)	
INFLIGHT MANOUVERS	S
• Steep turns (Min. 180° -Max. 360°)1	S
• Approach to stalls (Two may be waived)2	S
Take-off configuration	S
Clean configuration	S
Landing configuration	S
Note : one stall must be performed with bank angle 25°	
LANDINGS	
• Normal landing	S
• From ILS	S
• Cross wind	S
• Visual approach	S
• With 50% power plant failure	S
(2 Engines on one side for 4 Engines airplanes)	
• From circling approach	
• Rejected at 50 FT.	
NORMAL AND NON-NORMAL PROCEDURES	
• Anti icing and de-icing	S
• Hydraulics	S
• Electrical	S
• Pneumatic	S
• Gears	S
• Flaps	S
• Flight Controls	S
• Nav/comm. Equipment	S
EMERGENCY PROCEDURES	
• Inflight fire and smoke control	S
• Decompression	S
• Emergency descent	S
Emergency Landing(partial ldg,no flaps,etc.)	S
• Emergency Evacuation	S

OTHER EMERGENCY PROCEDURES RELATED TO SPECIFIC TYPE

* Non-Normal procedures : are Abnormal, Additional, Alternate,and Emergency Procedures.
** For Captains only.
*** The applicant must demonstrate the proper use, and apply the correct procedures, of as many of the listed items.
1 on direction may be waived 2 two may be waived

Flight Training Department
Flight Operations

Form No. C30-03(f)

HELIOPOLIS AIRLINES

(22)

PROFICIENCY CHECK FORM

Name: AHL EL SHAFIE		Code No.		Capt / F/O / F/E / ...
Simulator Owned By: A/C FLASH [illegible]	Location: [illegible]	Aircraft Type: [illegible]		Simulator Level
Flight Training Time	Time PF	Time PNF: [illegible]	Date: 11-17-02	IA / IB / IC / ID [illegible]

This form is based on ECARS 121 Appendix F.

Enter (S / U or NA) indicating Satisfactory / Unsatisfactory completion of each item or Not Applicable

1. ORAL TEST (Operational Oriented Questions)

• Aeroplane systems	[illegible]
• Aeroplane performance	[illegible]
• Normal and non-normal procedures[1]	[illegible]
• ETOPS, North Atlantic or special routes	
• Company flight operations manual	
• Use of checklists	

2. FLIGHT CHECK

PRE FLIGHT AND TAXIING	
• Pre-flight and cockpit preparation	[illegible]
• Engine start	[illegible]
• Low visibility taxiing (150/200m RVR)[2]	[illegible]
TAKE-OFFS	
• Normal	[illegible]
• Low visibility takeoffs (150/200m RVR)[2]	
- *X- Wind with loss of visual cues at 100 Kt.*	
- *Rejected T.O with an engine failure before V_1*	
- *With simulated engine failure at V_1*	
INSTRUMENT PROCEDURES	
• Area departure	[illegible]
• Area arrival and Holding	[illegible]
• ILS approach (Coupled)	
• Second ILS approach (Manual)	
• Missed approach	
• Non-precision approach	
• Second Non-precision approach	
• Circling approach	
• Engine failure missed approach	
CAT II Approaches	
• A min. of 3 CAT II approaches are required for CAT II recurrent	
SPECIAL TRAINING	
• ETOPS	
• North Atlantic En-route diversion scenario	
• MNPS	

2. FLIGHT CHECK (cont'd)

INFLIGHT MANEUVERS	
• Steep turns (Min 180° - Max 360°)[3]	
• Approach to stalls (two may be waived).	
- *Take-Off configuration*	
- *Clean configuration*	
- *Landing configuration*	
Note: One Stall must be performed with bank angle 25°.	
LANDINGS	
• Normal Landing	
• From ILS	
• Cross Wind	
• Visual approaches	
• With 50% power plant failure	
• (2 Eng.'s on one side for 4 Eng.'s aeroplanes)[4]	
• From circling approach	
• Rejected at 50'	
NORMAL AND ABNORMAL PROCEDURES	
• Anti icing and De-icing	
• Hydraulics	
• Electrical	
• Pneumatic	
• Gears	
• Flaps	
• Flight Controls	
• Nav/Comm. Equipment	
EMERGENCY PROCEDURES	
• In-flight Fire and Smoke Control	
• Decompression	
• Emergency Descent	
• Emergency Landing (Partial L/G, No Flaps, etc..)	
• Emergency Evacuation	
EMERGENCY PROCEDURES RELATED TO SPECIFIC TYPE	

1. Non-Normal Procedures: Are Abnormal, Additional, Alternate and Emergency Procedures
2. 150/200m RVR for category C/D aircrafts respectively.
3. One direction may be waved.
4. For Captains Only.

Note:
Heliopolis Airline operation ceased operation and Flash Airline took over its traffic rights and operated under the name of Flash Airline
Flight Training (August 12, 02):

HELIOPOLIS AIRLINES

PROFICIENCY CHECK FORM (cont'd)

This Training is an EgyptAir T.M. requirement and should be covered during TRAINING DAY

RHS TRAINING FOR INSTRUCTORS	RHS TRAINING FOR CAPTAINS
• Error recovery	• Normal Take Off
Lateral effects	• Manual ILS (CAT I manual)
Vertical effects	• Minimum 3 Touch & Go
• Minimum 3 Touch and Go	*Note: Above manoeuvres are not required for instructors*

EVALUATION

Knowledge	US	S-	S	S+
Flight Operations Manual (FOM) and Relevant ECARs	☐	☐	☑	☐
A/C Systems, Limitations and Performance	☐	☐	☑	☐
Normal, Non-Normal Procedures[1]	☐	☐	☑	☐
Flash Air Operations Specifications	☐	☐	☑	☐
Flying Skills	**US**	**S-**	**S**	**S+**
Compliance with SOP (Flight Operations Manual & FCOM)	☐	☐	☑	☐
Attitude flying and correct trim technique	☐	☐	☑	☐
Use of FMC, PMS, FMGS, etc.	☐	☐	☑	☐
Aeroplane configuration, Altitude & Speed Control	☐	☐	☑	☐
Flying accuracy & Smoothness	☐	☐	☑	☐
Management	**US**	**S-**	**S**	**S+**
Compliance with *Flight Operations Manual (FOM)*	☐	☐	☑	☐
Planning ahead and use of FMC, PMS, FMGS, etc.	☐	☐	☑	☐
Crew co-ordination and use of available resources	☐	☐	☑	☐
Adherence to clearances and safe heights	☐	☐	☑	☐
Situational awareness	☐	☐	☑	☐
Cabin crew safety briefing	☐	☐	☑	☐

Comments

Note: *Please write positive or negative comments only, remedial actions are strictly a training management business.*

HE HAS PERFORMED AIRCRAFT RHS TRAINING ON TA A/C AT ABU SIMBEL FOR 3 T.O AND 2 LANDING WITH GOOD PERFORMANCE [signature]

Base Month (Through Last Day of): Month Year	**License Valid** (Through Last Day of): Month Year	Next Event ☐ PC ☐ Recurrent Training
Date of Last 3 Takeoffs and Landings:[2]	1. / /	2. / / 3. / /
Check Airman Name: IHAB EL SONBATY	Code No.: 1007	Check Airman's signature: [signature]
Checking Result Previous ☐ US ☐ S; Current ☐ US ☑ S	Trainee's signature	G.M Flight Training

1. *Non-Normal Procedures: Are Abnormal, Additional, Alternate and Emergency Procedures.*
2. *Trainee is responsible for the accuracy of this data, and he must sign the form.*

RLINES

Forms and Records

... No. 04 - 1/4

IOE / USV FORM

... Type	ID.No.	Captain

Date	Route	Previous	Today	Total	Previous	Today	Total
/							
/							
/							
/							
/							
/							
/							
/							
/							
/							
/							
/							

Date / Type of Training	Comments	Instructor Name	Signature
12/08/02 IOE RHS USV	HE HAS PASSED ... CHECK AND SATISFACTORY	[illegible]	
/ IOE RHS USV			
/ IOE RHS USV			
/ IOE RHS USV			

...AL RELEASE

This is to certify that Captain..............................is fit fly as a Captain under supervision on..............................aircraft type.

Chairman Name	Signature	Date
IHAB EL SONBATY		12-08-2002
1003	Trainee's Signature	

:Initial Operating Experience
:Right hand Seat (Two sectors :one PF-one PNF)
:Under Super Vision

Form No. 04 - 1/4

IOE / USV FORM

Name AMR EL SHAFEI		ID No.		□ Capt. ☑ F/O	□ F/E
A/C Type B737-300					

Date	Route	Time Previous→ Today	Time Total	Sectors Previous→ Today	Sectors Total
27/07/02	SSH - CDG	05:15	05:15	1	1
27/07/02	CDG - LXR	05:00	10:15	1	2
30/07/02	HRG - CAI	01:00	11:15	1	3
01/08/2002	CAI - BEE - SSH	02:50	14:05	2	5
07/08/02	SSH - CAI	00:50	14:55	1	6
10/08/02	CAI - CDG	04:30	19:20	1	7
11/08/02	CDG - HRG	05:15	24:35	1	8
12/08/02	HRG - BLQ	03:55	28:30	1	9
12/08/02	BLQ - HRG	03:45	32:15	1	10
/ /					
/ /					
/ /					

Date / Type of Training	Comments	Instructor Name	Signature
27/07/02 □ IOE □ RHS □ USV	NORMAL FLIGHT PROGRESSING	IHAB EL SONBATY	[signature]
30/07/02 □ IOE □ RHS ☑ USV	NORMAL FLIGHT	IHAB EL SONBATY	[signature]
07/08/02 □ IOE □ RHS □ USV	GOOD FLIGHT	IHAB EL SONBATY	[signature]
11/08/02 □ IOE □ RHS □ USV	GOOD FLIGHT READY FOR CHECK RIDE	IHAB EL SONBATY	[signature]

IOE :Initial Operating Experience
RHS :Right hand Seat (Two sectors :one PF-one PNF)
USV : :Under Super Vision

Form No. 04 – 4/4

IOE / USV FORM (Cont'd)

EVALUATION

KNOWLEDGE	US	S
FLIGHT OPERATION MANUAL (FOM)and Relevant ECARs	?	✓
A/C Systems, Limitations and Performance	?	✓
Normal, Non-Normal Procedures*	?	✓
LUXOR AIR Operations Specifications	?	✓
FLYING SKILLS	**US**	**S**
Compliance with SOP (Flight operations Manual & FCOM)	?	✓
Attitude flying and correct trim technique	?	✓
Use of FMC, PMS, FMGS, etc...	?	✓
Aeroplane configuration, Attitude & Speed control	?	✓
Flying accuracy & Smoothness	?	✓
MANAGMENT	**US**	**S**
Compliance with FLIGHT OPERATION MANUAL (FOM)	?	✓
Planning ahead and use of FMC, PMS, FMGS, etc...	?	✓
Crew co-ordination and use of available resources	?	✓
Adherence to clearances and safe heights	?	✓
Situational awareness	?	✓
Cabin crew safety briefing	?	✓

Remarks

HE HAS PASSED WITH GOOD KNOLEDG AND GOOD PERFORMANCE

Date	ID No.	Signature
12-08-02	1003	[signature]

This is to certify that all applicable Flight Training and Discussion items on this form have been complied and trainee is Ready For final line check and company oral.

✓ IP Name	Signature	Date
IHAB EL SONBATI	[signature]	12-08-02
1003	(name) & Signature: [signature] Shafie	
Trainee Name: [signature]		

* Normal procedures are Abnormal, Additional, Alternate and Emergency Procedures.

Flight Deck Ground Training/ Competency Check/ General Emergency (22-05-02):

(25)

شركة فلاش

EGYPT AIR TRAINING DIVISION Gen. Dept. for Aviation Training E.T. C . COMPETENCY CHECK.	قطـاع التدريب الادارة العامه لتدريب الطيران مركز تدريب الطوارئ

Flight deck Ground Training / COMPETENCY Check
GENERAL EMERGENCY

NAME. Amr Mahmoud Shafie Code : X		Crew Position Cap ☐ F/O ☑ F/E ☐
DATE : 22-05-2002	LOCATION E.T.C	☐ INITIAL ☑ RECURRENT ☐ RE-QUALIFICATION

ALL ITEMS MUST BE COMPLETED CHECK (/) INDICATING COMPLETION EACH ITEMS

COMPETENCY CHECK ITEMS

PART 1 EMERGENCY SITUATION	
- Flight CREWMEMBER DUTIES AND RESPONSIBILITIES	S
- CREW COORDINATION AND COMPANY COMMUNICATION	S
- AIRCRAFT FIRES	S
- FIRST AID EQUIPMENT	S
- ILLNESS,INJURY,AND BASIC FIRST AID	S
- GROUND EVACUATION	S
- DITCHING	S
- RAPID DECOMPRESSION	S
- PREVIOUS AIRCRAFT ACCIDENTS/INCIDENTS	S
- CREWMEMBER INCAPACITATION	S
- HIJACK AND BOMB THREAT	S
PART 2 EMERGENCY DRILL	
- HAND-HELD FIRE EXTINGUISHERS	S
- PORTABLE OXYGEN SYSTEM	S
- EMERGENCY EXITS AND SLIDES. *	S
- DITCHING EQUIPMENT. **	S

INSTRUCTOR NAME AHMED HELMY	CODE NO. 8028	INSTRUCTOR SIGNATURE
RESULT ☑ Satisfactorily Completed	TRAINEE SIGNATURE	E.T.C Manager
		G.M. AVIATION TRAINING

E.T.C 001/06/2001

26

PROFICINCY CHECK FORM

Name AMR SHAFIE			
Simulator Owned by ROYAL AIR MAROC		ID No.	F/O F/O
Flight Training Time 8/00	Time pf 4 / Time PNF 4	Location CAS	Simulator Level D
This form is based on ECARS 121 Appendix F		Date 15/16.05.03	
Write (S or U) indicating Satisfactory or Unsatisfactory of each item.			

1. ORAL TEST (operational oriented

Item	S/U
• Airplane Systems	S
• Airplane performance	S
• Normal and non-normal procedures**	S
• Appropriate Provisions of AFM	S
• Company flight operations manual	S
• Use of checklists	S

2. FLIGHT CHECK

Item	S/U
PRE FLIGHT AND TAXING	
• Pre flight and cockpit preparation	S
• Engine start	S
• Taxing	S
TAKE-OFFS	
• Normal	S
• Instrument(100' ceiling or 400 m RVR)	[illegible]
• Cross wind	S
• With simulated Engine failure	S
• Rejected	S
INSTRUMENT PROCEDURES	
• Area departure	S
• Area arrivel and Holding	S
• ILS approach (Coupled)	S
• Second ILS approach (Manual)	S
• Missed approach	S
• Non-precision approach	S
• Second Non-precision approach	S
• Circling approach	S
• Engine failure missed approach	S

2. FLIGHT CHECK(cont'd)

Item	S/U
INFLIGHT MANOUVERS	
• Steep turns (Min. 180° -Max. 360°)1	S
• Approach to stalls (Two may be waived)2	
Take-off configuration	S
Clean configuration	S
Landing configuration	S
Note : one stall must be performed with bank angle 25°	
LANDINGS	
• Normal lanaing	S
• From ILS	S
• Cross wind	S
• Visual approach	S
• With 50% power plant failure (2 Engines on one side for 4 Engines airplanes)	S
• From circling approach	S
• Rejected at 50 FT.	N/A
NORMAL AND NON-NORMAL PROCEDURES	
• Anti icing and de-icing	S
• Hydraulics	S
• Electrical	S
• Pneumatic	S
• Gears	S
• Flaps	S
• Flight Controls	S
• Nav/comm. Equipment	S
EMERGENCY PROCEDURES	
• Inflight fire and smoke control	
• Decompression	S
• Emergency descent	S
Emergency Landing(partial ldg,no flaps,etc.)	
• Emergency Evacuation	S

OTHER EMERGENCY PROCEDURES RELATED TO SPECIFIC TYPE

* Non-Normal procedures : are Abnormal, Additional, Alternate and Emergency Procedures.
** For Captains only.
*** The applicant must demonstrate the proper use, and apply the correct procedures, of as many of the listed items.
1 on direction may be waived 2 two may be waived

PROFICIENCY CHECK FORM (cont'd)

RHS TRAINING FOR INSTRUCTORS	RHS TRAINING FOR CAPTAINS
• Error recovery	• Normal take Off
Lateral offsets	• Manual ILS (CAT I minima)
Vertical Offsets	• Non-Precision approach and landing
• Minimum 3 Touch and Go	• Simulated Engine failure – Take off
	• One Engine Out-Approach and landing

EVALUATION

	US	S
KNOWLEDGE		
FLIGHT OPERATION MANUAL (FOM)and Relevant ECARs		S
A/C Systems, Limitations and Performance		S
Normal, Non-Normal Procedures*		S
PHARAOH AIR Operations Specifications		S
FLYING SKILLS	US	S
Compliance with SOP (Flight operations Manual & FCOM)		S
Attitude flying and correct trim technique		S
Use of FMC, PMS, FMGS, etc...		S
Aeroplane configuration, Attitude & Speed control		S
Flying accuracy & Smoothness		S
MANAGMENT	US	S
Compliance with FLIGHT OPERATION MANUAL (FOM)		S
Planning ahead and use of FMC, PMS, FMGS, etc...		S
Crew co-ordination and use of available resources		S
Adherence to clearances and safe heights		S
Situational awareness		S
Cabin crew safety briefing		S

COMMENTS :

Satisfactory
Good handling

[illegible] 16.05.07

Base Month (through Last day of) : Month Year	Licensee Valid (through Last day of) : Month Year		Next Event
Date of last 3 take-offs & Landings** :	1. / /	2. / /	3. / /
Name*** CP IP YORDAN DIMITROV	ID No. 464		Check Airman's Signature
Training Result Previous US Current S	Trainee's Signature		Training Manager

PILOT'S RECURRENT TRAINING FORM

Name AMR EL SHAFIE			ID No.	
Simulator Owned by Royal Air Maroc			Location Maroco	Simulator Level
Flight Training Time 04:-	Time PF 4	Time PNF –	Date 11-12-03	D

PART ONE : GROUND TRAINING SEGMENT

( ) Indicates that item has been covered

a) OPEN BOOK QUIZ (Q&A)*		b) Briefings	
• Airplane Systems	✓	• Use of chklists	✓
• Airplane performance	✓	• Review of normal training Scenario:	✓
• Normal and non-normal procedures**	✓	-Normal and Non-normal procedures**	✓
• Appropriate Provisions of AFM	✓	-LOFT	✓
• Company flight operations and route	✓	-Windshear	✓
• PharaohAir Operation Specifications	✓	• CRM	✓

PART TWO : FLIGHT TRAINING SEGMENT

Scenario :

PRE FLIGHT AND TAXING		LANDINGS	
• Pre flight and cockpit preparation	✓	• Normal landing	✓
• Engine start	✓	• From ILS	✓
• Taxing	✓	• Cross wind	✓
TAKE-OFFS		• Visual approach	✓
• Normal	✓	• With 50% power plant failure	✓
• Instrument(100' ceiling)	✓	• (2 Engines on one side for 4 Engines airplanes)	
• Cross wind	✓	• From circling approach	✓
• With simulated engine failure	✓	• In Windshear conditions	
• Rejected	✓	• Rejected at 50 FT.	
• Windshear during take-off	✓	**NORMAL AND NON-NORMAL PROCEDURES**	
INSTRUMENT PROCEDURES		• Anti icing and de-icing	✓
• Area departure	✓	• Hydraulics	✓
• Area arrival and Holding	✓	• Electrical	✓
• ILS approach (Coupled)	✓	• Pneumatic	✓
• Second ILS approach (Manual)	✓	• Gears	✓
• Missed approach	✓	• Flaps	✓
• Non-precision approach	✓	• Flight Controls	✓
• Second Non-precision approach	✓	• Nav/comm. Equipment	✓
• Circling approach	✓	**EMERGENCY PROCEDURES**	
• Engine failure missed approach	✓	• Inflight fire and smoke control	✓
INFLIGHT MANEUVERS		• Decompression	✓
• Steep turns (Min. 180° -Max. 360°)	✓	• Emergency descent	✓
• Approach to stalls	✓	• Emergency Landing(partial l/g,no flaps,etc.)	✓
• Specific flight characteristics	✓	• Emergency Evacuation	✓

OTHER EMERGENCY PROCEDURES			
[illegible]	✓		
TCAS RESOLUTION	✓		

* Q&A :question and answers
** Non-Normal procedures : are Abnormal, Additional, Alternate and Emergency Procedures.
*** For Captains only.

PILOT'S RECURRENT TRAINING FORM (cont'd)

RHS TRAINING FOR INSTRUCTORS		RHS TRAINING FOR CAPTAINS	
• Error recovery		• Normal take Off	
Lateral offsets		• Simulated Engine failure – Take off	
Vertical Offsets		• One Engine Out-Approach and landing	
• Minimum 3 Touch and Go		• Minimum 3 Touch and Go's	

EVALUATION

KNOWLEDGE	US	S
FLIGHT OPERATION MANUAL (FOM) and Relevant ECARs		✓
A/C systems Limitations and Performance		✓
Normal Non-Normal Procedures*		✓
PHARAOH AIR Operations Specifications		✓

FLYING SKILLS	US	S
Compliance with SOP (Flight operations Manual & FCOM)		✓
Attitude flying and correct trim technique		✓
Use of FMC, PMS, FMGS, etc...		✓
Aeroplane configuration, Attitude && speed control		✓
Flying accuracy & Smoothness		✓

MANAGMENT	US	S
Compliance with FLIGHT OPERATION MANUAL (FOM)		✓
Planning ahead and use of FMC, PMS, FMGS, etc...		✓
Crew coordination and use of available resources		✓
Adherence to clearances and safe heights		✓
Situational awareness		✓
Cabin crew safety briefing		✓

COMMENTS :

SATISFACTORY

GOOD KNOWLEDGE

Base Month (through Last day of) : Month Year	License Valid (through Last day of) : Month Year	Next Event [X] Proficiency check
Date of last 3 take-offs & Landings** :	1. / / 2. / /	3. / /
Name*** CP IP: IHAB EL SOMBATY	ID No. 107	Check Airman's Signature: [signature]
Training Result — Previous: S; Current: S	Trainee's Signature: [signature]	Safety & Training Manager: [signature]

* Non-Normal procedures : are Abnormal, Additional, Alternate and Emergency Procedures.
** Trainee is responsible for the accuracy of this data, and he must sign the form.
*** CP: CheckAirman, IP :Instructor Pilot.

(28)

EGYPTAIR مصر للطيران

EMRG TRAINING

قطـــاع التدريب
الإدارة العامة للتدريب الطيران
مركز تدريب الطوارئ

نتيجة فرقة : تنشيطية للســادة الطيــاريــن العاملــين بشـــركـــه فـــلاش

امر تدريب رقم :– ١٢٧ / ٢٠٠٢ (طوارئ)

تاريخ بداية الفرقة :– ٢٢ / ٥ / ٢٠٠٢

تاريخ نهاية الفرقة :– ٢٣ / ٥ / ٢٠٠٢

م	الاســـــم	عملي	سلامة طائرات (Aircraft Flight Safety)	بضائع خطرة (Hazmat)	اسعافات (First Aid)	ملاحظات
١	ك / ايهاب السنباطى	١٠٠	٩٦	١٠٠	١٠٠	ناجح
٢	ك / اشرف زارع	١٠٠	١٠٠	٩٣	١٠٠	ناجح
٣	ك / نـــور سعـــد	١٠٠	٩٦	غـــ	١٠٠	راسب ب خطرة
٤	ك / خريستو لوستانس	١٠٠	١٠٠	٩٥	١٠٠	ناجح
٥	ك / وائــل فكـــرى	١٠٠	١٠٠	٩٥	١٠٠	ناجح
٦	ك / جمـــال عـــون	١٠٠	١٠٠	٩٥	١٠٠	ناجح
٧	ك / عمرو عبد الحميد	١٠٠	٩٢	٩٥	١٠٠	ناجح
٨	ك / علـي رشـــاد	غـــ	٩٦	غـــ	١٠٠	راســـب
٩	م ٠ ك / علـى رشـــاد	١٠٠	٩٦	٩٥	١٠٠	ناجح
١٠	م ٠ ك / محمد حسنى	١٠٠	١٠٠	٩٥	١٠٠	ناجح
١١	م ٠ ك / ياسر فكـرى	١٠٠	٩٢	٩٥	١٠٠	ناجح
١٢	م ٠ ك / هبة درويش	١٠٠	٩٦	١٠٠	١٠٠	ناجح
١٣	م ٠ ك / شيريف ابو العز	١٠٠	٩٦	٨١	١٠٠	ناجح
١٤	م ٠ ك / خالد كوثر	١٠٠	٩٦	غـــ	١٠٠	راسب ب خطرة
١٥	م ٠ ك / هانى المليجى	١٠٠	١٠٠	٩٥	١٠٠	ناجح
١٦	م ٠ ك / عمر الشافعى	١٠٠ 100	١٠٠ 100	٩٥ 95	١٠٠ 100	ناجح
١٧	م ٠ ك / محمود حنفى	١٠٠ 100	٩٦ 96	٩٥ 95	١٠٠ 100	ناجح
١٨	مرحل / اشرف لملوم	١٠٠	١٠٠	٩٥	١٠٠	ناجح

F/O OBSERVER

Practical Test (Procedures)

التوقيع :-

الاسم :- أ / كلوديــا يحـيي وفـــا

الوظيفة :- مدير ادارة مركز تدريب الطوارىء

التوقيع :-

الوظيفة :- مدير عام الادارة العامة لتدريب الطيران

تحريرا فى ٢ / ٦ / ٢٠٠٢

(29)

وزاره الطيران المدنى
قطاع العمليات والنقل الجوى
الاداره العامه لامتحانات الطيران

رقم القيد : ٢٩٠٢
التاريخ : ٢٠٠٢/٦/٢٦

CAA EXAM (Oral)

2915 To 10/6/2002

Shafie

نتيجة امتحان طيارين طراز B737-300
بوينج ٧٣٧/٣٠٠-٤٠٠ (شركه فلاش)
الذى عقد فى الفتره من ٥/٢٩ : ٢٠٠٢/٦/١٠

م	الأســـــــــم	انظمه (Systems)	اداء (Performance)	ملاحظـــــات
١	عمرو محمود عبد الحليم شافعى	٩٨ (98)	٩٨ (98)	ناجـــــح (Pass)

روجعت طبقا للائحة الامتحانات

ابو الغيط محمد شحات
المشرف على الاداره العامه لامتحانات الطيران

يعتمد,,,,,,

طيار/ صالح احمد موسى
رئيس قطاع العمليات والنقل الجوى

Shafie

كشف بنسبة حضور فرقة Basic indoctronation

تاريخ بداية الفرقة 21 / 8 /2002 ، تاريخ انتهاء الفرقة 29 /8 / 2002

م	الاسم	الدورة	ملاحظات
1	رضا السيد مصطفي	Basic indoctronation	حضر الدورة
2	محمود حنفي	Basic indoctronation	حضر الدورة
3	عمرو شافعي	Basic indoctronation	حضر الدورة

توقيع المدرب : رتيب / يوسف

الاسم : م/ رتيب محمد حامد / م/ يوسف حسنين

الوظيفة : مدير [illegible] / مدير الجودة

تحريرا في 29/8/2002 : ٢٩/٨/٢٠٠٢ ٢٩/٨/٢٠٠٢

[illegible] / مدير الطيارين / الطيار السباعي

٢٩/٨/٢٠٠٢

FLASH AIRLINES
OPERATIONS

Form No. 04 – 3/4

IOE / USV FORM (Cont'd)

THE FOLLOWING ITEMS MUST BE COVERD DURING LINE CHECK

(√) Indicates that item has been checked

PRE FLIGHT	
Dispatch	
• Computerized and ATC flight plan	√
• Weather briefing, T.O. and landing min.	√
• Alternate planing Wx min	√
• NAT. Operations Specifications*	N/A
• NOTAM briefing and "B" snags	√
• Cabin crew safety briefing	√
Cockpit	
• Technical log and B snags	√
• MEL-CDL and the effect on T.O/Landing Performance	√
• Aircraft library and documentation	√
• Cockpit preparation-FMS/FMGS/PMS	√
• TAKE OFF BRIEFING	√
• Load, trim sheet and NOTOC	√
• SNOWTAM (de-icing)*	√
• Hot Wx operation	√
• T.O Performance, T.O speeds and C.G	√
• Engine start procedures	√
TAXI, TAKE-OFF AND INITIAL CLIMB	
• Push back procedures	√
• Aircraft geometry during turns	√
• Taxi speed and braking technique	√
• T.O roll and V1 concept	√
• Noise abatement procedure and initial climb	√
• Best angle, best rate and turbulence speeds	√
• Area departure, SID and holding	√
CRUISE	
• Flight level selection, specific range and OPT.ALT	
• Step climb and fuel saving	
• Cruise mach no. and manoeuvre capability	
• [illegible] of weather radar and weather avoidance	
• ETOPS and MORA (Special routes)	
• Drift down procedures	
• Enroute alternate and Emergency Proc.	
• Alternate Weather minima	
• Minimum fuel for diversion(Alternate+Holding)	
• Communication failure procedures	
• Flight control comm. Procedures (Stockholm radio)	

DESCENT AND APPROACH	
ATIS, SNOWTAM and braking action*	√
• Descent planing	√
• Approach briefing and stars	√
• Approaches: √Precision √N.precision √Visual	√
• Destination and alternate weather minima	√
LANDING AND TAXI IN	
• Landing technique	√
• Use of auto breaks and reverse trust	√
• After landing and taxi in procedure	√
DISCUSSION ITEMS	
A) Flight operation manual	
• IOE, Initial release, USV and Command Responsibility	N/A
• Navigation Bag content	√
• The difference between planning and actual Weather min. and Wx min. for new captain.	√
• Fuel policy	√
• Windshear, thunderstorms and turbulence	√
• Fueling with PAX on board	√
• Dangerous goods	√
• Shoulder harness, seat belt policy and cockpit door	√
• First officer T.O. and landing	√
• ECARS 121	√
• Flight operations manuals & answers	
B) Aircraft performance and technical knowledge	
• Operational system knowledge	√
• T.O performance limits	√
• Wet and contaminated runways	√
• Reduced (flex) thrust	√
• Approach and landing climb performance	√
• [illegible], non normal and emergency procedures	√
• Flight patterns	√
C) Safety procedure	
• Communication between cockpit and cabin	√
• Emergency evaluation procedure	√
• Prepared/unprepared emergency	√
• [illegible] on board and least risk location	√
• [illegible] incapacitation	√

(32)

TRAINING RECORD., FFS - LESSON 1

NAME :- AMR EL SHAFEI CREW POSITION:- F/O

AIRLINE: Flash Airlines TYPE:- B 737-300-400-500

Briefing		**Cruise**	
Training plan	S'	Normal procedures	S'
Operation philosophy			
Preflight		**Descent , Approach**	
Normal procedures	S'	Normal procedures	S'
Supplementary Normal procedures	S'		
Engine start		**Landing**	
Normal procedures	S'	Normal procedures	S'
Additional training item	S'		
Taxi- out & takeoff		**Taxi - in & park**	
Normal procedures	S'	Normal procedures	S'
Climb			
Normal procedures	S'		
Demonstration fight	S'		

REMARKS

INSTRUCTOR [signature] DATE 22-6-2002

(33)

TRAINING RECORD FFS - LESSON 2

NAME :-AHR EL SHAFEI........ CREW POSITION:----F/O.........
AIRLINE: Flash Airlines TYPE:----B-737-300-400-500

Briefing
- Set up MCP ,CDU
- Engine inoperative flight characterstics

Preflight
- Set up MCP ,CDU
- After start checklist

Engine start
- Normal procedures

Taxi- out & takeoff
- Rejected T/O
- T/O engine failure after V II
- T/O engine failure after V I
- Wind shear near VR

Climb
- Normal procedures

Cruise , Descent
- Hydraulic system A loss

Approach , Landing
- One engine inop. manual , F/D ILS approach
- One engine inop. Visual traffic Patterns full stop.
- One engine inop. Landing
- Wind shear training
- Wind shear flight path control
- Hold
- A/P ,A/T ,F/D VOR approach , Full stop landing

Taxi - in & park
- Normal procedures

REMARKS
....
....
....
....
....
....
....

INSTRUCTOR DATE 23-06-2002

(34)

TRAINING RECORD, FFS – LESSON 3

NAME :-- AHR EL SHAEF .... CREW POSITION:---- F/O

AIRLINE: Flash Airlines TYPE:--- B 737 – 300/400/500

Briefing

Review item in phase of flight [S]

Preflight

Normal procedures [S]

Engine start

Aborted engine starts [S]

Taxi- out & takeoff

Normal procedures [S]

Rejected T/O [S]

T/O engine failure after V I [S]

Normal T/O [S]

Climb

Wheel well fire [S]

Runaway stabilizer [S]

Bus off [S]

Loss of both engine driven gen. [N/A]

Cruise, Descent

Rapid depressurization [S]

Emergency descent. [S]

Steep turns [S]

Approach to stall recovery [S]

Approach, Landing

One engine inop. A/P , F/D

,VOR approach, circle to land, full [S]

One engine inop. ILS approach [S]

,missed approach [S]

Hold [S]

Taxi – in & park

Normal procedures. [S]

REMARKS

INSTRUCTOR [signature] DATE 28 – 06 – 2002

TRAINING MANUAL

TRAINING RECORD FFS - LESSON 4

NAME :-AMR EL SHAFEI CREW POSITION:---F/O

AIRLINE: Flash Airlines TYPE:---------B.737-300/400/500

Briefing

Full auto flight for precision app. SI
Review item in phase of flight SI

Preflight

Normal procedures SI
Reduced thrust computation SI

Engine start

Aborted starts (1) SI
Aborted starts (2) SI

Taxi- out & takeoff

Normal procedures SI
No autopilot & F/D SI
Reduced thrust takeoff SI
Flap retraction SI

Climb

Normal procedures SI
Max angle climb SI
Econ climb SI

Cruise

Steep turns SI
Approach to stall recovery SI

Descent ,

Normal procedures SI
Economy path descent SI
Arrival procedure SI

Approach ,Landing

Normal procedures SI
A/P , A/T ,(no F/D) autoland
ILS approach SI
Touch & go landing SI
Row data F/D ILS , T&GO. SI
A/P ,A/T ,F/D VOR approach SI
Touch & go landing SI

Taxi - in & park

Normal procedures SI

REMARKS

INSTRUCTOR DATE 25-08-2002

(36)

TRAINING MANUAL

TRAINING RECORD .FFS - LESSON 5

NAME :-AMREL SHAFI ---- CREW POSITION:----F/O
AIRLINE: Flash Airlines TYPE:----------B 737-300/400/500

Briefing

Set up MCP ,CDU [S']
Engine inoperative flight characterstics [S'] [S']

Preflight

Set up MCP ,CDU [S']
After start checklist [S']

Engine start

Normal procedures [S']

Taxi- out & takeoff

T/O engine failure after V1(1) [S']
T/O engine failure after V1(2) [S']
T/O engine failure after V1(3) [S']

Climb

Normal procedures [S']

Cruise, Descent

Approach, Landing

One engine inop. A/P , F/D [S']
No A/T ILS approach [S']
Missed approach [S']
One engine inop. manual , F/D [S']
No A/T ILS approach [S']
Full stop landing [S']
Normal T/O , manual Row data
F/D ILS , T&GO [S']
Loss of both engine driven gen. [S']
Manual ILS , T&GO. [S']
A/P ,A/T ,F/D VOR approach
, circle to land rejected landing [S']
A/P ,A/T ,F/D ILS approach [S']
Visual traffic patterns [S']

Taxi - in & park

Normal procedures [S']

REMARKS

INSTRUCTOR [signature] DATE 26-06-2002

TRAINING MANUAL

TRAINING RECORD FFS - LESSON 6

NAME :- AHR EL SHAFI CREW POSITION:- F/O

AIRLINE: Flash Airlines TYPE:- B 737-300/400/500

Briefing

Set up MCP ,CDU	S1
Engine inoperative flight characterstics	S1

Preflight

Set up MCP ,CDU	S1
After start checklist	S1

Engine start

Normal procedures	S1

Taxi- out & takeoff

Rejected T/O	S1
T/O engine failure after V II	S1
T/O engine failure after V 1	S1
Wind shear near VR	S1

Climb

Normal procedures	S

Cruise , Descent

Hydraulic system A loss	S1

Approach , Landing

One engine inop. manual , F/D ILS approach	S1
One engine inop. Visual traffic Patterns full stop.	S1
One engine inop. Landing	S1
Wind shear training	S1
Wind shear flight path control	S1
Hold	S1
A/P ,A/T ,F/D VOR approach , Full stop landing	S1

Taxi - in & park

Normal procedures	S1

REMARKS

HE IS REDY FOR CHECK RIDE.

INSTRUCTOR [illegible signature] DATE 03-6-2002

(38)

TRAINING MANUAL

TRAINING RECORD FFS - LESSON 7

NAME :- AMR EL SHAFEI CREW POSITION:- F/O

AIRLINE: Flash Airlines TYPE:- B 737 - 300/400/500

Briefing

Review item in phase of flight ✓
Set up MCP ,CDU ✓

Preflight

Set up MCP ,CDU ✓
After start checklist ✓

Engine start

Fast start ✓

Taxi- out & takeoff

Normal procedures ✓
Normal T/O ✓

Climb

Normal procedures ✓

Cruise, Descent

Approach, Landing

A/P ,A/T ,no F/D VOR approach , full stop landing. ✓
Hold. ✓
Jammed stabilizer visual traffic pattern full stop landing.(Capt) ✓
ILS approach full stop landing , ASS. Flaps. ✓
Hydraulic System A &B failure Manual rev. ✓
Visual traffic patterns all up Flap (capt.) ✓

Taxi - in & park

APU fire F/O ✓
Enc. fire on 400' (capt.) ✓
Passenger evacuation ✓

REMARKS

HE HAS PASSED IR CHECK RIDE
SATISFACTORY WITH GOOD
PERFORMANCE.

INSTRUCTOR DATE 30 - 06 - 2002

TRAINING MANUAL

TRAINING RECORD FFS - LESSON 8

NAME :- AMR EL SHAFEI CREW POSITION:- F/O

AIRLINE: Flash Airlines TYPE:- B 737-300/400/500

Item	Mark
Briefing	
Review item in phase of flight	S
Preflight	
Normal procedures	S
Engine start	
Normal procedures	S
Taxi- out & takeoff	
Rejected T/O	S
T/O engine failure after V 1	S
Normal T/O	S
Climb	
Wheel well fire	S
Runaway stabilizer	S
Cruise, Descent	
Steep turns	S
Approach to stall recovery	S
Holding	S
Engine fire	S
Wing /body over heat	S
Bleed or pack trip	S
Rapid depressurization (capt)	S
Emergency descent.	S
Approach , Landing	
One engine inop. F/D , VOR approach, circle to land (capt)	S
V1 cut One engine inop. , ILS Approach , missed approach	S
Taxi - in & park	
Normal procedures	S

REMARKS

HE HAS PERFORMED T.O AND LANDING AS BASE TRAINING AND HE IS REDY FOR AR RETRAINING

Dr. [signature]

ATR 1443

INSTRUCTOR [signature] DATE 07-07-2003

iv- Personal situation
To be completed by the OPS Group

1.5.2.3. 72-hour history of the F/O:
Refer to interviews included in pages 72-73 of the Factual Report

1.5.2.4. Interviewing the individuals who trained and flew with the F/O (including ground and simulator instructors)
None available

1.5.2.5. Interviewing CAA inspectors who flew with F/O.
Interviews to be carried out by OPS Group

1.5.2.6. Interviewing former head of operations at Flash Airlines
(No official former head of operation in Flash Airlines)

1.5.2.7. Additional factual documentation (F/O)

Number of days the F/O had been working since his last day off.
Refer to Factual Report

F/O interpersonal characteristics, including perceptions of fellow pilots regarding their capability for assertiveness.
All available information is available in pages 72-73 Factual Report

Reported proficiency information. Outcome and comments from training records and proficiency check forms.
Refer to 1.5.2.2 (iii)

Spatial disorientation or upset recovery training received at Flash Air AI196
According to CAA regulations, Spatial Disorientation training is not mandatory
No available documents from Flash Airline concerning SD training.
Inputs from different investigation partners are needed.
According to and CAA regulations, Upset Recovery training is not mandatory
Upset Recovery Training recommendation may be included in the Recommendations Chapter.

F/O's flying proficiency and cockpit style from fellow pilots, instructors, and/or check pilots.
Not available

1.5.3 The Observer

Background:

The Observer “Ashraf Abdel Hamid” was completing his training as a first officer for Flash Airlines.

Beginning of his flying career:

Training at USA

ISIS Airman Report CAIS Information - Basic Information
Cert Pfx: Cert No: 2440980 Cert Sfx: Soc.Sec.No: 620480104
Name: ABDELHAMID, ASHRAF Name Sfx:
DOB: 1961 10 25 Sex: M Hair: BROWN Eyes: BROWN Ht: 68 Wt: 154
POB: CAIRO, EGYPT
Status: Info: Name/Address Source: Airm
Date of Address Update: 2004 03 10 Citizenship: USA
Street: PO BOX 414 County: 065
City: PALM DESERT State: CA Zip: 92261-0414
Country:

TOT CIVIL HOURS: 03750 TOT MIL HOURS: 00400

ISIS Airman Report CAIS Information - Medical
Cert Pfx: Cert No: 2440980 Cert Sfx: Information
Medical Information for: ABDELHAMID, ASHRAF
Class: First
Certificate Desc.: LIMITED
Medical Date: 2003 01 28 Medical ID#: 200001408794
Restriction:
MUST HAVE AVAILABLE GLASSES FORNEAR VISION.

ISIS Airman Report CAIS Information - Certificate
Cert Pfx: Cert No: 2440980 Cert Sfx: Information
Specl Purp Pilot Info ABDELHAMID ASHRAF
Cert-Level: COMMERCIAL PILOT (FOREIGN BASED)
Rating/Level:
AIRPLANE SINGLE ENGINE LAND/COMMERCIAL PILOT (FOREIGN BASED)
INSTRUMENT AIRPLANE/COMMERCIAL PILOT (FOREIGN BASED)
Type Rating/Level:
Date of Issue: 1991 10 17 OrgDOI: Update Date: 1991 10 17
Seal: Black Cert Status: Active

ISIS Airman Report CAIS Information - Certificate
Cert Pfx: Cert No: 2440980 Cert Sfx: Information
Specl Purp Pilot Info ABDELHAMID ASHRAF
Certificate Limitations
ISSUED ON BASIS OF AND VALID ONLY WHEN ACCOMPANIED BY CANADIAN PILOT LICENSE NO. C275467. ALL LIMITATIONS AND RESTRICTIONS ON THE CANADIAN PILOT LICENSE APPLY. NOT VALID FOR AGRICULTURAL AIRCRAFT OPERATIONS.
INSTRUMENT AIRPLANE (U.S. TEST PASSED).

ISIS Airman Report CAIS Information - Certificate
Cert Pfx: Cert No: 2635768 Cert Sfx: Information
Pilot Information for: ABDELHAMID ASHRAF

Cert-Level: AIRLINE TRANSPORT PILOT
Rating/Level:
AIRPLANE MULTIENGINE LAND/AIRLINE TRANSPORT PILOT
Type Rating/Level:
Date of Issue: 2000 06 15 OrgDOI: Update Date: 2001 06 21
Seal: Blue Cert Status: Active

ISIS Airman Report CAIS Information - Previous Certificate
Cert Pfx: Certificate No: 2440980 Cert Sfx:
Previous Certificate for: ABDELHAMID ASHRAF

Previous Certificate Information:
Pfx Cert Num. Sfx Cert Date Cert Level/Type

NO PREVIOUS CERTIFICATE INFORMATION AVAILABLE

ISIS Accident/Incident (AID) Report Airman Accident/Incident
Airman Name: ABDELHAMID, ASHRAF Cert #: 002440980
Accident Date: 02/15/2001 Air Agency Cert #:
Accident Event: GENERAL AVIATION ACCIDENT Source: .4
Type of Accident: LOSS OF DIRECTIONAL CONTROL
Accident Location--------
City: SAN DIEGO State: CA

Aircraft Involved--------
N-Number: N4922D
Make: CESSNA Model: 172N

ISIS Accident Incident Report Full AID Text Page No.: 1
Case number: 4922D20010215115931 of 3
Jump to page: __ AID Text

ON FEBRUARY 15, 2001, ABOUT 1516 HOURS PST, A CESSNA 172N, N4922D, VEERED OFF THE RUNWAY AND COLLIDED WITH A TAXIWAY SIGN DURING LANDING ROLLOUT ON RUNWAY 28L AT THE MONTGOMERY FIELD, SAN DIEGO, CA. THE AIRPLANE WAS SUBSTANTIALLY DAMAGED. NEITHER THE AIRLINE TRANSPORT CERTIFICATED PILOT NOR PASSENGER WAS INJURED. PLUS ONE FLYERS, INC., IN SAN DIEGO, OPERATED THE AIRPLANE. VISUAL METEOROLOGICAL CONDITIONS PREVAILED AND AN INSTRUMENT FLIGHT RULES FLIGHT PLAN WAS FILED. THE PERSONAL FLIGHT WAS PERFORMED UNDER 14 CFR PART 91, AND IT ORIGINATED IN SCOTTSDALE, AZ. ABOUT 1135. AIRPORT PERSONNEL REPORTED THAT THE COLLISION OCCURRED ABOUT 1,000 FEET UPWIND OF THE RUNWAY'S THRESHOLD. THE AIRPLANE IMPACTED THE TAXIWAY "C" SIGN, AND VEERED OFF THE RUNWAY. THE AIRPLANE CAME TO A STOP ABOUT 200 FEET NORTH OF THE RUNWAY. THE PILOT STATED THAT DURING THE LANDING ROLLOUT, AS THE AIRPLANE WAS DECELERATING THROUGH ABOUT 50 KNOTS, THE LEFT WING SUDDENLY LIFTED UP. THEREAFTER HE LOST CONTROL OF THE AIRPLANE. HE ADDITIONALLY REPORTED THAT HE WAS UNAWARE OF THE REASON FOR THIS OCCURENCE. NO MECHANICAL MALFUNCTIONS WERE REPORTED WITH THE AIRPLANE.

ON FEBRUARY 15, 2001, ABOUT 1516 HOURS PACIFIC STANDARD TIME, A CESSNA 172N, N4922D, VEERED OFF THE RUNWAY AND COLLIDED WITH A TAXIWAY SIGN DURING LANDING ROLLOUT ON RUNWAY 28L AT THE MONTGOMERY FIELD, SAN DIEGO, CALIFORNIA. THE AIRPLANE WAS SUBSTANTIALLY DAMAGED. NEITHER THE AIRLINE TRANSPORT CERTIFICATED PILOT NOR PASSENGER WAS INJURED. PLUS ONE FLYERS, INC., SAN DIEGO, OPERATED THE AIRPLANE. VISUAL METEOROLOGICAL CONDITIONS PREVAILED, ANDAN INSTRUMENT FLIGHT RULES FLIGHT PLAN WAS FILED. THE PERSONAL FLIGHT WAS PERFORMED UNDER 14 CFR PART 91, AND ORIGINATED IN SCOTTSDALE, ARIZONA, ABOUT 1235 MOUNTAIN STANDARD TIME. AIRPORT PERSONNEL REPORTED THAT THE COLLISION OCCURRED ABOUT 1,000 FEET UPWIND OF THE RUNWAY'S THRESHOLD. THE AIRPLANE IMPACTED THE TAXIWAY "C" SIGN AND VEERED OFF THE RUNWAY. THE AIRPLANE CAME TO A STOP ABOUT 550 FEET FARTHER UPWIND OF THE SIGN AND ABOUT 200 FEET NORTH OF THE RUNWAY. THE PILOT STATED TO THE NATIONAL TRANSPORTATION SAFETY BOARD INVESTIGATOR THAT DURING THE LANDING ROLLOUT, AS THE AIRPLANE WAS DECELERATING THROUGH ABOUT 50 KNOTS, THE LEFT WING SUDDENLY LIFTED UP. THEREAFTER, HE LOST CONTROL OF THE AIRPLANE. HE ADDITIONALLY REPORTED THAT HE WAS UNAWARE OF THE REASON FOR THIS OCCURRENCE. NO MECHANICAL MALFUNCTIONS WERE REPORTED WITH THE AIRPLANE. IN THE PILOT'S PARTIALLY COMPLETED ACCIDENT REPORT, HE INDICATED THAT WHEN THE AIRPLANE WAS "ALMOST HALF WAY DOWN THE RUNWAY" THE LEFT WING ROSE UP, AND THEREAFTER HE LOST CONTROL OF THE AIRPLANE AS IT "VIOLENTLY" VEERED OFF THE RUNWAY. THE PILOT ALSO REPORTED THAT WHEN HE WAS ON FINAL APPROACH THE TOWER CONTROLLER REPORTED THAT THE WIND WAS FROM 270 DEGREES AT 6 KNOTS.

Enforcement for Airman: ABDELHAMID, ASHRAF Recs: 0
Using Certificate: 002440980 (Specl Purp Pilot In thru: 0
A search of EIS data by LAST NAME found 0 other matches, Press F5 to view
Jump to VIOL. DATE ____________ Sort by column: 1 A of: 0
Viol.Date Status Rgn Case# Related case#

NO RECORDS FOUND

Enforcement for Airman: ABDELHAMID, ASHRAF Recs: 0
Using Certificate: 002635768 (Pilot) thru: 0
A search of EIS data by LAST NAME found 0 other matches, Press F5 to view
Jump to VIOL. DATE ____________ Sort by column: 1 A of: 0
Viol.Date Status Rgn Case# Related case#

NO RECORDS FOUND

Inspection for Airman: ABDELHAMID, ASHRAF Recs: 1
Using Certificate: 002440980 (Specl Purp Pilot In thru:
Jump to: RECORD ID _____________ Sort by column: 1 A of:
Record ID Activity Code FAR Status Start Date Completion

NO RECORDS FOUND

Inspection for Airman: ABDELHAMID, ASHRAF Recs: 1
Using Certificate: 002635768 (Pilot) thru:
Jump to: RECORD ID ______________ Sort by column: 1 A of:

Record ID	Activity Code	FAR	Status	Start Date	Completion

NO RECORDS FOUND

Interview with Brother of observer Pilot/ Ashraf Abdel Hamid:

Captain/Alaa El Saadany Training Captain with EgyptAir was interviewed by Dr. Adel Fouad and Captain Shaker Kelada who said that Ashraf Abdel Hamid was a lively person sociable and easy to get along with, was friendly confident and out spoken. Asked about his career as a pilot he said that he started his initial training in Cairo than went to Canada and obtained Canadian citizenship and Canadian pilot license and flew single engine planes. He then went to the USA and also obtained USA citizenship and flew there on single engine and Lear jets had a total of around 4000 hrs.

On a family visit to Egypt, he was persuaded by Captain\ Sombaty (Operations Manager of Flash Airline), a colleague and personal friend to stay in Egypt and fly for Flash. He had attended B737 ground school course and was due for examination two days after the accident. He flew as an observer with Captain Sombaty who was assisting him to complete his B737 qualification.

Correction:

The following statement included in page 15 of the factual report should be deleted: Airline training procedures require a certain amount of observation time prior to serving as an active crew member. The observer was assigned to this flight to observe as a part of that training requirement.

The following statement should replace it:

Ashraf Abdel Hamid was flying as an observer as it is common practice for operators in Egypt is to assign pilots joining an airline or upgrading to a new type to fly as an observer on the type to be flown to get acquainted with company routes and procedures of the operator and type

CAA regulations regarding observation time:
N/A

Flash Airline policy regarding observation time:
As required

1.5.4 Maintenance Engineer

Engineer Mostafa Erfan graduated from the National Civil Aviation Training Institute on September a6th 1972. He worked as a mechanic for the Kuwait Airways for twenty years during which he received the following training courses:

1- B 747-269B Mechanics Familiarization during the period from Feb 17th 1979 to March 3rd 1979. (Kuwait Airways).
2- Airbus Mechanics Familiarization Course during the period from October 6th to October 18th 1984 (Kuwait Airways).
3- B767 Mechanics Familiarization A& C Course during the period between February 7th to February 19th, 1987 (Kuwait Airways).

In 1991 he attended the Cessna 188 course at DEVCO training center, and then he got his Egyptian license without type rating (LWTR) No 1525 on August 1st 1992 which is valid until July 27th, 2004.

He joined Flash Airlines two years ago; during these two years he had the following training and exams:

1- B737-300 type course at EgyptAir approved training center during the period from December 22nd, 2002 to February 27th, 2003.
2- Basic Indoctrination Course during the period from 13-14 June 2003.
3- An On Job Training for 9 months on Flash Airlines B737-300 fleet.
4- An approval authorization exam for the engine on November 2nd, 2003 and for the airframe November 3rd, 2003.

His approval No: 014	Valid until: July 26th, 2004	Issued on: Nov 28th, 2003
LWTR No: 1525	Valid until: July 27th, 2004	issued on: August 1st, 1992

1.6 Airplane Information

1.6.1 Airplane History

The accident airplane was a Boeing model 737-3Q8 airplane, serial number 26283, and was equipped with two CFM56-3 engines. The airplane was delivered on 22 October 1992 to an aircraft lessor. Since that time, it had been leased to several different operators and had carried US, UK, and Egyptian registration marks. The airplane had been operated by Flash Airlines since June 2001. At the time of the accident, the airplane carried Egyptian registration marks SU-ZCF and had accumulated 25603 flight hours and 17976 cycles.

Aircraft Type	: B737-3Q8
Minimum Crew	: 2 (Pilot and Copilot)
Registration Marks	: SU-ZCF
Serial Number	: 26283
Manufacture Date	: October 1992
Line Number	: 2383
Variable No	: PQ294
Interior Configuration	: Total 148 Economy Class
ECAA Minimum Number of Flight Attendant	: 3

1.6.2 Cockpit Instrumentation

The airplane was equipped with an electronic flight instrument system (EFIS) which provides displays for most of the airplane's navigational systems. The major displays provided by the EFIS are: color displays of pitch and roll; navigational maps; weather; radio altitude and decision height; and autopilot and flight path information. The EFIS also provides displays of: airspeed; ADF/VOR bearings; ILS data; and stall warning information. There are two separate display screens for each pilot, the electronic attitude direction indicator (EADI) and the electronic horizontal situation indicator (EHSI). The EADI is mounted just above the EHSI in front of each pilot. In addition to the EADI and EHSI, each pilot's panel includes an airspeed indicator, a radio digital distance magnetic indicator (RDDMI) which displays directions and distance to radio navigation aids, an altimeter, a vertical speed indicator (VSI), and a clock. See Figure 1.6.2-1 for a simulated view of the captain's panel showing these instruments.

Figure 1.6.2-1 Example Captain's Instrument Display

1.6.2.1 Electronic Attitude Direction Indicator (EADI)

The Electronic Attitude Director Indicator (EADI) provides a multicolor display of airplane attitude, airspeed, flight director commands and various other data. The primary display is an artificial horizon which depicts the pitch and roll of the airplane. The artificial horizon line which separates the upper blue portion of the display from the lower brown portion moves up and down as the airplane pitches and tilts *left and right as the airplane rolls.* The display is designed such that the artificial horizon line that appears on the display is always parallel with the real horizon. Pitch and roll data for the captain's and first officer's EADI are supplied by separate left and right inertial reference units. In independent standby attitude indicator is installed on the captain's panel inboard of the EADI. In addition to attitude information, the EADI displays a moving airspeed scale along the left side and ground speed in the lower left corner. The upper portion of the EADI is called Flight Mode Annunciator (FMA). This area is used to display the current operating modes of the autoflight system to the crew. The FMA is separated into four separate areas in which are displayed (from left to right), the autothrottle mode, pitch mode, roll mode, and autopilot mode. See section 1.6.4 for further information about the autopilot and flight director.

An example EADI screen is shown in Figure 1.6.2.1-1.

Figure 1.6.2-2 Example EADI Display – In this example, the airplane is pitch is 7.5 degrees above the horizon and the roll angle is 20 degrees to the left, airspeed is 220 knots, ground speed is 238 knots, the autopilot mode is "N1", the pitch mode is "MCP Speed", the roll mode is "heading select", and the autopilot mode is "Flight Director"

1.6.2.2 Electronic Horizontal Situation Indicator (EHSI)

The EHSI provides horizontal navigation information to the flight crew. There are a number of display formats available which can be separately selected by the flight crew. On the accident flight, both the captain and first officer were using the expanded VOR display which is described below

Figure 1.6.2-3 Example EHSI Display – Expanded VOR Mode – Flag notes denote various options

1.6.3 Lateral Flight Control System

Lateral control is provided by an aileron and two flight spoilers on each wing which are controlled by either control wheel in the flight deck. A pair of cables transfers motion of the control wheels to motion of an aft quadrant located near the main landing gear wheel well.

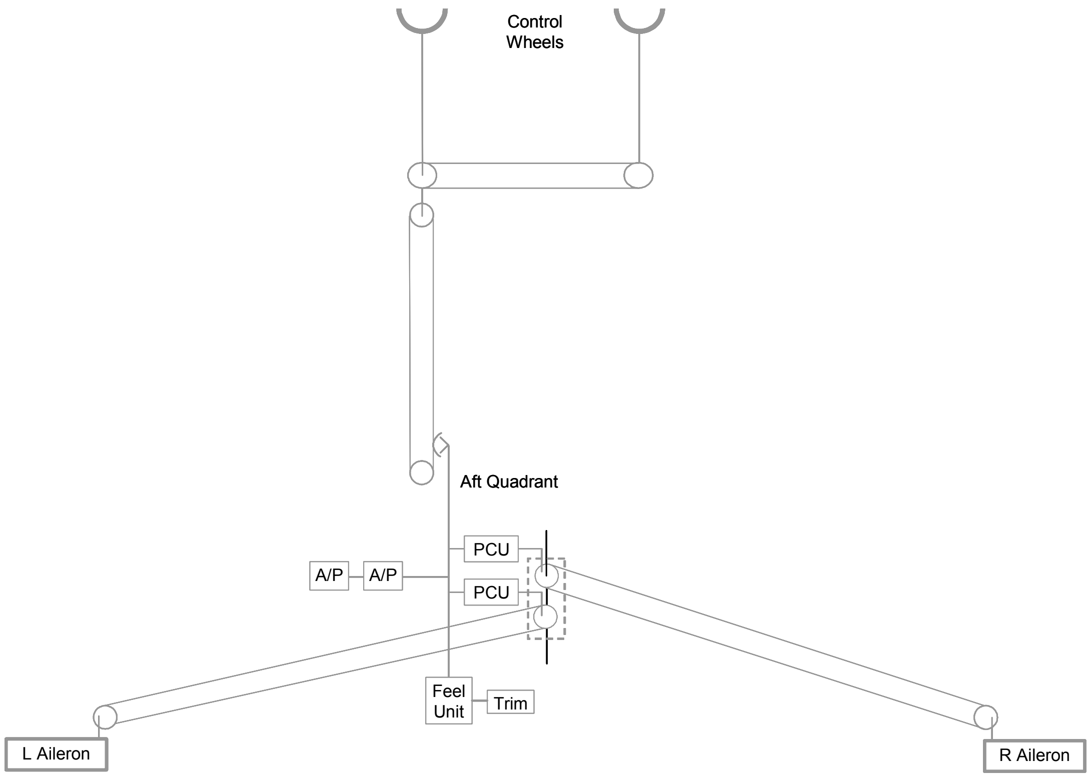


Figure 1.6.3-1 Simplified Lateral Control System Schematic – Additional cable runs, jam protection features, and spoilers not shown

The aft quadrant is connected to the control valves of two independent hydraulic power control units. Either unit alone is capable of providing full-range lateral control. Artificial feel and wheel centering for lateral control is provided by the feel unit which consists of a centering cam, roller, and spring. Aileron trim is accomplished with aileron trim switches on the aft end of the pilots' control stand. The trim switches command an electro-mechanical linear actuator which repositions the feel and centering mechanism.

Two flight spoilers on each wing operate in conjunction with the ailerons through a spoiler mixer mechanism connected to the aft quadrant.

Two autopilot actuators are connected to the aft quadrant. Either or both of the autopilot actuators can move the aft quadrant, resulting in movement of both the control wheels and the ailerons. One feature of the lateral control system is that the position of the ailerons always corresponds to the position of the wheel. Even if aileron trim or the autopilots are in use, the relationship between the position of the control wheels and the position of the aileron is unchanged.

1.6.4 Autoflight System

The digital flight control system consists of a centrally located mode control panel (MCP), two independent flight control computers (FCCs), two aileron autopilot servo actuators, and two elevator autopilot servo actuators. Together, these components provide the functions of the autopilot and flight director. The MCP, located above the pilot's front panels and below the windows, provides a centralized location for all autopilot, flight director and autothrottle control selections. The FCCs receive flight crew requests and airplane sensor inputs which are used to generate flight director displays and, if the autopilot is engaged, command flight control surfaces.

1.6.4.1 Autopilot System

Each of the two FCCs provides an independent autopilot and are designated A and B. Each FCC is connected to one aileron and one elevator servo actuator. The autopilot is engaged by selecting the appropriate push button on the MCP. If certain required conditions are met, the selected autopilot will synchronize the roll channel autopilot servo to the current position of the ailerons. Following synchronization, the autopilot servo will clamp onto the aft quadrant and begin moving the ailerons (and control wheel) in response to the flight path selected by the crew. A similar process occurs in the pitch channel.
During cruise, only a single autopilot is used. If the second autopilot is selected, the first autopilot is disengaged when the second autopilot engages. During approach, both autopilots may be used together for two channel operation.

Engage Switches:

The pushbuttons are normally-open, momentary contact switches which control an engage relay by means of electronic circuitry. Either channel can be engaged in CWS or CMD by pressing the appropriate switch. A light illuminates on the switch to indicate that the autopilot has been engaged, and each switch may be disengaged by pressing the switch again. Loss of power (28v) or ground to the relay will cause it to de-energize and the pushbutton switch light will go out. If CWS or CMD is pressed while either power or ground for the relay is not provided, the relay will not energize and the pushbutton light will not illuminate.

Autopilot Actuators: (Figure 1.6.3-1)

A- Four autopilot actuators are installed, two in the main wheel well area for the aileron axis and two in the aft fuselage for the elevator axis. One set, aileron and elevator, is controlled by the A autopilot system and the other set by the B autopilot system. The units are mechanically linked to aileron and elevator power control units (PCU's) which drive the flight control surface

B- A pressure switch is installed on each actuator. The switch closes when normal hydraulic pressure is applied to the PCU. The engage interlock voltage is wired through the switches.

C- Autopilot system electrical signals operate valves which modulate hydraulic pressure to displace a hydraulic piston and provide a rotary output to the respective PCU. Control and position signals are provided by the following components which re installed on each actuator: engage solenoids, transfer valve, linear variable displacement transducer (LVDT), and pressure regulator.

1- Engage Solenoids

Two engage solenoids are on each autopilot module. Each solenoid is an electrically operated valve (28 volts dc) which, when energized, applies hydraulic pressure within the module. The ACTUATOR solenoid provides hydraulic pressure to the TRANSFER VALVE and to the DETENT SOLENOID. The detent solenoid provides hydraulic pressure to the detent mechanism. Both solenoids are energized at A/P engagement. However, the detent solenoid is delayed slightly from the ACTUATOR solenoid. The solenoids are attached to the module with four bolts. Electrical pins mate with wiring within the module when the units are installed. Hydraulic pressure is powered into the units through ports which align when the solenoids are installed.

2- Linear variable displacement transducer (LVDT)

The linear variable displacement transducer provides positional information for the actuator piston and provides an ac output signal in proportion to piston position.

3- Pressure regulator

The pressure regulator is in line with the hydraulic passages between the detent solenoid and the detent piston (which locks the actuator piston to the output crank). The regulator bypasses hydraulic fluid to limit the output force (autopilot authority) of the actuator when the unit is backdriven or stalled

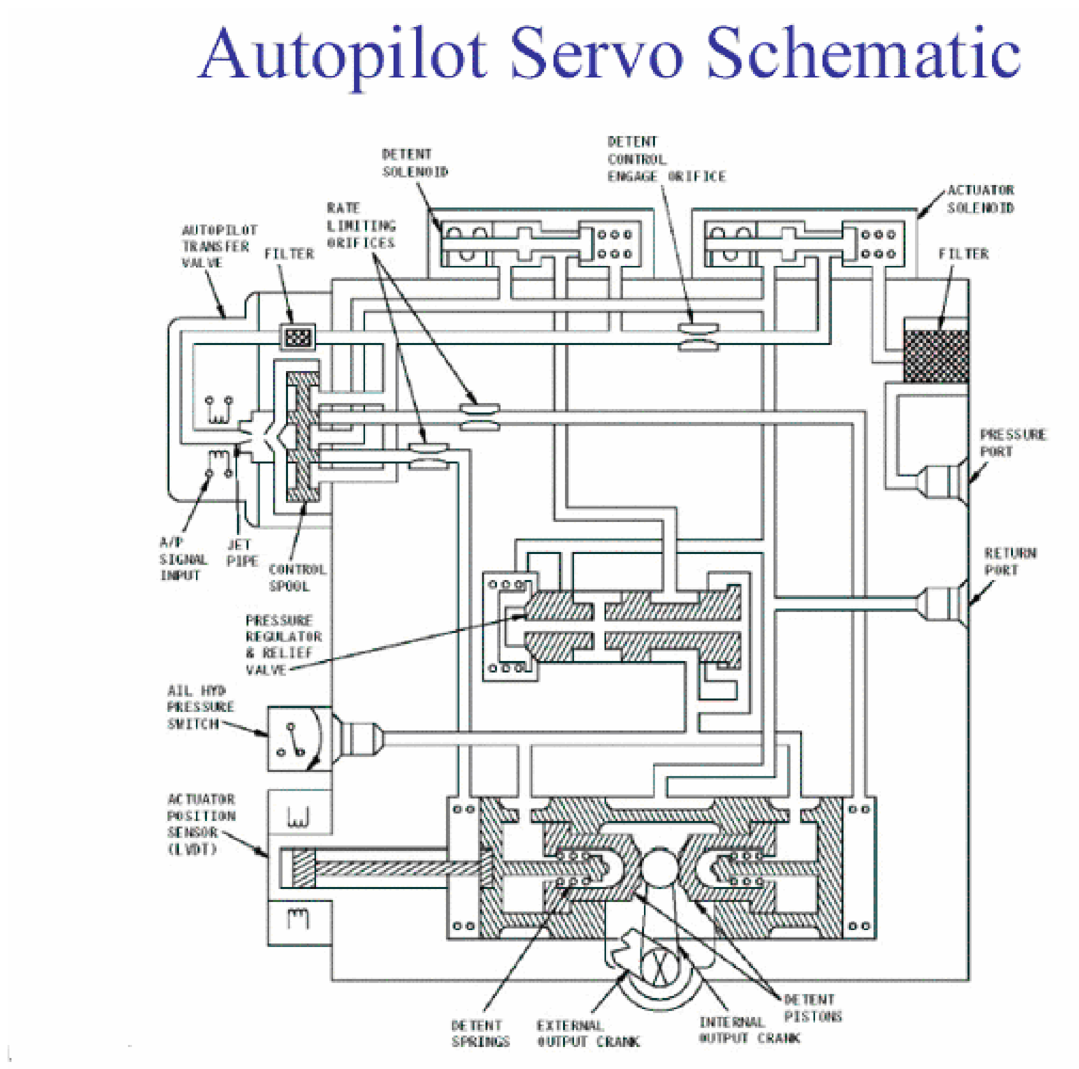


Figure 1.6.4-1 Autopilot Actuator

1.6.4.2 DFCS Modes

Various pitch and roll modes are available and can be manually selected by the flight crew via the MCP. In some cases, automatic mode changes can occur in response to invalid sensor inputs, certain flight conditions, or selection of other compatible modes. During the accident flight, the following modes were used:

Take-Off

Flight director guidance during takeoff is initiated by pressing the take-off/go-around (TOGA) switches located on the throttles. In addition to selecting flight director TOGA mode, these switches also signal the autothrottle to advance the throttles to takeoff power. In TOGA mode, the flight director provides pitch and roll guidance to the crew. If TOGA is engaged, no other modes may be selected until an altitude of 400 ft AGL.

Level Change

Level Change is an autopilot and flight director pitch mode during climb or descent. In this mode, a fixed thrust level is selected and the autopilot will control the angle of climb or descent to hold the airplane's speed to the value selected in the speed window on the MCP. If the airplane is flying faster than the selected speed, the autopilot will command the airplane to pitch nose up to a steeper climb angle, thus lowering the speed. If the airplane's speed is slower that the selected speed, the autopilot will command the airplane to pitch nose down to a shallower climb angle, which will result in a speed increase. When Level Change mode is selected, "MCP SPD" appears in the pitch section of the flight mode annunciator (FMA) on the EADI. As the airplane nears the selected altitude, the autopilot will automatically transition to altitude acquire ("ALT ACQ" on the MCP) and then altitude hold ("ALT HOLD"). Level Change is available for both autopilot and flight director operation.

Heading Select

Heading select is an autopilot and flight director roll mode used to turn to and hold a specific heading. The MCP contains a selected heading window, as well as a bank angle limit selector. The window displays the selected heading, a number from 0 to 359, corresponding to the magnetic heading selected by the crew. The value can be changed by rotating the heading selector knob located immediately below the window. A bank angle limit selector is concentrically located on the same shaft. In Heading Select, the crew can select the bank angle of autopilot turns from 10° to 30° by 5° increments. When heading select mode is engaged, the autopilot will command a turn towards the selected heading. The airplane will bank to the selected bank angle limit and will remain at that limit until the current heading begins to approach the selected heading. As the turn nears completion, the bank angle is reduced until the airplane is flying wings level on the selected heading. The direction of turn is determined to be the shortest turn between the current heading and the selected heading. If the airplane is already in a turn and the selected heading is changed to pass through the reciprocal bearing (greater than 180°), the direction of turn will reverse and the autopilot will seek the shortest turn to reach the selected heading. Heading select is active when "HDG SEL" appears in the roll section of the FMA and is available during both flight director and autopilot operation.

Control Wheel Steering - Roll

Control wheel steering roll (CWS R) is a separate autopilot roll mode designed to reduce crew workload. CWS R mode may be manually selected via the CWS pushbutton on the MCP. In this case, flight director modes may be selected via the mode selection push buttons on the MCP. If certain conditions required for other

roll modes are not met or if a certain amount of force is applied to the control wheel, the autopilot mode will automatically change from CMD to CWS R.
In CWS R, the autopilot commands the aileron servo to follow the motions of the control wheel. If the pilot releases the control wheel, the autopilot provides aileron commands to hold the current bank angle and thereby continue the commanded turn. However, if the bank angle when the wheel is released exceeds 30°, the autopilot will command a roll back to a bank angle of 30°. If the bank angle when the wheel is released is less than 6°, the autopilot will command wings level and maintain the current heading. CWS R is active when "CWS R" appears in the autopilot section of the FMA. When the autopilot enters CWS R mode, the roll section of the FMA will be blank and the flight director roll command bar disappears. However, other roll flight director modes may subsequently be engaged.

MCP Speed

MCP speed is a pitch mode of the autopilot that is used when climbing or descending. In this mode, a fixed thrust level is selected and the autopilot will control the angle of climb or descent in order to hold the airplane's speed to the value selected in the speed window on the MCP. If the airplane is flying faster than the selected speed, the autopilot will command the airplane to pitch nose up to a steeper climb angle, thus lowering the speed. If the airplane's speed is slower that the selected speed, the autopilot will command the airplane to pitch nose down to a shallower climb angle, which will result in a speed increase. MCP speed mode is active when "MCP SPD" appears in the pitch section of the flight mode annunciator (FMA) on the EADI.

Operation of the FD vertical bar with “Heading Select” disengagement as the AP engages.

Refer to Boeing AMM 22-11-00 Page 38

1.6.4.3 Flight Director

The flight director is provided as an aid to the crew during manual flight and as a way for the crew to monitor the operation of the autopilot. The flight director consists of pitch and roll command bars which appears as horizontal and vertical magenta lines on the EADI respectively. When the airplane is following the flight path selected on the MCP, the flight director bars will be centered on the EADI display. If the airplane is flying below the selected path, the horizontal pitch bar will begin to rise on the display, indicating that a nose up command is required to regain the path. As the airplane regains the selected path, the command bar returns to the centered position. Similarly, if the airplane is following the selected roll path, then the vertical roll command bar will be centered. If the airplane deviates to the right of the selected path, the roll command bar will deviate to the left indicating that a bank to the left is required. It should be noted that the flight director roll command bar indicates the additional bank that is required to fly the selected path. For example, with the bank angle limit set to 20 degrees, if the airplane is in a 20 degree right bank as part of a 90 degree right turn, the flight director bar will be centered on the display because the airplane is on the desired path (in this case a 20 degree bank turn). As the turn continues and the airplane approaches the selected heading, the flight director bar will begin to move to the left indicating that the airplane should begin rolling left, out of the turn, and back towards wings level.

1.6.5 Engines:

General:

The airplane is powered by two CFM56-3C1 engines (Serial numbers are: "engine #1" 857 352, "engine #2" 856 481. The engine is a dual rotor axial flow turbofan. The N1 rotor consists of a fan, a three stage booster section connected by a through shaft to a four stage low pressure turbine. The N2 rotor consists of a high pressure compressor and a high pressure turbine. The N1 and N2 rotors are mechanically independent.

The main engine control (MEC) schedules fuel to provide the thrust called for by the forward lever setting. The fuel flow is further refined electronically by the power management control. Thrust is set by positioning the thrust levers. The thrust levers are positioned automatically by the autothrottle system or manually by the flight crew. The forward thrust levers control forward from forward idle to maximum. The reverse thrust control thrust from reverse idle to maximum reverse

Engine indications are displayed on the center instrument panel by the Engine indication System (EIS). N1, EGT, N2, and FF/FU are the primary indications and are displayed as both digital readouts and round dial/ moving pointer indications. N1, EGT, N2 have operating and caution ranges and limits indicated by green and yellow bands and red dials. Oil Pressure and oil temperature indications are displayed with a round dial/moving pointer. Operating and caution ranges and limits are displayed with green and yellow bands and red dials. The oil quantity indicator displays a digital readout of quantity as a percentage of full

The low pressure spool (fan) rotating speed (N1) of the left engine (position 1) does not appear representative of the high pressure spool (core) rotating speed and fuel flow on the DFDR read out; however, the indicated core speed is working as well as the other parameters, which indicate most probably a data recording or read out problem for N1. (refer to Exhibit B FDR Group Factual Report)

1.6.6 Airplane Maintenance[5]

1.6.6.1 Maintenance Records

1.6.6.1.1 Maintenance Program Summary- Flash Airlines B737-300

Flash Airlines has developed their customized Maintenance Program. The Maintenance Program last revision was issued on January 20, 2003 and approved by the (ECASSA), Airworthiness Central Administration under approval No MOCA/FLASH/737-300/MP/R2/03. This Maintenance Program incorporated guidance from Boeing Maintenance Planning Document (MPD) Revision July 2002.

The Periodic Service Check is accomplished on layover. The check is performed as a walk-around, visual inspection and servicing when necessary.

The Routine Inspection is performed every 250 flight-hours (A Checks). A Routine Inspection Procedures Index is used to assure the check is completed. The Inspection consists of a visual inspection of the aircraft's major components, servicing, operational and functional checks.

1.6.6.1.2 Last Heavy Check

The last "A" check accomplished by Flash Airlines and the last "C" check and Structural inspection carried by Braathens Engineering and Maintenance for the SU-ZCF were as follows:

"8A" Check :	December 12, 2003	at 25423:50 Flight Hours
"7C" Check :	From Nov 3 - Dec 21, 2002	at 23531 Flight Hours
Last SI Check :	From Nov 3 - Dec 21, 2002	at 23531 Flight Hours
Last 15 M Check:	From Nov 3 - Dec 21, 2002	
Last 45 M Check:	From Nov 3 - Dec 21, 2002	

`

1.6.6.1.3 Repairs and Alterations

---

[5] See the Maintenance Records Group Report for full details

1.6.6.1.4 Aircraft Total Hours and Cycles

Total Hours at Time of Accident:	25603 Flight Hours
Total Cycles at Time of Accident:	17976 Flight Cycles

1.6.6.1.5 Weights and Balance Summary

According to the Egyptian Civil Aviation Regulations, ECAR 91 Appendix H attachment 1 the aircraft has to be reweighed every three years. Furthermore, aircraft must be reweighed if the effect of modifications on the mass and balance is not accurately known. Flash Airlines aircraft was weighed last time on December 19, 2002 in Braathens SAFE, Stavangar, Norway and recalculated by Flash Airlines after the reinforced cockpit door modification installation on November 1st, 2003, and the results were as follows.

Empty Weight	:	70794 lbs
Moment	:	45921358.6 lb.in
% AMC	:	17.42%

1.6.6.1.6 Engines: CFM56-3C-1

Engines are maintained in accordance with Flash Airlines Maintenance program and are based on the life cycle limits of the rotating components. CFMI Engine maintenance manual together with the applicable Service Bulletins and engine teardown data determine these limits. Overhauls are performed at the SNECMA MOROCCO Workshop or other authorized Certified Repair Station.

	Engine Position 1 (Left Side)	Engine Position 2 (Right Side)
Serial Number (ESN)	857352	856481
Time Since New (TSN)	25314 hours	26045 hours
Cycles Since New (CSN)	17815 Cycles	17523 Cycles
Date of Installation on SU-ZCF	August 1998	Jan 3, 2003
Time Since Last O/H	8741 Hours	1828 Hours
Cycles Since Last O/H	6188 Cycles	909 Cycles

Engine Disks and First Limiters Status as per attached (refer to exhibit A, Maintenance Records Group Factual Report- attachment 02)

1.6.6.1.7 Engine Monitoring System

Flash Airlines engines are monitored as per the manufacturer (CFMI) engine condition monitoring program (Sage Trend Analysis program). Sage is a set of programs which collectively provide the functionality to perform standard condition monitoring of CFMI engines. Sage is designed to work in an interactive environment with the major analytical calculations performed at scheduled times throughout the day.
By reviewing the engine condition monitoring trend reports for both engines, they showed no deviation or important shift, the EGT margin is considerable ok. Engine

Condition Monitoring cruise trend sheet is attached (refer to exhibit A, Maintenance Records Group Factual Report- attachment 14)

1.6.6.1.8 Flight Data Recorder/ Cockpit Voice Recorder.

Description	P/N	S/N	Test Date	Workshop
Sundstrand FDR	980-4120-DXUN	10069	O/H 18/11/02	Air Transport Avionic
CVR	93A100-80	57994	Tested 12/11/02	Braathens

1.6.6.1.9 Aircraft Status

1.6.6.1.9.1 Minimum Equipment List (MEL)

Flash Airlines Customized Minimum Equipment List CMEL was approved by the ECAA on Feb 23rd, 2002

1.6.6.1.9.2 Aircraft Condition Report (A/C deferred defects)

No deferred items were recorded in the aircraft deferred snags log Book

1.6.6.1.9.3 Type Certificate Data Sheet

FAA “Type Certificate Data Sheet” number A16WE (revision 28, dated October 29, 1999) for B737-300 series airplanes was reviewed for compliance conditions and limitations. No discrepancies were noted. Type certificate Data Sheet attached (refer to exhibit A, Maintenance Records Group Factual Report- attachment 15)

1.6.6.1.9.4 Supplemental Type Certificates

Supplemental Type Certificates supplied by Flash Airlines were reviewed. One Supplemental Type Certificate was issued to install a Matsushita Audio Entertainment System in accordance with General Aerospace Engineering Order No GA-23-1042. STC attached (refer to exhibit A, Maintenance Records Group Factual Report- attachment 16)

1.6.6.1.9.5 Airworthiness Directives (AD) Summary and Service Bulletins (SB) Summary

The Airworthiness Directives compliance status list dated January 12th, 2004 (attachment 03) submitted by Flash Airlines was reviewed with special concentration on AD’s carried out after the aircraft was leased by Flash Airlines.
The previous AD’s Status which was forward to Flash Airlines during the aircraft delivery was reviewed with special attention to those AD’s which had an open or repetitive status.
All listed Airworthiness Directives and Service Bulletins have been complied with no discrepancies noted.
Service Bulletins compliance status attached ((refer to exhibit A, Maintenance Records Group Factual Report- attachment 17)

1.6.6.1.9.6 Prior Discrepancies/Accidents Involving SU-ZCF

Per Flash Airlines records, no previous accidents were reported for the accident aircraft.

1.6.6.1.9.7 Logbook Forms

- The original aircraft Technical Log Book sheets were reviewed for the last three months from September 27, 2003 through December 2003 for discrepancies, no trends or discrepancies noted.
- Copy of the technical log book sheets listing as well as a list of technical log book entries and relevant corrective actions are attached to "Exhibit A Maintenance Records Group Factual Report"

1.6.6.2 Contracted Repair Station Listing

- EgyptAir Maintenance and Engineering
- Braathens Maintenance and Engineering
- Snecma Morocco Engine Services.

1.6.6.3 Maintenance Performed on the A/C before the accident flight.

A Maintenance done by Flash Airlines Tech Staff at Cairo Base

The Last Check carried out on the accident aircraft was an 8A check. The check was performed by Flash Airlines Technical staff at Cairo base station. The check work package included visual inspection, servicing, and operational checks. A routine borescope inspection for the HPT nozzles guides vanes and the combustion chamber was performed on both engines by EgyptAir with no findings. The work package was reviewed with no discrepancies.

B Transient Check carried out for the Flight VCE/SSH

A transient check was carried out in VCE by engineer Motaz Awad on January 2nd, 2004 a copy of the interview with him is attached

C Last PDC carried out for the Accident Flight

On *3 January 2004*, aircraft SU-ZCF, a daily check was performed in accordance with the approved checklist as per the company maintenance schedule at SSH station just before the flight. The check was carried out by the accident flight on board engineer.

This was reported by incoming engineer

D Aircraft refueling before the Accident Flight and investigations done after the accident.

The Refueling was done for the accident aircraft on January 3rd, 2004 between 03:50 and 04:00 local time (UTC +2) for the quantity of 3500Liters by truck no 4432 belonging to Misr Petroleum Company (service invoice is attached) (refer to exhibit A, Maintenance Records Group Factual Report- attachment10)

The same truck had refueled the following airplanes on the same date:

- EgyptAir aircraft A320 SU-GBF at 02:05 LT before the accident aircraft.
- Taroum aircraft YR-GGX at 04:20 LT after the accident aircraft.
- EgyptAir aircraft SU-GCD at 05:10 LT after the accident aircraft.

After the aircraft accident, three fuel samples had been drawn from the Misr Petroleum fuel truck on January 3rd, 2004 at 12:45 local time. One of them was used for a dehydrated Copper Sulfate capsule field inspection for fuel water content, which was satisfactory (attachment 11). The two others samples were sent to the following laboratories for analysis:

- The Egyptian Petroleum Research Institute Nasr City, Cairo (refer to exhibit A, Maintenance Records Group Factual Report- attachment 12)
- Misr Petroleum Company, Ghamra Research Center Laboratory (refer to exhibit A, Maintenance Records Group Factual Report- attachment 13)

The Egyptian Petroleum Research Institute (EPRI) performed the Jet (A-1) fuel analysis, ASTM distillation and ASTM D-86. The results of these analyses show that all the values are within limits except for the water content, ppm, which is 48, and the max is 30.

The Misr Petroleum Co, Ghamra Research Center Laboratory performed the same analyses done by (EPRI), all the results comply with the requirements of DES-STAN 91-91 issue 4 (DERD 2494) and the joint fueling systems “Checklist” specifications for JET A-1 issue 19 Sept, 2002.

1.6.6.4. The maintenance log sheets for the flights after 12/31/03
Lost on board and no copies prior to departures from SHH which is a violation of ECAA regulations. Necessary measures are taken by ECAA to ensure adherence.

1.6.6.5. The lack of write-ups on the TOGA problem and slat indication that existed on the entire 25-hours of FDR.
Status of the technical log is not known due to being lost on board.

1.6.7 Weight and Balance:[6]

The Flash Airlines weight and balance calculations provided to the flight crew contained the following information[7]:

---

[6] See attached Performance Factual Report

[7] See attached Flash Airlines Load and Trim Sheet.

	Weight (kilograms)	
Total Traffic Load	11,450[8]	
Dry Operating Mass	33,200	
Actual Zero Fuel Mass	44,650	
Maximum Zero Fuel Mass	47,627	
Takeoff Fuel	7,000	
Actual Takeoff Mass	51,650	
Maximum Takeoff Mass (Certificate Limit)	63,276	
Landing Mass	49,650	
Maximum Landing Mass (Certificate Limit)	51,709	

Zero Fuel Mass Center of Gravity (CG)	20.0%	
Zero Fuel Mass CG Limits[9]	8.0% Forward	28.4% Aft
Takeoff Mass CG	18.0%	
Takeoff Mass CG Limits[10]	6.7% Forward	27.9% Aft

Stabilizer Trim settings for takeoff were:

Flaps 1 or 5	4 ¾ Units
Flaps 15	3 ¾ Units

According to the Flash Airlines Flight Operations Manual Chapter 6, Paragraph

6.1.8.3, Passenger and Baggage Masses, the following chart was published:

	Male	Female
All flights except	88kg	70kg
Holiday	83kg	69kg
Children	35kg	35kg

---

[8] A review of the Load and Trim Sheet indicated a low 100-kilogram error. The total cargo weight plus passenger mass (Total Traffic Load) should be 11,550 kilograms. Correspondingly, the Zero Fuel Mass, Takeoff Mass, and Landing Mass will be low in error by the same 100-kilogram Mass.

[9] Estimated Zero Fuel Mass CG limits were derived from Flash Airlines Load and Trim sheet index chart based upon a Zero Fuel Mass of 44,650 kilograms.

[10] Estimated Takeoff Mass CG limits were derived from Flash Airlines Load and Trim sheet index chart based upon a Takeoff Mass of 51,650 kilograms.

A review of the accident Load and Trim Sheet indicated a Passenger Mass of 9,450kg. If 350kg is removed for 10 children (10 x 35kg) the result is 9,100kg. Dividing the 125 adult passengers into the 9,100kg would give an average value of 72.8kg per adult passenger.

Using the table above, and assuming 50% Male and 50% Female adult passengers, the worst-case difference in weight calculation would be the following:

The average weight of male and female for all flights except would be 88kg + 70kg / 2 = 79kg per adult passenger.

79kg x 125 passengers = 9,875kg

The represents an increase in weight of 775kg.

Using this value for Load and Trim calculations provided the following information:

Takeoff CG	18.2%MAC
Zero Fuel Mass CG	20% MAC
Takeoff Trim (flaps 5)	4 ¾ Units

These worst-case differences in values for passenger weight still fall within structural and calculated limitations for the airplane.

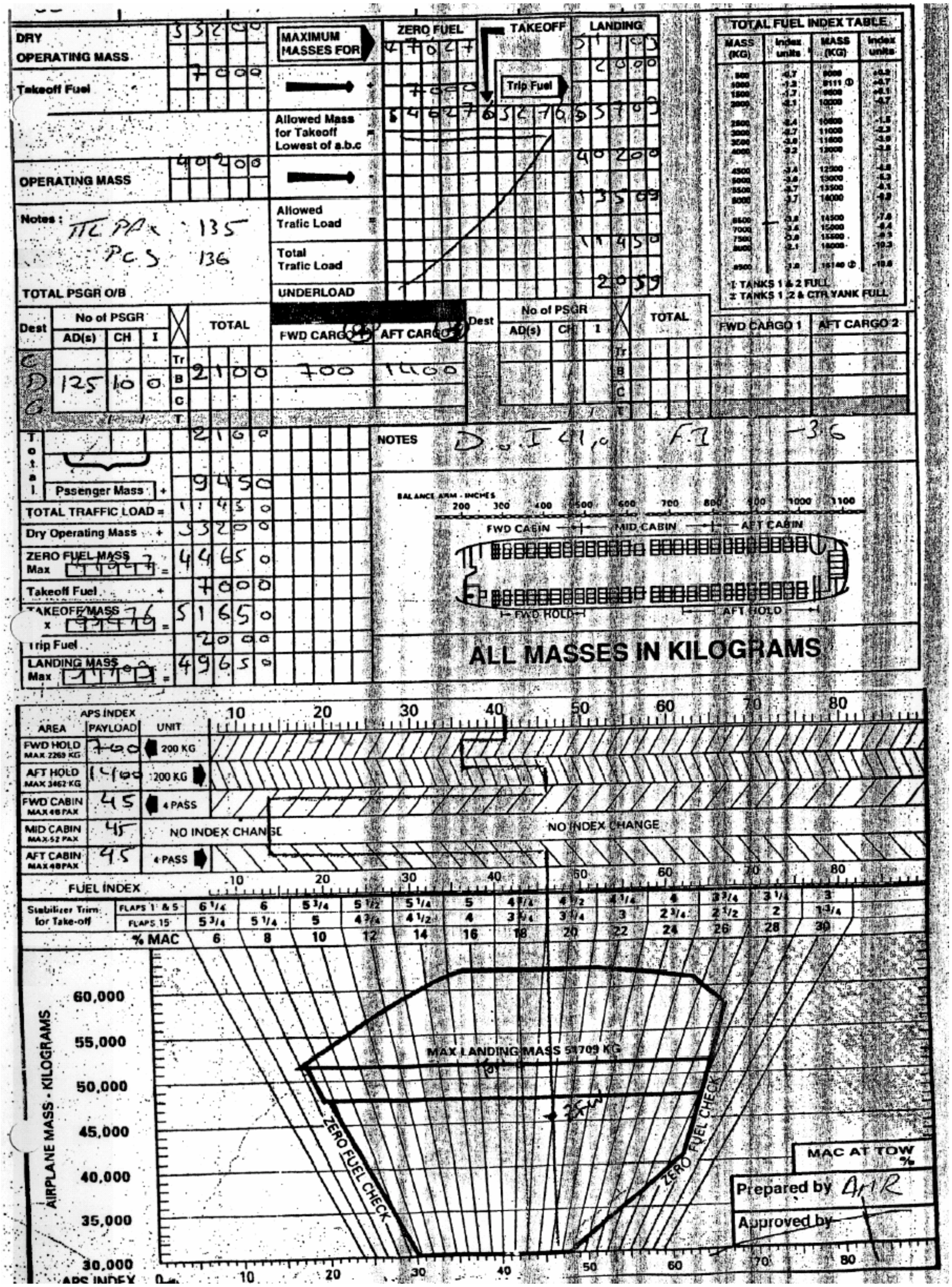


Fig 1.6.5-1 Copy of the Accident Flight Load Sheet

1.7 **Meteorological Information:** [11]

Sharm El Sheikh does not provide Automatic Terminal Information Service (ATIS).

The SSH weather at 0200Z was reported as:

270 degrees at 06 knots, ceiling and visibility OK (CAVOK)[12], temperature 17 degrees Celsius, dew point minus 6 degree Celsius, altimeter 1011 HectoPascals (hPa), No significant change (NOSIG)[13].

The SSH weather at 0300Z was reported as:

280 degrees at 08 knots, ceiling and visibility OK (CAVOK) temperature 17 degrees Celsius, dew point minus 6 degree Celsius, altimeter 1011 HectoPascals (hPa), No significant change (NOSIG).

---

[11] Refer to exhibit D, Airplane performance Group Factual Report

[12] CAVOK, this terminology means ceiling above 5000 ft and visibility above 10 kilometers.

[13] NOSIG, this terminology means no significant change expected

1.8 Aids to Navigation:

1.8.1 Maps, charts, etc.

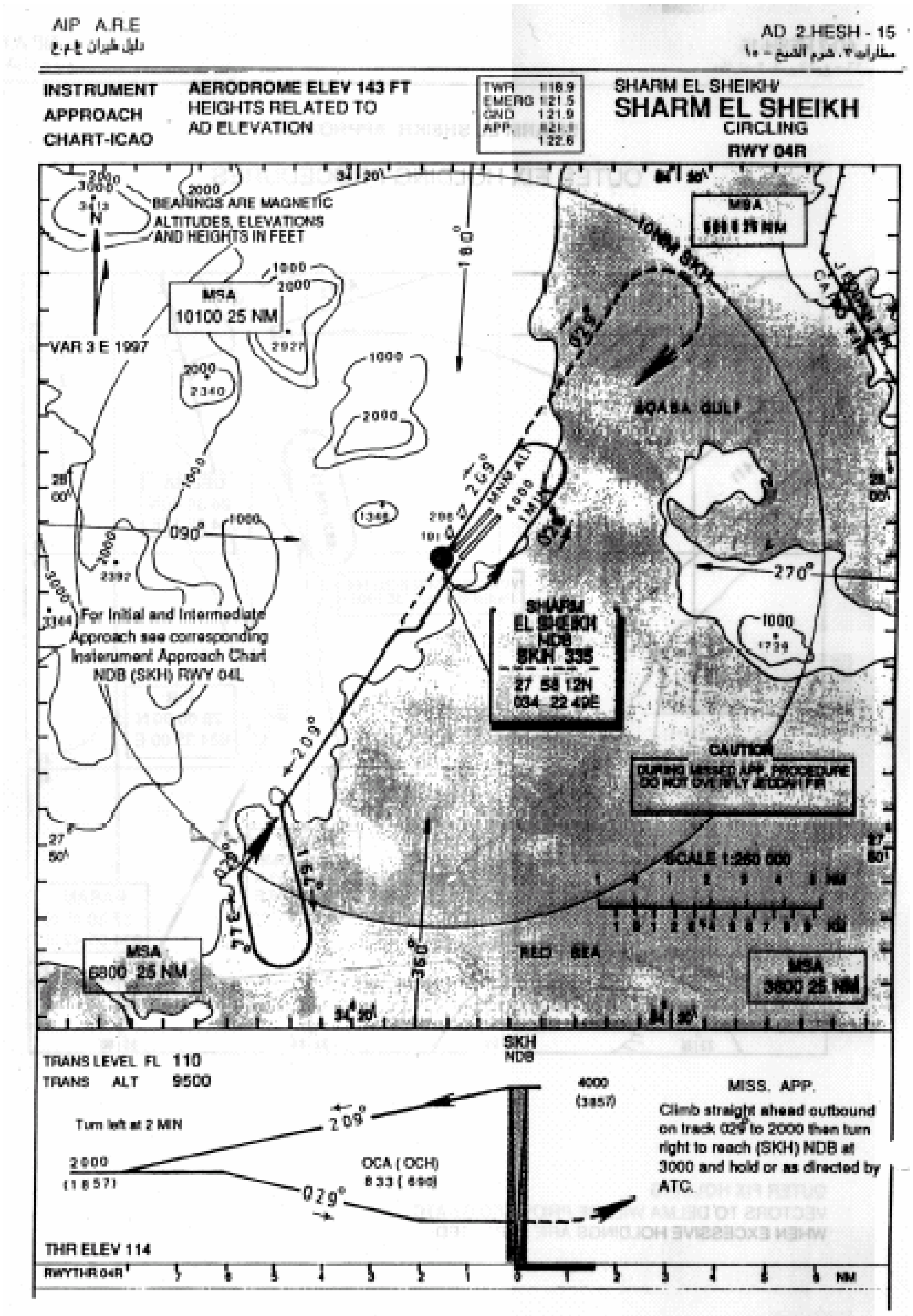


Fig. 1.8.1-1

SHARM EL SHEIKH
Minimum Radar Vectoring Altitude Chart

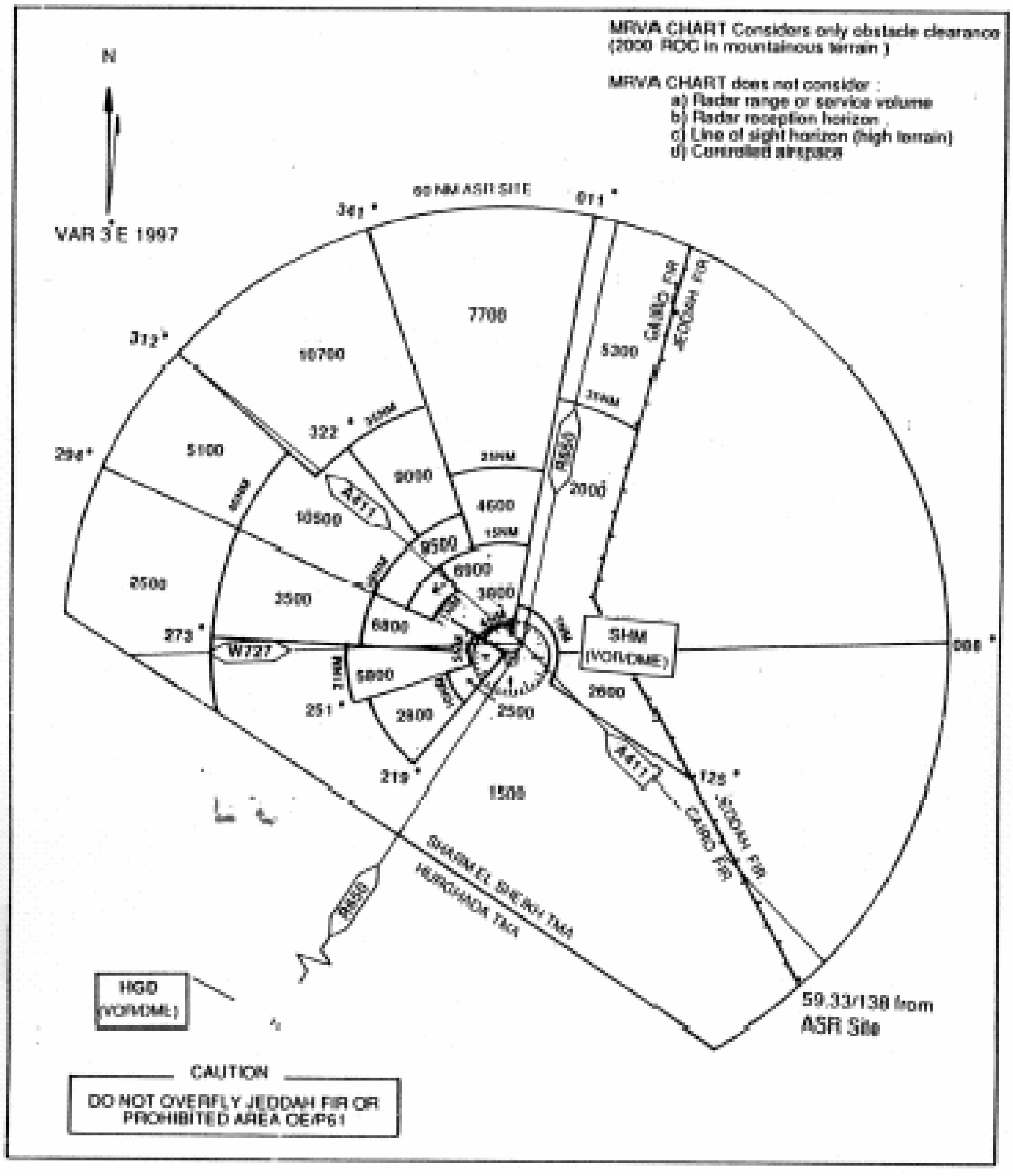


Fig. 1.8.1-2

1.8.2 Sharm el-Sheikh Radar[14]

1.8.2.1 General Specifications:

ASR 12 Radar (Aircraft Surveillance Radar)
Secondary 250 nm
Primary 60 nm
15 revolution per minute approximately (Scan time = 4.13 sec)
Radar site location: 2758.057n/ 03421.985e (Lat. 27.96762 Degree north, Long. 34.36642
Degree east)
Radar Elevation: 299.3 ft

1.8.2.2 Radar data

The radar data from Sharm were reviewed and compared with FDR data to produce flight path

1.8.3 Hurgada Radar

1.8.3.1 General Specifications:

Radar site location: 2711.546N/03346.814E (Lat. 27.19243333 Degree north, Long. 33.78023 Degree east)
Radar Elevation: 176.344 ft

1.8.3.2 Radar data

The radar data from Hurgada were reviewed and compared with FDR to produce flight path

---

14 See attached Performance Factual Report

1.9. Communications

1.9.1 ATC communications with FSH604

1-Frequency 118.9

Time	Speaker	Content	CVR/FDR time
02:30:00 FSH604	C >P	FSH604 Sharm el Sheikh	02:28:59
	P > C	Go ahead sir	
	C > P	FSH604 copy Cairo MET condition time 02:22(GMT) S/W 210/10 kt VIS 6 Km W Sky clear D 01 QNH 1013	
		Confirm due point please	
	P > C	D 01	
	C > P	Roger Copied next call when ready ان شاء الله يا كابتن	
02:33:43 FSH604	P > C	Check tower FSH604	02:31:55
	C > P	FSH604 go ahead	
	P > C	Our stand destination Cairo request startup clearance	
	C > P	Startup approved QNH 1011 RWY 22R	
	P > C	Startup approved RWY 22R . FSH604 thank you	
02:38:26 FSH604	P > C	Sharm el sheikh FSH604 ready to taxi out	02:36:39
	C > P	04 taxi right D_A hold short 22R	
	P > C	Roger to the right via D_A to holding point 22R. FSH604	
02:39:50 FSH604	C > P	604 ready to copy	02:38:01
	P > C	Go ahead sir	
	C > P	FSH604 destinations Cairo as filed climb initially FL 140 1673 on the squak	
	P > C	Ok destination Cairo via flight plan rout 140 initially 1673 on the squak FSH604 and we have total pax 135 ان شاء الله	
	C > P	135 and confirm SU-ZCF	
	P > C	I do confirm	
	C > P	ان شاء الله continue taxi via “A” , line up 22R . Advice ready for departure	
	P > C	Roger next call ready ان شاء الله	
02:42:25 FSH604	P > C	604ready to departure	02:42:38
	C > P	FSH604 S/W 280/13 Kts left turn to intercept R306 clear for take off 22R	
	P > C	Clear for take off RWY 22R with left turn to establish 306 Sharm VOR our FSH604 clear for take off	
Time	**Speaker**	**Content**	**CVR/FDR time**
02:43:22 FSH604	P >C	FSH604 confirm to the left to establish 306	02:41:35
	C > P	ان شاء الله	

	P > C	And initially 140	
	C > P	ان شاء الله	
	P > C	شكرا	
02:44:49 FSH604	C > P	FSH604 air born time 44 when ready to the left to intercept 306 radial report on course ان شاء الله	02:43:05
	P > C	Roger when ready ان شاء الله left turn to establish 306 Sharm VOR	
02:45:05 MSR227	P >C	Sharm MSR227 السلام عليكم	02:43:19
	C > P	وعليكم السلام ورحمة الله و بركاته MSR227 go ahead	
	P > C	Maintaining FL 120 43 DME inbound to sharm el sheikh and request descent	
	C > P	MSR227 clear SHM VOR visual approach RWY 22R pilot discretion descent 4000 ft. QNH 1011	
	P > C	دلوقتى اد ايه wind هوه حضرتك الـ	
	C > P	Indicated 280/10 kts	
	P > C	Right 04 يا فندم RWY 04 طيب حضرتك ما تشغل	
	C > P	مافيش مشاكل يا فندم straights ILS approach RWY 04L report full establish QNH 1011	
	P > C	Straights approach RWY 04L 1011 next call full establish MSR227	
			End of CVR recording 02:45:06
02:47:45 FSH604	C >	604 position	
02:47:54 FSH604	C >	FSH604 sharm el sheikh	
02:48:06 FSH604	C >	604 sharm el sheikh do you read?	
02:48:17 FSH604	C >	FSH604 sharm el sheikh do you read?	
02:48:28 FSH604	C >	FSH604 sharm el sheikh tower do you read?	
02:48:50 FSH604	C >	FSH604 sharm el sheikh tower do you read?	
02:49:00 FSH604	C >	FSH604 sharm el sheikh tower do you read?	
02:49:08 FSH604	C >	FSH604 sharm el sheikh tower do you read?	
02:50:12 MSR227	C > P	MSR227 could you please to attempt two- way communication with FSH604	
	P >C	حاضر يا فندم	
	C > P	شكرا	
Time	**Speaker**	**Content**	**CVR/FDR time**
	P > P	FSH604 from MSR227	
	P > P	FSH604 from MSR227 how do you read ?	
	P > C	حضرتكnegative contact with FSH604 MSR227	
	C > P	شكرا جزيلا	
	P > C	عفوا	
02:50:36	C > P	MSR227 insight S/W 290/10 Kts clear to land RWY 04L	

	P > C	**Clear to land RWY 04L MSR227**	
02:51:02	**C >**	**FSH604 sharm el sheikh do you read ?**	
02:51:20	**C >**	**FSH604 sharm el sheikh do you read ?**	
02:51:37	**C >**	**FSH604 sharm el sheikh do you read ?**	
02:52:02	**C >**	**FSH604 sharm el sheikh do you read ?**	
02:52:30	**C >**	**FSH604 sharm el sheikh do you read ?**	
02:52:43	**C >**	**FSH604 sharm el sheikh do you read ?**	
02:54:23	**C >**	**FSH604 sharm el sheikh do you read ?**	
02:54:30	**C >**	**FSH604 sharm el sheikh do you read ?**	
02:54:40	**C >**	**FSH604 sharm el sheikh do you read ?**	
02:54:45 **MSR227**	**P > C**	الفلاش رايح فين ولا جاى منين يافندم ؟	
	C > P	يا كابتن الطيارة طلعت**air born** واخذت **left turn** علشان يكسب ارتفاع فوق الميه المفروض كان هوه داخل **over head** وداخل على الـ**route** كنت وقتها حضرتك حوالى **30** ميل او **35** ميل ومن ساعتها مبيرضش عليه	
	P > C	ما تسأل كده نشوف على الرادار باين ولا لأ ؟	
	C > P	مش باين فى الرادار فى القاهرة خالص مفيش اى **Communication**	
	P > C	دخل **left turn** على الجبال؟	
	C > P	يا كابتن **22R** من **Left turn**	
	P > C	هو مش باين ومفيش اى حد خالص **Ok**	
	C > P	ان شاء الله **Clear to land**	
	P > C	**Clear to land MSR227**	
02:55:47	**C >**	**FSH604 sharm el sheikh do you read ?**	
02:56:37	**C >**	**FSH604 sharm el sheikh do you read ?**	
02:56:49	**C >**	**FSH604 sharm el sheikh do you read ?**	
02:58:15	**C > P**	**MSR227 on ground time 58 to the left via F-A-E stand number 14 report marcheller insight**	
	P > C	**TO the left F-A-E next call marcheller insight MSR227**	
	P >C	**Sharm MSR227**	
	C > P	اتفضل يا فندم	
	P > C	احنا سمعنا على **121,5** حد من فلاش بيتكلم يعنى مش عارف **604** ولا فيه طيارة ثانية فلاش	
	C > P	هيه **604** مفيش حاجة غيرها خالص	
	P > C	هوه كان على **121,5** بيتكلم يعنى **ok**	
	C > P	شكرا جزيلا يا فندم	
	P > C	عفوا	
	C > P	ان شاء الله **Ground 121.9 for company information**	
Time	**Speaker**	**Content**	**CVR/FDR time**
	P > C	السلام عليكم **121.9**	
	C > P	عليكم السلام	

Information about the conversation between ATC and MSR 227 translated from Arabic into English.

2:58:15	C>P	
	P>C	
	P>C	Sharm MSR227
	C>P	***Go Ahead Sir***
	P>C	***We heard on frequency 121.5 some one from Flash speaking, I do not know if it is 604 or it is another Flash Aircraft***
	C>P	***It is 604, there is no other aircrafts***
	P>C	***He was speaking on 121.5, so it is O.K.***
	C>P	***Thank you very much Sir***
	P>C	***You're welcome***
	C>P	Ground 121.9 for company information**, *God willing***
	P>C	***Peace be with you 121.9***
	C>P	***And with you***

N.B. Frequency 121.5 was checked no transmission was recorded at the time of the accident with any traffic

1.10. Aerodrome Information

According to the Aeronautical Information Publication (AIP), Sharm el-Sheikh International Airport is located 23 kilometers northeast of the city. The elevation of the airport is 143 feet mean sea level. The airport had two paved parallel runways; 04L-22R and 04R-22L. Both runways were 3081 meters in length and 45 meters in width. Runways 04R and 04L have CAT 1 Approach Lighting System and runways 22R and 22L had Simple Approach Lighting System. Neither runway had runway centerline lights.

According to the AIP Flight procedures, there were no standard departures and standard arrival routes or any other systematic procedures established within Sharm el-Sheikh approach airspace, heading, flight level, speed and or holding instructions shall be specified in approach control clearances to arriving and departing flights as appropriate to meet the requirements of traffic conditions.

Air Traffic Control Services for Sharm el-Sheikh

An Interview with the Director of Radar Airports, National Air Navigation Service Company indicated that at SSH, the local controller and the departure controller were the same person. The previous last flight departure before the accident flight departed about one hour earlier. An arrival flight landed less than 10 minutes after the accident flight departed. Radar was operating but no radar service was provided to the accident flight.

According to the Director, there were no Standard Instrument Departures (SIDs), or Standard Terminal Arrival Routes (STARs) in Egypt. Clearance was provided to the accident flight crew while on the ground and the departure included a left turn at pilot's discretion and to climb to Flight Level (FL) 140 and to intercept the 306 VOR radial. MEA for this sector is 10500 ft.

According to the Director, the prevailing winds at SSH require the use of runway 04L 70%-80% of the year. On the date of the accident, runway 04L was being used. However, sometime during the day prior to the accident, the runway was changed to 22R.

There was no inspection of the runway after notification of the accident, however, it was stated that the landing airplane after the accident did not report debris on the runway. There is a daily runway inspection performed at SSH.

For AIP information, see attachment

1.11. Flight Recorders

1.11.1. Flight Data Recorder[15]

The accident airplane's flight data recorder (SSFDR), part number 980-4120-DXUN S/N 10069, was retrieved from the Red Sea on January16, 2004 by the French Navy. The FDR was immersed in water and sealed in an ice chest and transported to MCA, accident investigation laboratory at Cairo.

- Readout of the FDR was accomplished using the laboratory's playback hardware, Hand held Down Load unit manufactured by ALLIED SIGNAL Part No. 964-0446-001 and recovery/ analysis/ presentation system (RAPS) software.
- In spite of the damage that had occurred to the external case of SSFDR, the internal solid state memory was in good condition and all the available data was retrieved. RAPS considered the recorded signal and data quality to be very good.

- Data plots and tabular listings of each data parameter for the entire accident flight are included in this report as Appendix "exhibit B, FDR Group Factual Report". The entire 25-hour contents of the FDR were also transcribed,

After the cockpit voice recorder (CVR) timing had been compared to the SSFDR vhf microphone keying and Autopilot disengages warning, a time correlation was developed. (refer to exhibit B, FDR Group Factual Report)

[15] See FDR Group Factual Report

1.11.2 Cockpit Voice Recorder[16]

- The accident airplane's Cockpit Voice data recorder (CVR), Fairchild, Part no. 93-A100 – 80, serial no. 57994 was retrieved from the Red Sea on January17, 2004 by the French Navy. The CVR was immersed in water and sealed in an ice chest and transported to MOCA, accident investigation laboratory at Cairo.

- Readout of the CVR was accomplished using the laboratory's playback hardware and software as follow:

  Download Unit:
  A100 CVR play back Deck - Store 4DS
  Audio Analysis System:
  MPL 1024 , 12 Channel Microphone Mixer – Samson
  Filter : PCAP II (Samson)
  Amplifier : Samson - Servo-550 Studio Amplifier
  Software:
  Vegas 4 – Sound Forge 6 –PCAP II

- The recorder consisted of four channels of audio information.

Channel One:	First officer hot mic.
Channel Two:	Area Mic.
Channel Three:	Observer hot Mic..
Channel Four:	Captain hot Mic..

- After the initial retrieved sound task was completed another effort was undertaken with the assistance of BEA expert as follows:

  - The output signal from the tape deck playback machine was too low compared to the recording on the same conditions in BEA. This problem was solved by increasing the output level when the screw of the adjustable gain control was turned clockwise.

  - The sensitivity of the acquisition audio card of the PC was not good enough to capture correctly the audio signal coming from the tape deck player. This problem was solved by changing the value of the "Variable Signal Levels" on the hardware setting of the audio card, from the manufacture value +4 to -10. The gain was increased and the input signal amplified.

  - The speed of the tape was not correct with an interference of the power (115 V, 400 Hz) measured at 375 Hz. It was not possible to adjust properly the speed of the tape with the device installed. This problem is solved by resembling the wave file with a correct ratio (400/375= 1.0665).

---

[16] (refer to exhibit C, CVR Group Factual Report)

- Some high frequencies were missing when doing the spectrum analysis. This problem was solved by using a sampling rate of 32000 kHz instead of 22000 kHz.

- The alignment of the head installed on tape deck player was checked, adjusted and was found satisfactory prior to playback the tape.

A new copy of the CVR was performed. This recorded copy is satisfactory.

1.12. **Wreckage and Impact Information**:[17]

1.12.1 Scope of Site and Wreckage Group Field Notes

The scope of this report is the recovery operations that took place from 3 January 2004 through 5 February 2004 in the Red Sea off Sharm el-Sheikh, Egypt and initial inspection for the recovered parts. Recovery operations initially consisted of the recovery of floating wreckage elements only. Recovery of the underwater wreckage (including FDR and CVR) began when the first ship equipped with a suitable Remote Operated Vehicle (ROV), arrived at the accident scene on 11 January 2004.

This report provides a summary of the recovery operations and documents the wreckage that was identified and recovered.

1.12.2 Recovery Operations

Survival aspects

The initial search for possible survivors and the recovery of bodies were priorities for the rescue and investigation teams. Rescue teams were on site minutes after the accident. They searched for survivors but due to the high energy impact of the aircraft with the sea surface, the depth of the water in this area, their efforts were unsuccessful in recovering any survivors.

Efforts were made to locate human remains by use of deep sea cameras and robots but were also not successful due to the location of the wreckage and the depth of more than 1000 meters.

Floating Wreckage

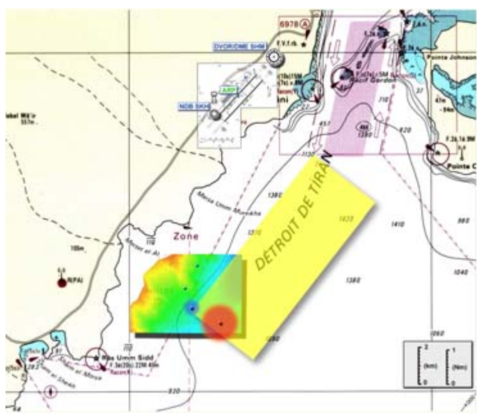


Figure 1.12.4-1 Water depth map

---

[17] Refer to Exhibit E Site and Wreckage Group Factual Report

The floating wreckage which was recovered shortly after the crash was stored in a hangar in Sharm el-Sheikh airport. On 11 January 2004, the Site and Recovery Group met in the hangar for wreckage inspection. The wreckage was then identified (as much as possible), inspected, segregated (aircraft parts or personal effects). Later, the personal effects were transferred to the Egyptian Legal Authority in Sharm el-Sheikh. A database for the floating wreckage was created (including wreckage pictures).

Underwater Wreckage

Because of the depth of the Red Sea in the area where the accident occurred (approximately 1000 meters), specialized recovery resources were required for the submerged wreckage. The French vessels "Ile de Batz" and "Janus II" were contracted to conduct the underwater wreckage survey and recovery. Both vessels were equipped with deep water recovery capabilities consisting of submersible Remotely Operated Vehicles (ROV). The necessary support equipment to accurately locate and map the airplane wreckage was provided by the French Navy. An oceanographic vessel, the "Beautemps-Beaupré" was sent to the accident site to undertake a bathymetry (depth mapping) of the seabed and a survey of tidal currents.

Figure 1.12.4-2 ROV

FDR / CVR Recovery

The initial focus of the underwater recovery operation was finding and retrieving the protected recorders, the Cockpit Voice Recorder (CVR) and Flight Data Recorder (FDR) and mapping the searched areas. Each recorder is equipped with an acoustic transmitter, called a "pinger" that transmits a detection signal that can be used to locate the box. Based on the initial determination of pinger locations, the ROV from Ile de- Batz, Scorpio, began a visual search using its cameras to find the recorders. To refine the location of the pingers, a network of sonobuoys (GIB, GPS Intelligent Buoys), (see Appendix 5 for detailed description of this operation), was employed in a cooperative effort between the French and Egyptian Navies. This method produced a new pinger position accurate to within 10 meters and the ROV was moved to the new location. A visual search of a grid created around the new pinger location resulted in discovery of the FDR on 16 January 2004.

The FDR was recovered by the ROV and taken onboard the Ile de Batz. Custody of the recorder was transferred to the Investigator in Charge, at the port of Sharm El Sheikh.

The pinger of the second recorder (CVR) was initially identified approximately 800 meters north of the first pinger. However, it was decided to continue the visual search using grids in the area where the first recorder was found. This search was successful and resulted in finding of the CVR on 17 January 2004 (approximately 24 hours after the FDR). It was also taken onboard the Ile de Batz and custody was transferred to the Investigator in Charge at the port of Sharm El Sheikh.

FDR underwater Location: N27 52.3605, E34 22.0165.
CVR underwater Location: N27 52.3467, E34 22.0207.

The recorders were both sent to Cairo for read out and analysis.

The focus of the recovery operation then changed to detailed mapping of the wreckage and recovery of selected airplane equipment. In addition, the recovery operation included recovery of any equipment deemed important to the investigation based on the review of the FDR and CVR in Cairo.

Wreckage Mapping

During the structured search for the recorders, the position (latitude and longitude) and description of surveyed wreckage was recorded. Following recovery of the FDR and CVR, additional grids were defined for ROV operations. These grids were used to systematically survey and document the entire wreckage area. The positions of large pieces, such as the three landing gears and the cores of the two engines were identified.

Data from both ships involved in mapping and recovery were consolidated into a single listing of all surveyed wreckage, which is included herein as Appendix 2.

The distribution of wreckage is included within a rectangle of approximately 275 by 440 meters defined by the following corner point coordinates:

North corner:	N 27°52,559	E 34°21,933
East corner:	N 27°52,410	E 34°22,126
South corner:	N 27°52,294	E 34°22,022
West corner:	N 27°52,450	E 34°21,817

Multiple surveys of the area confirmed the containment of the wreckage within these established boundaries.

Recovered Wreckage

The investigation team developed a strategy for wreckage recovery based on the review of the FDR and CVR undertaken in Cairo. Flight control actuation components and flight deck systems were considered as a priority.

A system was developed for recording the description, external dimensions and the location, in latitude and longitude coordinates, of all recovered wreckage pieces. A database of recovered floating wreckage is included herein as Appendix 3. Another database documenting all wreckage recovered by Ile de Batz and Janus II is included as Appendix 4. Both databases reference digital images of all floating and recovered wreckage.

Recovered wreckage was stored aboard the ships in sea water until taken ashore and loaded onto trucks. All of the recovered wreckage is stored in a hangar at Sharm El Sheikh Airport and is under the control of the investigative authorities.

1.12.3 Partial list of the Recovered Wreckage

- Parts of the horizontal stabilizer central section structure (called "Texas Star"), elements of the elevator structure and components of the elevator control system, including both elevator PCU's (Power Control Unit), both autopilot actuators, the feel and centering unit including the feel actuator.
- Horizontal stabilizer jackscrew and actuator gearbox.
- Vertical stabilizer structure with rudder control system components, including the main rudder PCU and standby rudder PCU, the feel and centering mechanism and with the trim actuator.
- Aileron PCU, spoiler mixer and TBD spoiler actuators.

1.12.4 Initial Observations

- The two engines were found approximately 24 meters apart
- The left and right main landing gear assemblies were found in between the two engines
- The recovered thrust reverser actuator was found retracted
- The recovered leading edge flap actuator was found retracted
- The recovered trailing edge flap jackscrew indicates that flaps were retracted
- The stabilizer jackscrew was measured at 7.5 inches between the flat of the ball nut and the flat of the end stop which corresponds to a stabilizer leading edge position between 2 and 3 degrees down or a trim unit setting between 5 and 6 pilot units.[18]

[18] B737-300 Aircraft Maintenance Manual 27-41-00

1.12.5 Wreckage Data bases and Photos

The full data base and photos of the wreckage are on a CD, which is which is available at the Egyptian Civil Aviation Ministry (MCA). This CD contains:

a. A folder with three Excel files for wreckage complete data base.

i. Floating Wreckage data base.

ii. Recovered Wreckage data base.

iii. Underwater Surveyed Wreckage data base.

b. A folder for photos with four sub-folders

i. Floating Wreckage Photos: 104 photos.

ii. Recovered Wreckage Photos: 98 photos.

iii. Underwater Surveyed Wreckage Photos: 330 photos.

iv. Wreckage Recovery Process Photos: 25 photos

1.13. Medical and Pathological Information

1.13.1. Egyptian Air Force – Medical Board Report

From : Egyptian Air Force – Medical Board
To : Chairman of Civil Aviation Medical Board
Subject: Medical records of RET. AVM Kheider Abdullah Saad

1. Sequence of medical records

a) Medically fit for all flying duties as from his first medical examination dated 30/05/1970.
b) Amend to be medically fit for all flying duties to be reexamined every sis months as of 14/07/1982.
c) Amend to be medically fit for all flying duties (remove six months restriction) as of 22/04/1985.
d) Medically fit for all flying duties until his last medical examination dated 08/01/1997.

2. Medical History[19]

a) Admitted to hospital on 06/02/1988, diagnosed (cut wound on left hand) sick leave until 20/02/1988, return to normal duty.
b) Admitted to hospital on 26/04/1999, released on the same day, diagnosed (effusion left knee).
c) Examined on 03/11/1999, fit for all flying duties as per last medical exam.

During Service A.F. Pilots are subjected to the following:

a) Tests for Spatial Disorientation as part of his routine periodic physical examination.
b) Sessions of physiologic training which include:
- Sudden Decompression.
- Certificate.
- Spatial Disorientation Training Chair.

No report was found of any medical factors related to Spatial Disorientation.

[redacted]

[19] During the time from 1997 to 1999 the Captain held an administrive post (Chief of Staff of an Airforce base) with no flying duties.

1.13.2. Medical factors related to SD (Spatial Disorientation):

A. FAA advisory Circular regarding SD

U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: PILOT'S SPATIAL DISORIENTATION | **Date:** 2/9/83 | **AC No:** 60-4A
Initiated by: AFO-840 | **Change:**

1. PURPOSE. To acquaint pilots with the hazards of disorientation caused by loss of visual reference with the surface.

2. CANCELLATION. Advisory Circular 60-4, Pilot's Spatial Disorientation, dated February 9, 1965, is canceled.

3. DISCUSSION.

a. The attitude of an aircraft is generally determined by reference to the natural horizon or other visual references with the surface. If neither horizon nor surface references exist, the attitude of an aircraft must be determined by artificial means from the flight instruments. Sight, supported by other senses, allows the pilot to maintain orientation. However, during periods of low visibility, the supporting senses sometimes conflict with what is seen. When this happens, a pilot is particularly vulnerable to disorientation. The degree of disorientation may vary considerably with individual pilots. Spatial disorientation to a pilot means simply the inability to tell which way is "up."

b. During a recent 5-year period, there were almost 500 spatial disorientation accidents in the United States. Tragically, such accidents resulted in fatalities over 90 percent of the time.

c. Tests conducted with qualified instrument pilots indicate that it can take as much as 35 seconds to establish full control by instruments after the loss of visual reference with the surface. When another large group of pilots were asked to identify what types of spatial disorientation incidents they had personally experienced, the five most common illusions reported were: 60 percent had a sensation that one wing was low although wings were level; 45 percent had, on leveling after banking, tended to bank in opposite direction; 39 percent had felt as if straight and level when in a turn; 34 percent had become confused in attempting to mix "contact" and instrument cues; and 29 percent had, on recovery from steep climbing turn, felt to be turning in opposite direction.

d. Surface references and the natural horizon may at times become obscured, although visibility may be above visual flight rule minimums. Lack of natural horizon or surface reference is common on overwater flights, at night, and especially at night in extremely sparsely populated areas, or in low visibility conditions. A sloping cloud formation, an obscured horizon, a dark scene spread with ground lights and stars, and certain geometric patterns of ground lights can provide inaccurate visual information for aligning the aircraft correctly with the actual horizon. The disoriented pilot may place the aircraft in a dangerous attitude. Other factors which contribute to disorientation are reflections from outside lights, sunlight shining through clouds, and reflected light from the anticollision rotating beacon.

e. Another condition creating restrictions to both horizontal and vertical visibility is commonly called "white-out." "White-out" is generally caused by fog, haze, or falling snow blending with the snow-covered earth surface which may obscure all outside references. Therefore, the use of flight instruments is essential to maintain proper attitude when encountering any of the elements which may result in spatial disorientation.

4. RECOMMENDED ACTION.

a. You, the pilot, should understand the elements contributing to spatial disorientation so as to prevent loss of aircraft control if these conditions are inadvertently encountered.

b. The following are certain basic steps which should assist materially in preventing spatial disorientation.

(1) Before you fly with less than 3 miles visibility, obtain training and maintain proficiency in aircraft control by reference to instruments.

(2) When flying at night or in reduced visibility, use your flight instruments in conjunction with visual references.

(3) Maintain night currency if you intend to fly at night. Include cross-country and local operations at different airports.

(4) Study and become familiar with unique geographical conditions in areas in which you intend to operate.

(5) Check weather forecasts before departure, en route, and at destination. Be alert for weather deterioration.

(6) Do not attempt visual flight rule flight when there is a possibility of getting trapped in deteriorating weather.

(7) Rely on instrument indications unless the natural horizon or surface reference is clearly visible.

5. CONCLUSION. You and only you have full knowledge of your limitations. Know these limitations and be guided by them.

Kenneth S. Hunt

KENNETH S. HUNT
Director of Flight Operations

B- MCA study regarding SD
Refer to Factual Report, page 55 (Dr. Marawan report) and item 1.16.4.
Tests and researches conducted by MCA:

C- Medical records for the captain related to any of the conditions conducive to spatial disorientation.
No report found

1.13.3. Most recent medical certification
A- Date, type
Refer to page 14 of the Factual Report
B- Limitations (if applicable)
None (Refer to page 14 of the Factual Report)

1.13.4. General health information for each crew member.
No Factual information available

1.13.5. Toxicological testing.
No toxicological testing was possible because the bodies were not recovered.

1.13.6. Last civil medical check for Captain
Refer to page 14 of the Factual Report

1.14. Fire

N/A

1.15. Survival Aspects

Refer to 1.12 Wreckage and Impact Information

1.16 Tests and Research

1.16.1. Tests and researches conducted by Boeing and Honeywell:

General:

A. The FDR records the movements of the pilot's controls (e.g. control column, control wheel position and rudder pedals), the movement of the control surfaces (e.g. elevator, aileron and rudder) as well as motion of the airplane (e.g. pitch and roll attitude and heading angle). The performance evaluation was conducted to determine if the control surfaces were responding normally to the pilot's controls and if the airplane was responding normally to movement of the control surfaces.

In order to accomplish this work, Boeing's 737-300 aerodynamic simulation model was used to recreate the accident flight. The simulation calculates the response of the airplane to movement of the flight control surfaces – for example, it can calculate the roll rate resulting from a 10 degree deflection of the ailerons. The simulation has been verified by comparison against actual flight test data and was used for the design and certification of the 737-300 airplane. In addition, the simulation is the basis for 737-300 crew training simulators used around the world. It should be noted that the 737-300 simulation model is essentially a computer program that represents a nominal airplane with nominal engines. Small differences between the simulation and individual airplane's behavior are common and expected due to differences in control surface rigging, engine wear, and other normal tolerances.

B. Performance Evaluation

FDR data are recorded at relatively low sample rates and are recorded from different sources, some of which have inherent biases. Because of these issues, a kinematic consistency (KINCON) process was used to supplement the FDR data and calculate additional parameters to be used in the performance analysis. Kinematic consistency analysis is a general practice for processing flight data (either flight test data or FDR data) to ensure consistency of position, speed, and acceleration data.

C. Baseline Simulation

A baseline simulation recreation of the accident flight was started just as the airplane turned onto the runway and the throttles were advanced, and the simulation was stopped at the end of the FDR data. Because the simulation can calculate the response of the airplane to control inputs, a set of control input time histories (column, wheel, and rudder movements) can be determined that results in the simulation following the same path as the accident airplane. It is important to note that this process does not use the control or surface position data recorded on the FDR, only the path information (e.g. accelerations, attitude and altitude).

Comparisons between the recorded FDR data and the simulation time history data are provided for longitudinal and lateral/directional data in Figures Figure 1.16.2-1 and Figure 1.16.2-2 respectively.

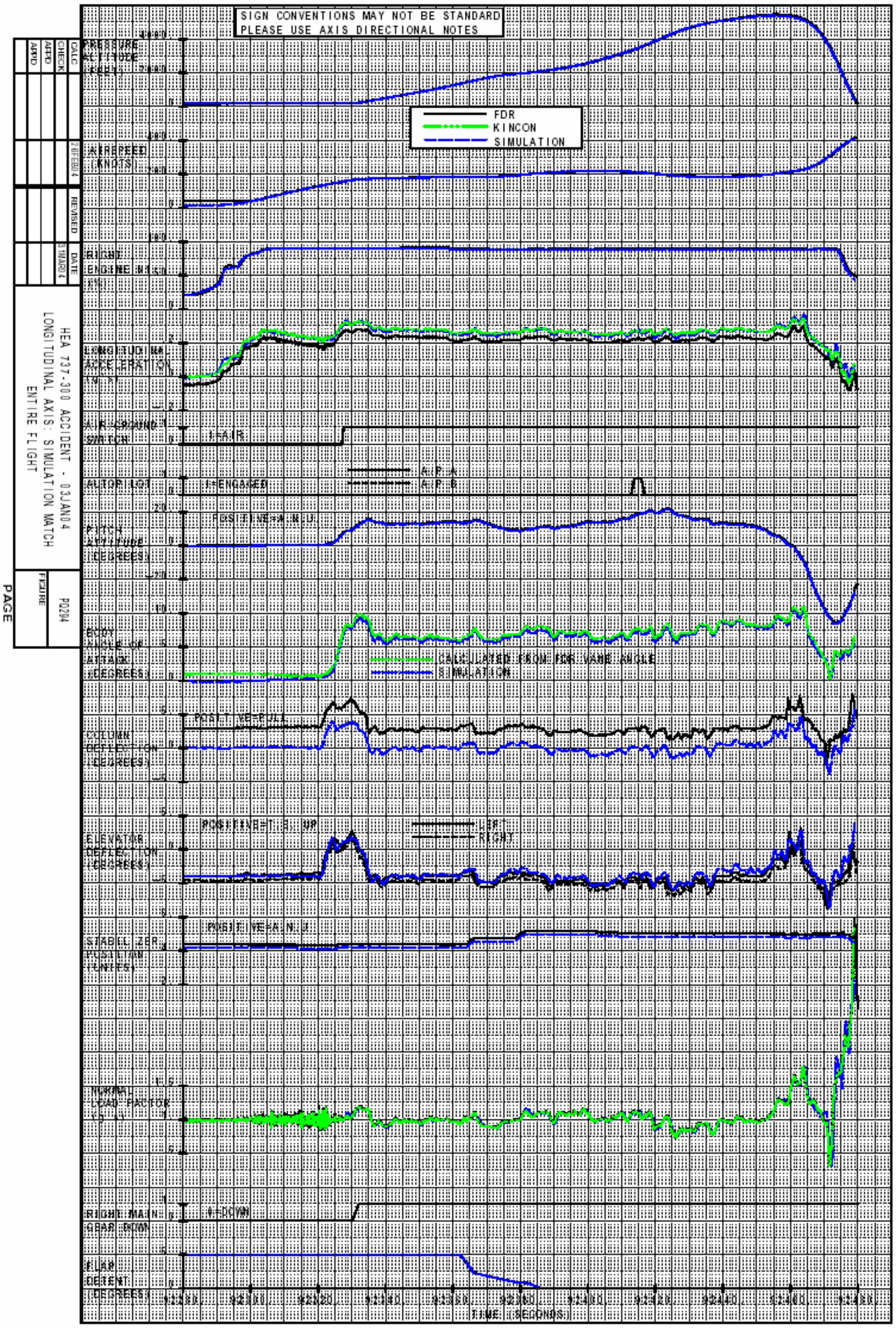


Figure 1.16.2-1 – FDR and Simulation Match Data – Longitudinal Axis

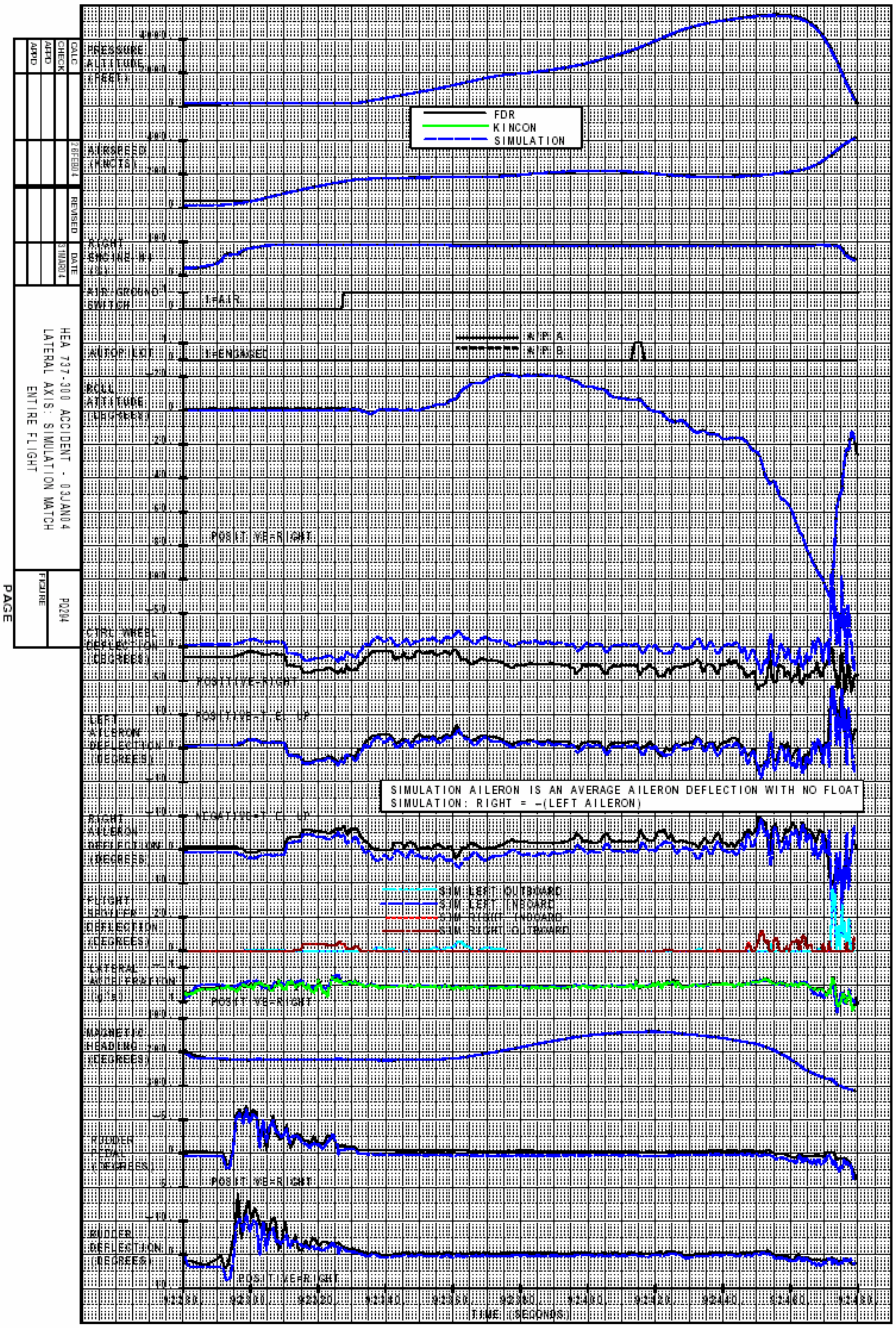


Figure 1.16.2-2 – FDR and Simulation Match Data – Lateral/Directional Axis

An examination of the baseline simulation revealed that the path of the accident airplane is consistent with the recorded motion of the control surfaces. Specifically, the extreme bank attitude that occurs towards the end of the flight is consistent with recorded motion of the ailerons.

The simulation also revealed that the motion of the control surfaces is consistent with the recorded motion of the control inputs, with the exception of control wheel

D. Hypothetical Faults resulting in a rolling moment

Several hypothetical airplane system faults were examined to determine if any could have resulted in the right roll behavior recorded on the FDR. These faults included:

- Uncommanded deployment of the #1 slat
- Uncommanded spoiler deflection to full travel (hardover)
- A spoiler disconnected from its actuator (spoiler float)
- Flap asymmetry
- Thrust asymmetry
- Unrecorded rudder motion

The hypothetical faults listed above are similar in that they each create a rolling moment unrelated to the position of the ailerons that will cause the airplane to bank. That is to say, if one of these faults had occurred, the path of the airplane would have differed from that predicted by the recorded position of the ailerons.

E. Multi-Purpose Engineering Cab Simulator

Additional tests were conducted at Boeing's multi-purpose engineering cab simulator or M-Cab. The M-Cab is similar to a flight crew training simulator in that it consists of a realistic flight deck mounted on a movable base. The M-Cab includes a visual system providing out-the-window views to the flight crew. Because the M-Cab is used to simulate the flight deck of many different Boeing models, actual flight instruments are not used. Instead, a large LCD display is programmed to simulate the flight instrument displays. Examples of the M-Cab's flight instrument displays for the 737-300 are shown in section 1.6.2.

Major differences between the M-Cab and a typical flight crew training simulator are listed below.

- The M-Cab can simulate different model airplanes including 707, 727, 737, 747, 757, 767, and 777.
- The M-Cab can be reprogrammed to simulate a wide variety of hypothetical aircraft system faults.
- The M-Cab can be "backdriven" to reproduce recorded data, such as the simulation match to the accident flight discussed in section 1.16.2. In addition, the backdrive can be interrupted at any point with a transition to normal simulator operation at the current flight conditions. This capability (known as "breakout" allows pilots in the simulator to attempt to recover the airplane from various points in the accident profile.
- The operation of the M-Cab is recorded at a high sample rate

The M-Cab was used to recreate the accident flight as well as to study a number of hypothetical airplane system faults.

F. Tests conducted in the M-Cab

The M-Cab was used to examine some of the faults mentioned above (item D), as well as a number of other hypothetical faults affecting the lateral control system or the autopilot system. M-Cab tests included:

- Backdrive of FDR data

- Backdrive with breakout at 02:44:44
- Backdrive with breakout at 02:44:56
- Spoiler float
- Uncommanded aileron trim to full authority
- Uncommanded aileron trim to half authority
- Autopilot servo actuator hardover without force limiter engaged
- Autopilot servo actuator hardover with force limiter engaged
- Autopilot servo actuator hardover with pressure regulator and relief valve inoperative

The spoiler control drum jam and control wheel shaft jam scenarios were accomplished by "background" simulation analysis.

The tests in the M-Cab were conducted with an out-the-window scene equivalent to that available to the accident pilots with the following exceptions:
1) The visibility conditions simulated (ceiling and visibility unlimited at night with no moon) were those reported at the airport at the time of the accident. Actual visibility conditions on the flight deck at the time of the accident are unknown.
2) The ground in the vicinity of Sharm el-Sheikh was depicted through the use of satellite photography taken during daylight hours. It did not represent the nighttime scene of street lights, building lights, etc. against an otherwise dark landscape.

1.16.1.0. General Overview of Boeing Process_ Kinematic Consistency:
(CairoMarch04Slides March Progress Meeting - Cairo.pdf)
(Kincon and Simulation (public release).ppt)

FDR Data

- Accelerations and Euler angles recorded on the FDR uniquely determine the path of the airplane

- Accelerations
  - Vertical
  - Longitudinal
  - Lateral

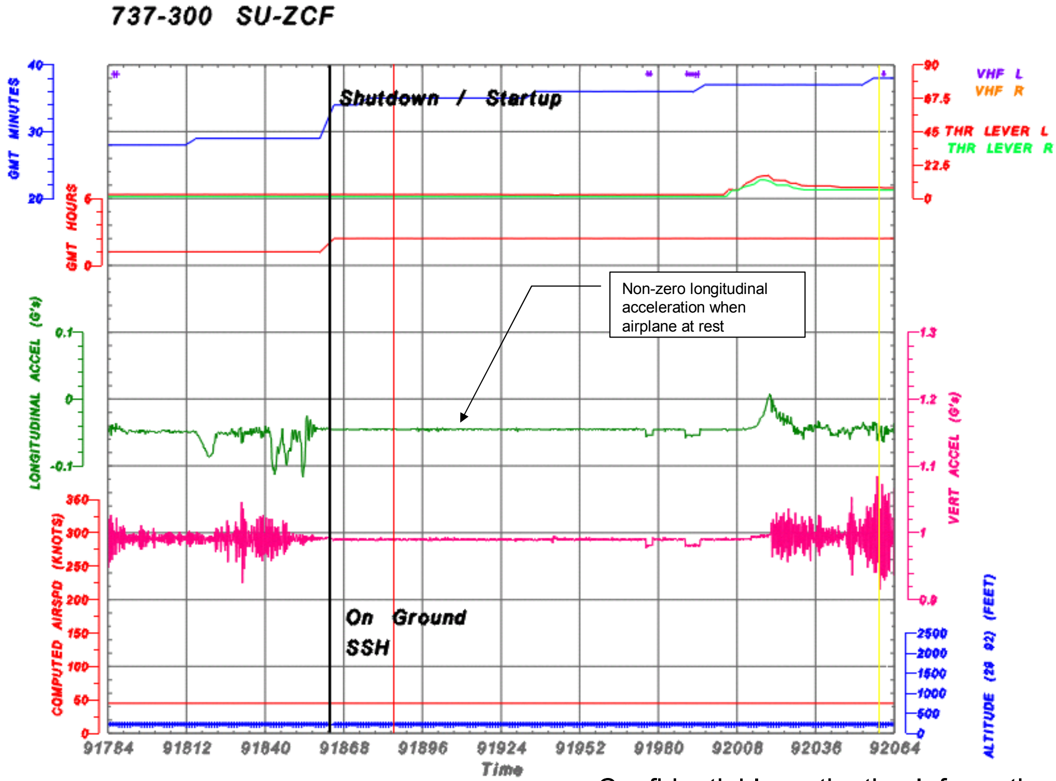
- Euler angles
  - Pitch
  - Roll
  - Heading

- Additional parameters describe path
  - e.g. altitude, ground speed, drift angle

Problem

- Some FDR data may be inconsistent with other FDR data

- Example:
  - Integrating longitudinal acceleration during a takeoff roll results in groundspeed. The calculated value may differ from the recorded value.
- Solution:
  - Add an offset to the acceleration such that the calculated groundspeed matches the recorded groundspeed.



Confidential Investigative Information

Kinematic Consistency

- Kinematic consistence is a process that adds a bias to the recorded accelerations so that the integrated path matches the recorded path

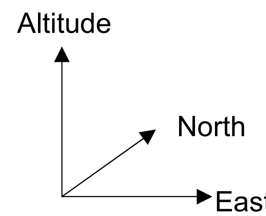
- i.e. calculate c_1 such that

$$v = \int (a + c_1) dt$$

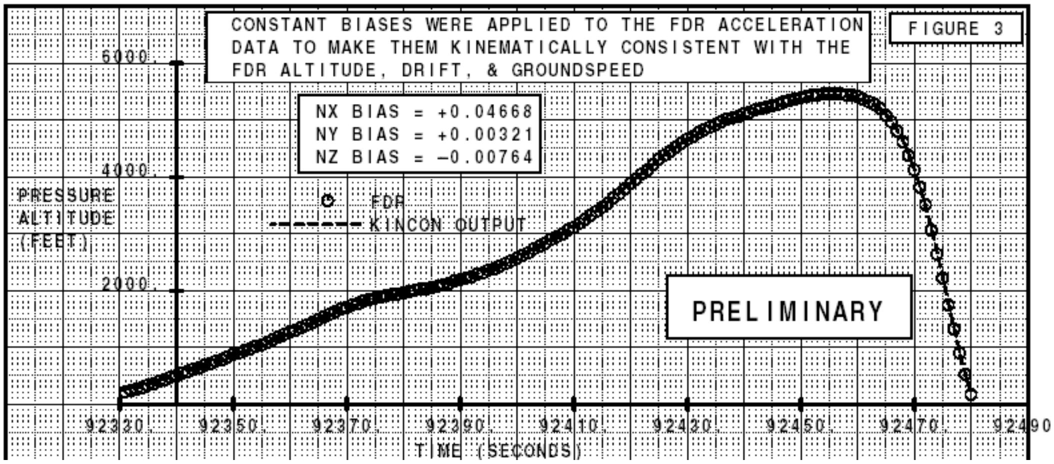
$$where$$

$$v = groundspeed$$

$$a = longitudinal\ acceleration$$

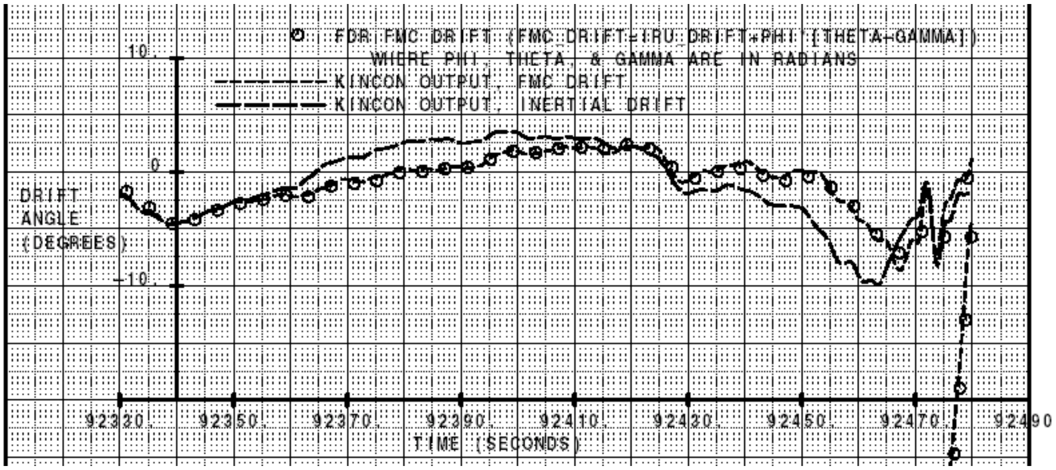


Kinematic Consistency Results



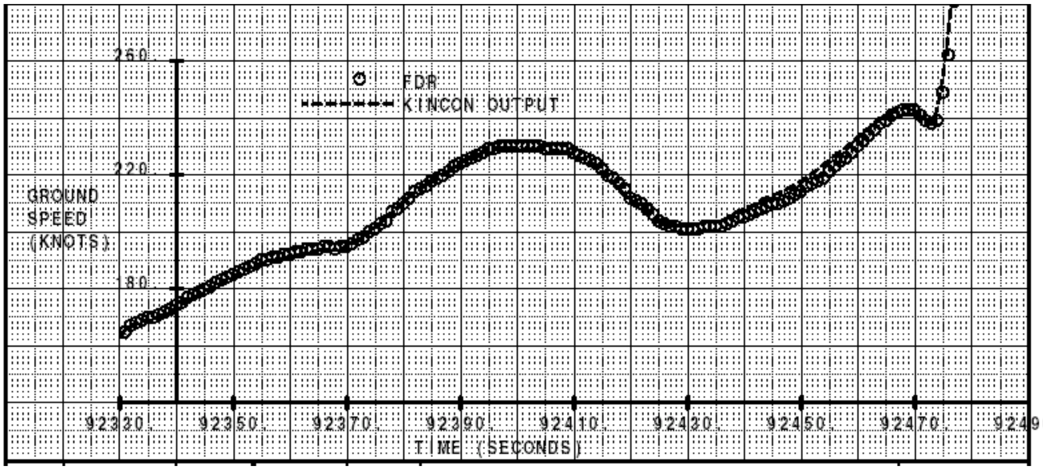
Confidential Investigative Information

Kinematic Consistency Results



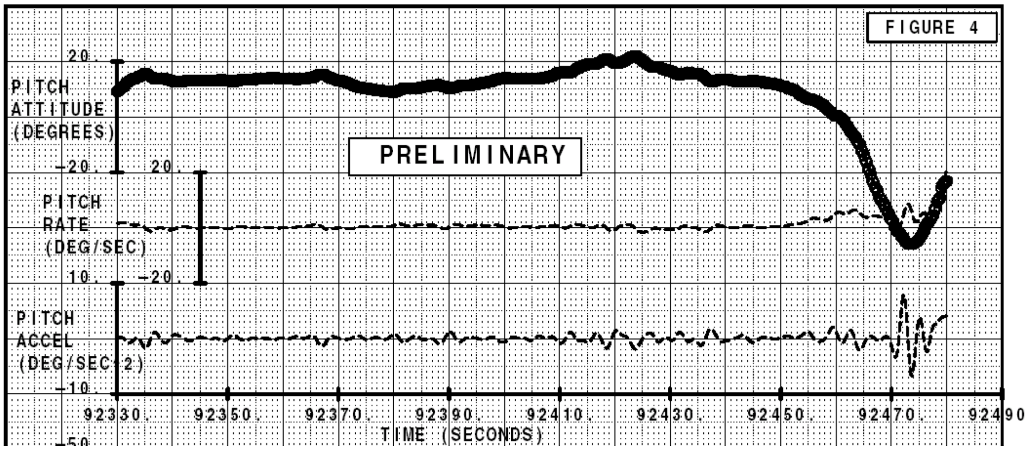
Confidential Investigative Information

Kinematic Consistency Results



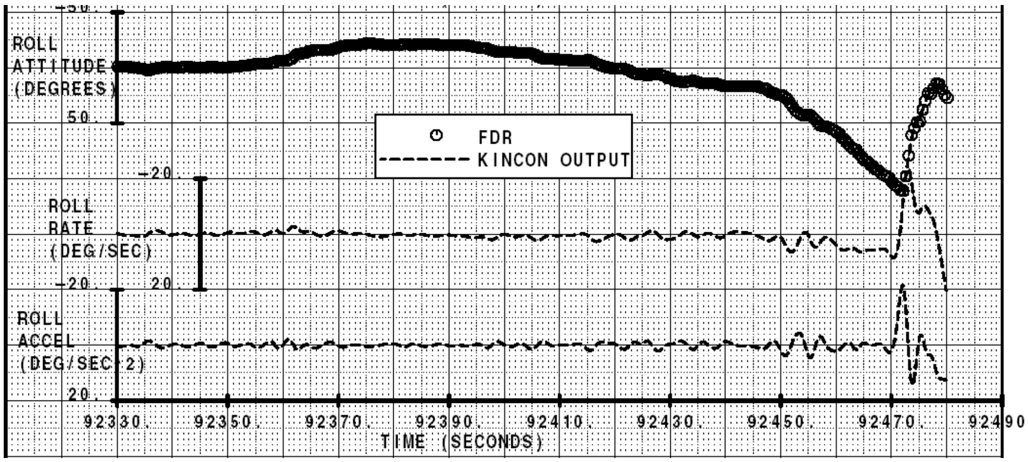
Confidential Investigative Information

Kinematic Consistency Results



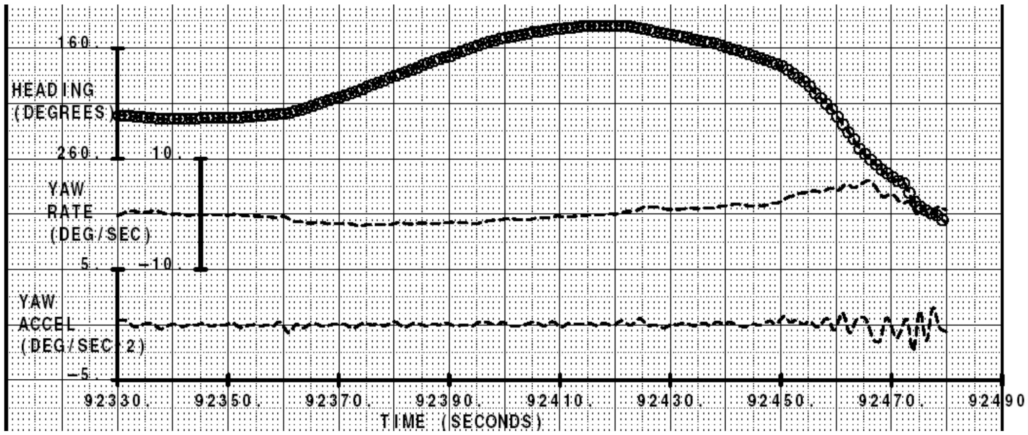
Confidential Investigative Information

Kinematic Consistency Results



Confidential Investigative Information

Kinematic Consistency Results



Confidential Investigative Information

Kinematic Consistency

- Note:

- The kinematic consistency process does not make any assumptions about the aerodynamic properties of the airplane

- In fact, the process can be applied to any moving object

Simulation

- Once the kinematically consistent accelerations and Euler angles have been calculated, an aerodynamic simulation of the airplane is used to reconstruct the flight path
- Time-step integration is used to calculate the motion of the airplane from one step to the next

$$v_{t1} = v_{t0} + a_{t0}\Delta t \qquad x_{t1} = x_{t0} + v_{t0}\Delta t$$

$$Lift = \frac{1}{2}\rho v^2 S C_L$$

$$C_L = f\left(\alpha, v, \, flaps, gear, control\, surfaces, \ldots\right)$$

Sensitivity Example

•Accident flight is approximately 147 seconds long
•Simulator match of altitude differs by approximately 200 feet

•Sensitivity analysis for straight and level flight 147 seconds long

$$F = MA \; or \; A = \frac{F}{M}$$

For vertical axis $\ddot{z} = \frac{L - W}{W}$ ⟶ $z = \iint \frac{L - W}{W} dt^2$

For constant weight $z = g \frac{L - W}{W} \frac{t^2}{2} \Big|_{t_1}^{t_2}$

Sensitivity Example

For constant weight $$z = g\frac{L-W}{W}\frac{t^2}{2}\Bigg|_{t_1}^{t_2}$$

Assume altitude error is result of incorrect lift $$\Delta z = g\Delta\frac{L-W}{W}\frac{t^2}{2}$$

Solve for ΔL $$\Delta\frac{L-W}{W} = \frac{2\Delta z}{g\,t^2} \qquad \Delta L = \frac{2W\Delta z}{g\,t^2}$$

$$\Delta L = \frac{2(113630\,lb)(200\,ft)}{32.2\frac{ft}{\sec^2}(147\sec)^2} = 65\ lbs$$

Therefore-

A 65 lb error in calculated lift will result in
a altitude error of 200 ft after 147 seconds.

Simulation Differences

The 737-300 simulation model represents a nominal airplane with nominal engines.

Small offsets between the nominal simulation airplane and an individual airplane in the fleet are common due to differences in rigging, engine wear, etc.

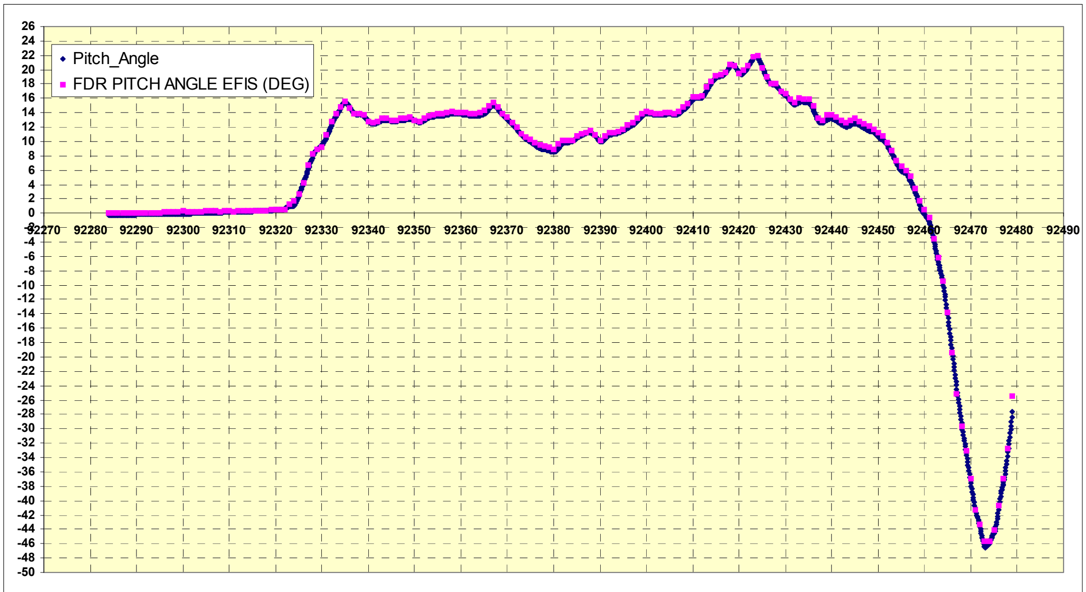
Pass Through Data

For Flash Airlines simulation –

- Stabilizer was adjusted to account for control column bias (2.9° offset)
- Throttle level position was adjusted to improve match of airspeed and altitude

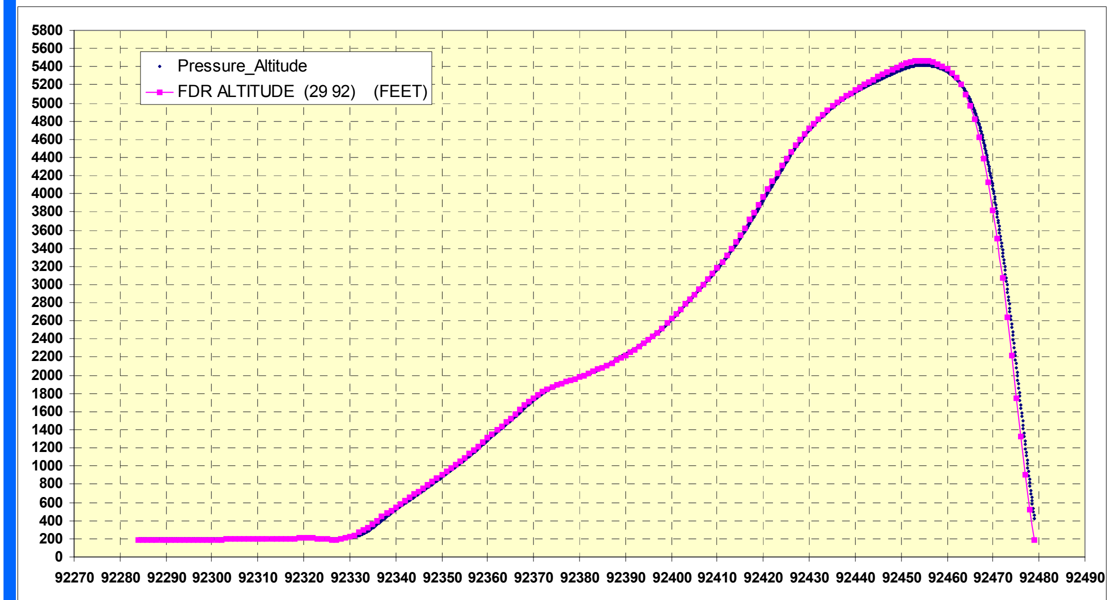
Confidential Investigative Information

Kincon Data Match



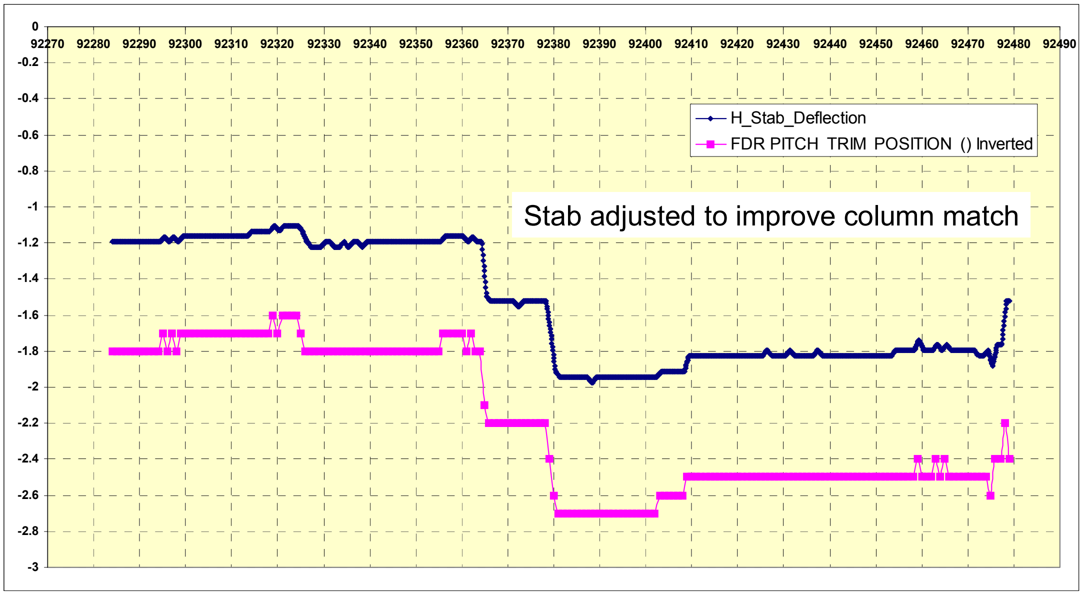
Confidential Investigative Information

Simulator Output Match



Confidential Investigative Information

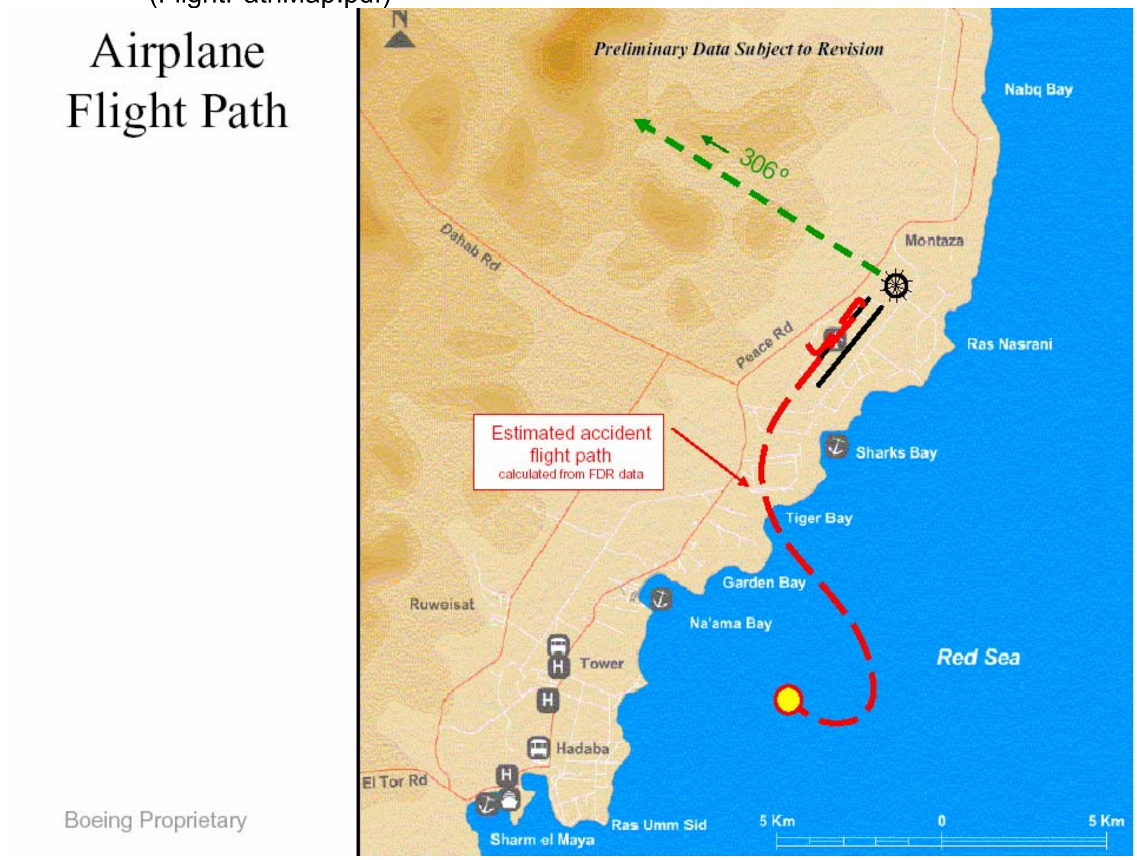
Pass Through Data Match



Confidential Investigative Information

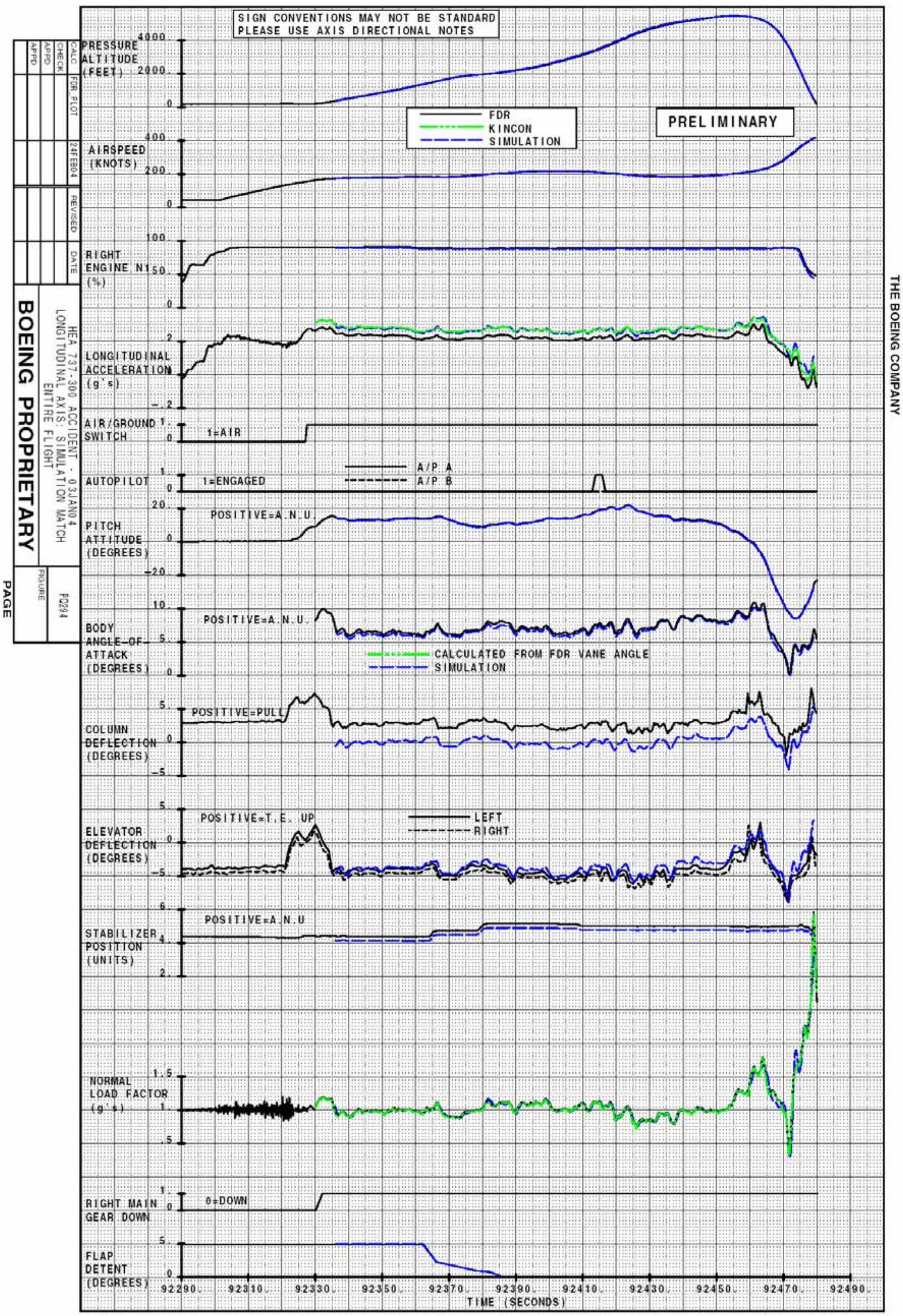
1.16.1.1. **Estimated accident flight path, calculated from FDR data:**

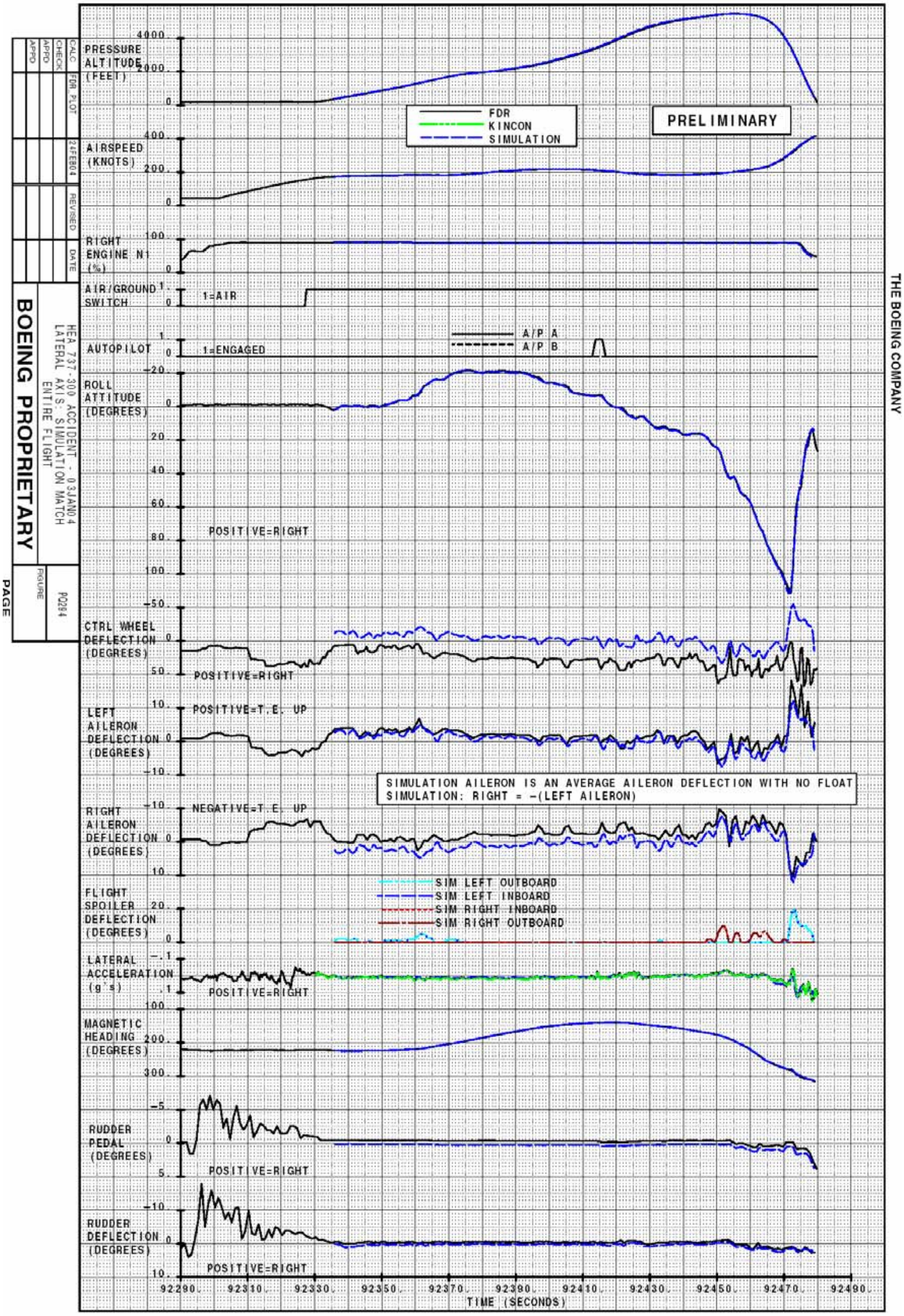
(FlightPathMap.pdf)

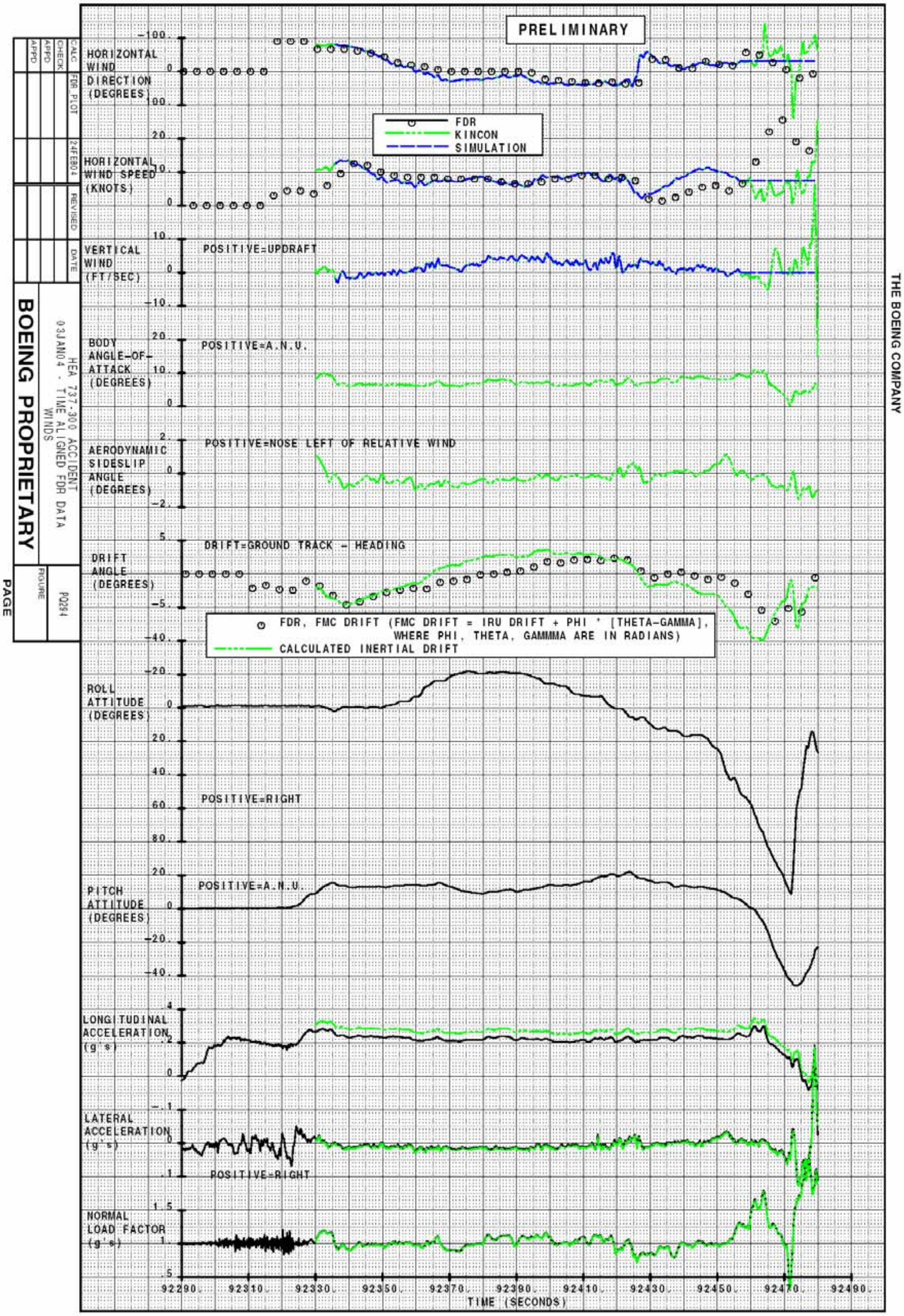


1.16.1.2. NA

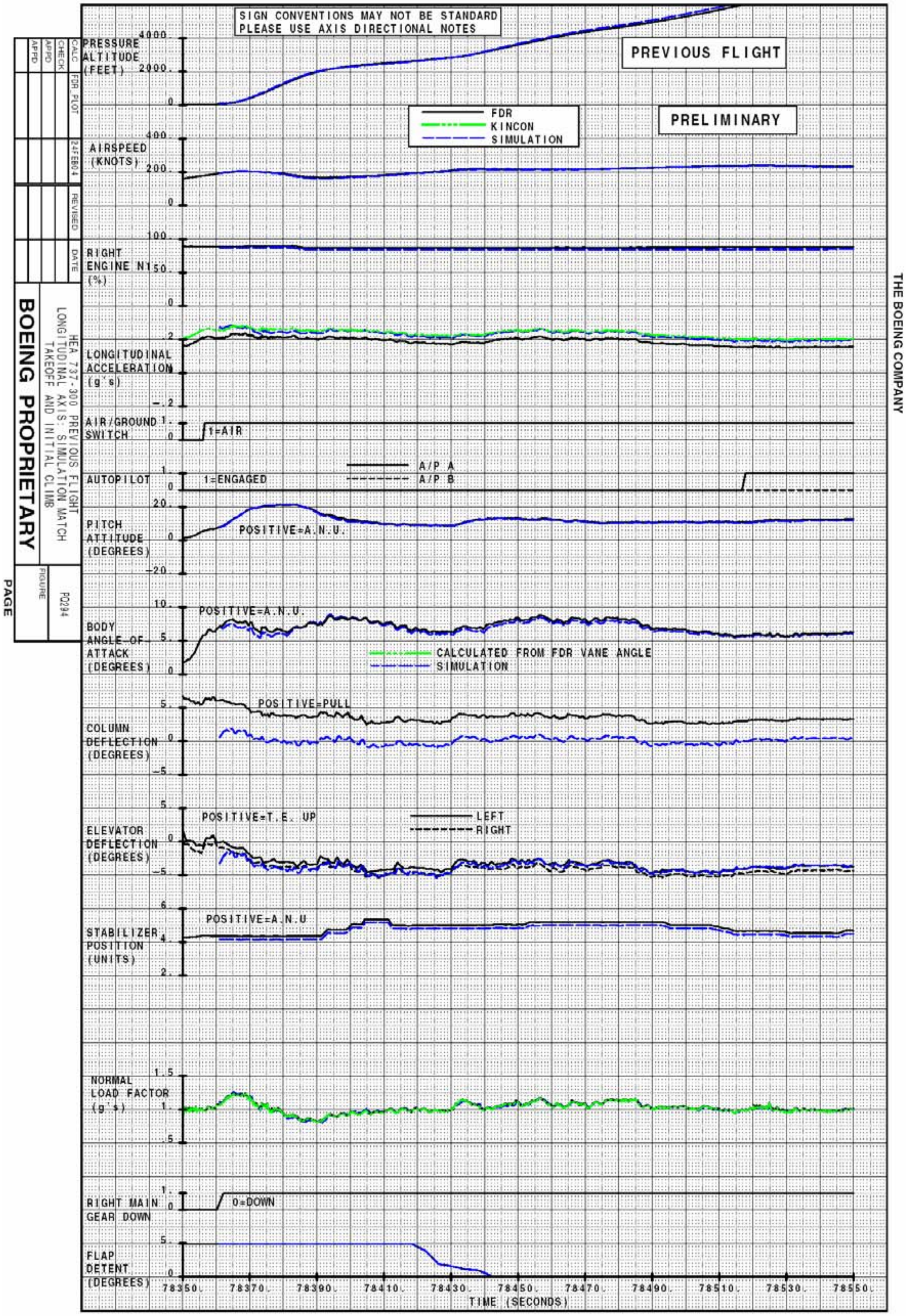
1.16.1.3. Simulator Match accident flight:
SimMatchaccidentflight 24-2-04.pdf (Simulation Match, FDR-Kincon-Simulation)

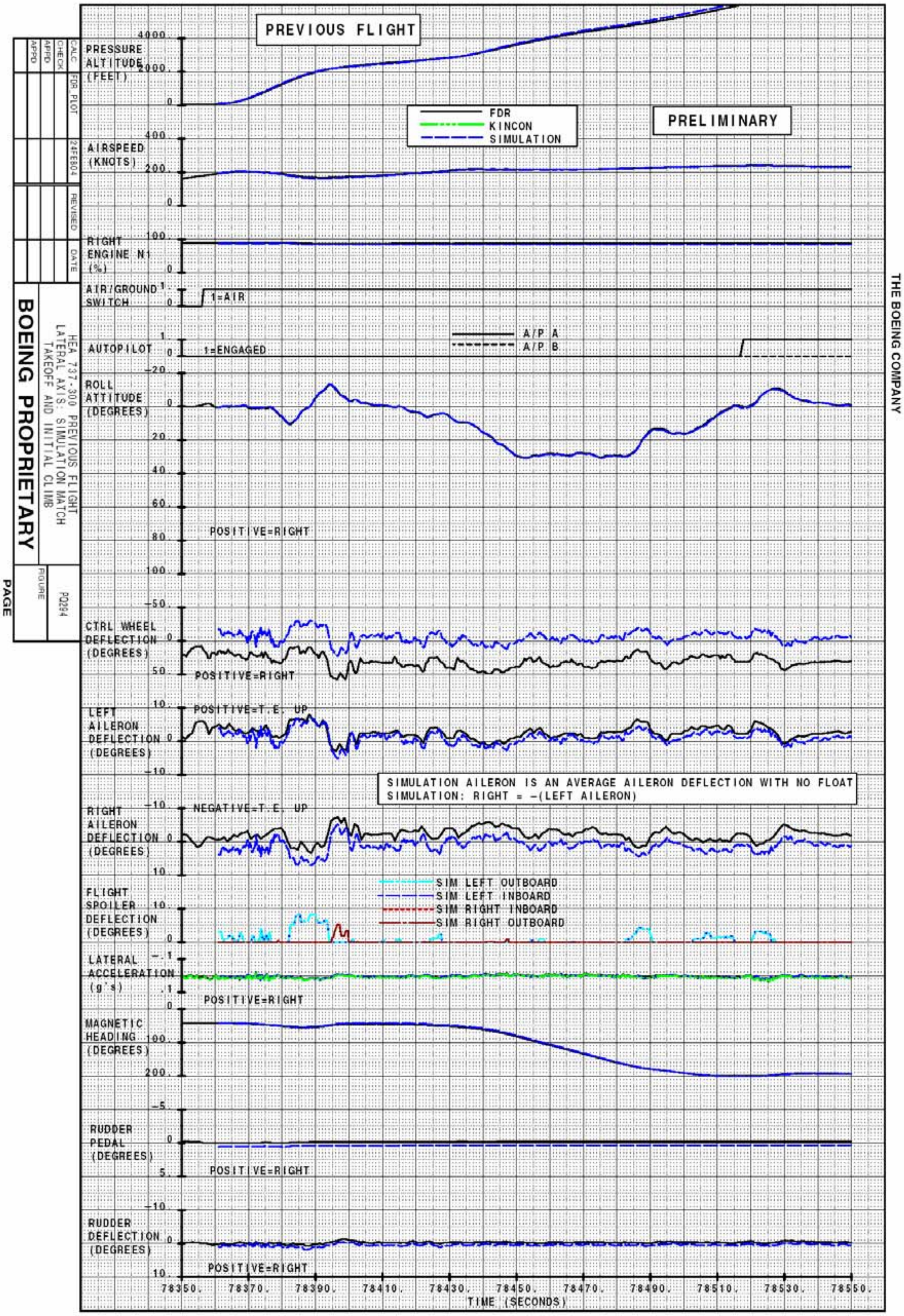


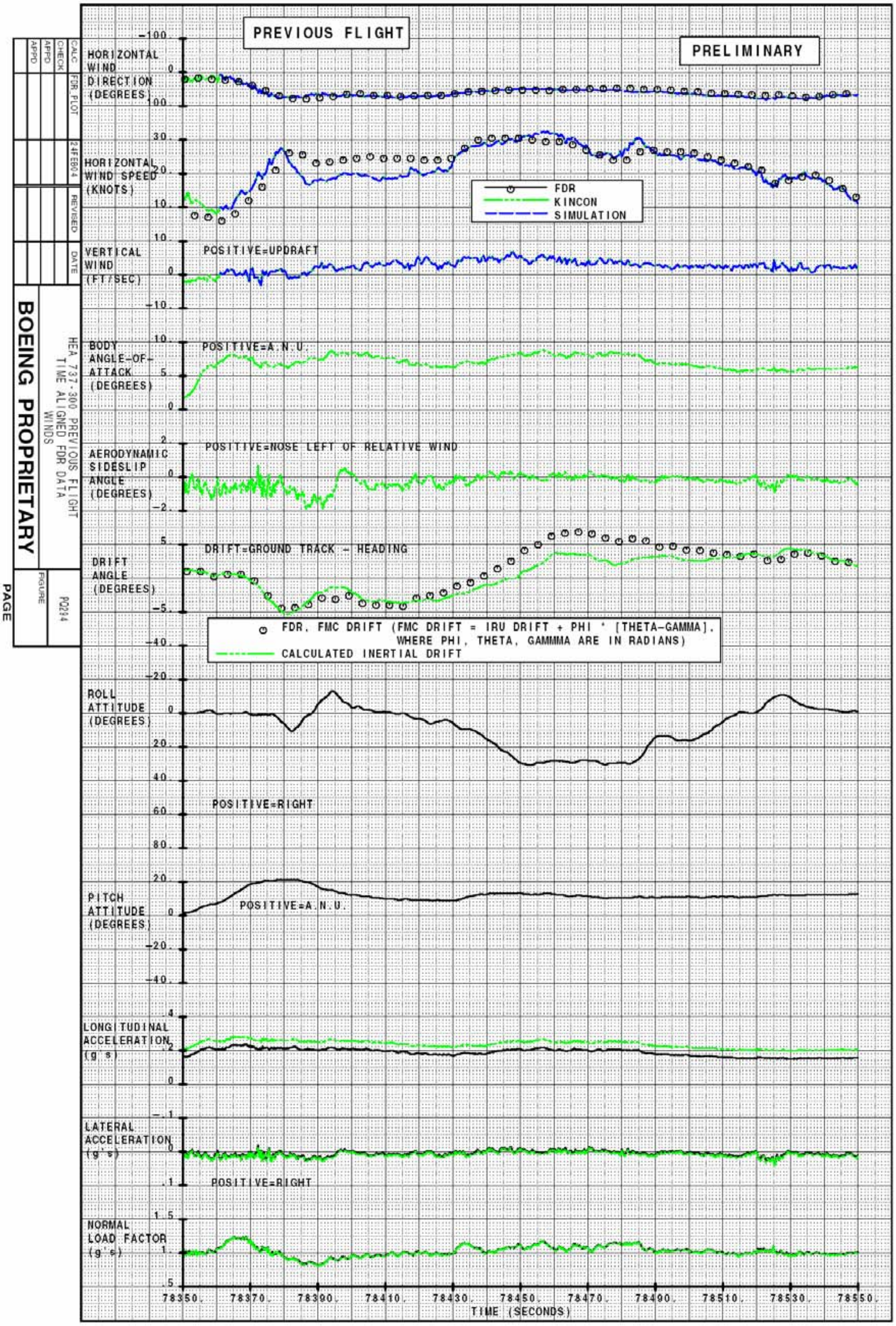

PRESSURE ALTITUDE (FEET)
AIRSPEED (KNOTS)
RIGHT ENGINE N1 (%)
AIR/GROUND SWITCH
1=AIR
AUTOPILOT
1=ENGAGED
A/P A
A/P B
ROLL ATTITUDE (DEGREES)
POSITIVE=RIGHT
CTRL WHEEL DEFLECTION (DEGREES)
POSITIVE=RIGHT
LEFT AILERON DEFLECTION (DEGREES)
POSITIVE=T.E. UP
SIMULATION AILERON IS AN AVERAGE AILERON DEFLECTION WITH NO FLOAT
SIMULATION: RIGHT = -(LEFT AILERON)
RIGHT AILERON DEFLECTION (DEGREES)
NEGATIVE=T.E. UP
FLIGHT SPOILER DEFLECTION (DEGREES)
SIM LEFT OUTBOARD
SIM LEFT INBOARD
SIM RIGHT INBOARD
SIM RIGHT OUTBOARD
LATERAL ACCELERATION (g's)
POSITIVE=RIGHT
MAGNETIC HEADING (DEGREES)
RUDDER PEDAL (DEGREES)
POSITIVE=RIGHT
RUDDER DEFLECTION (DEGREES)
POSITIVE=RIGHT
TIME (SECONDS)
FDR
KINCON
SIMULATION
PRELIMINARY
THE BOEING COMPANY
BOEING PROPRIETARY
HEA 737-300 ACCIDENT - 03JAN04
LATERAL AXIS: SIMULATION MATCH
ENTIRE FLIGHT
CALC
CHECK
APPD
APPD
FDR PLOT
24FEB04
REVISED
DATE
FIGURE
PQ284
PAGE


PRELIMINARY
HORIZONTAL WIND DIRECTION (DEGREES)
FDR
KINCON
SIMULATION
HORIZONTAL WIND SPEED (KNOTS)
VERTICAL WIND (FT/SEC)
POSITIVE=UPDRAFT
BODY ANGLE-OF-ATTACK (DEGREES)
POSITIVE=A.N.U.
AERODYNAMIC SIDESLIP ANGLE (DEGREES)
POSITIVE=NOSE LEFT OF RELATIVE WIND
DRIFT ANGLE (DEGREES)
DRIFT=GROUND TRACK - HEADING
FDR, FMC DRIFT (FMC DRIFT = IRU DRIFT + PHI * [THETA-GAMMA], WHERE PHI, THETA, GAMMMA ARE IN RADIANS)
CALCULATED INERTIAL DRIFT
ROLL ATTITUDE (DEGREES)
POSITIVE=RIGHT
PITCH ATTITUDE (DEGREES)
POSITIVE=A.N.U.
LONGITUDINAL ACCELERATION (g's)
LATERAL ACCELERATION (g's)
POSITIVE=RIGHT
NORMAL LOAD FACTOR (g's)
92290. 92310. 92330. 92350. 92370. 92390. 92410. 92430. 92450. 92470. 92490.
TIME (SECONDS)
CALC CHECK APPD APPD
FDR PLOT
24FEB04
REVISED
DATE
BOEING PROPRIETARY
HEA 737-300 ACCIDENT
03JAN04 - TIME ALIGNED FDR DATA WINDS
FIGURE
P0294
PAGE
THE BOEING COMPANY

SimMatchpreviousflight 24-2-04.pdf (FDR-Kincon-Simulation match 24-2-04)

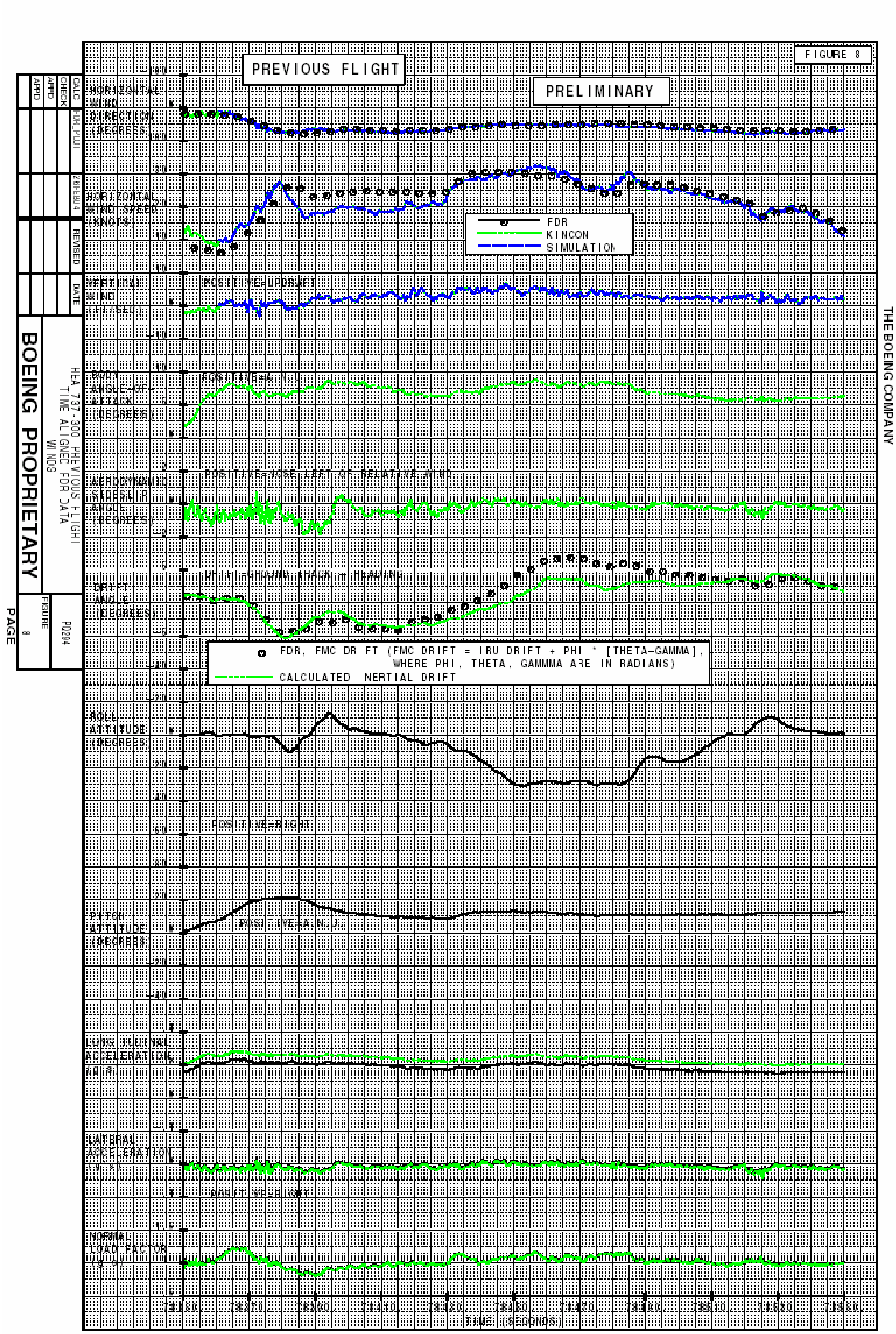


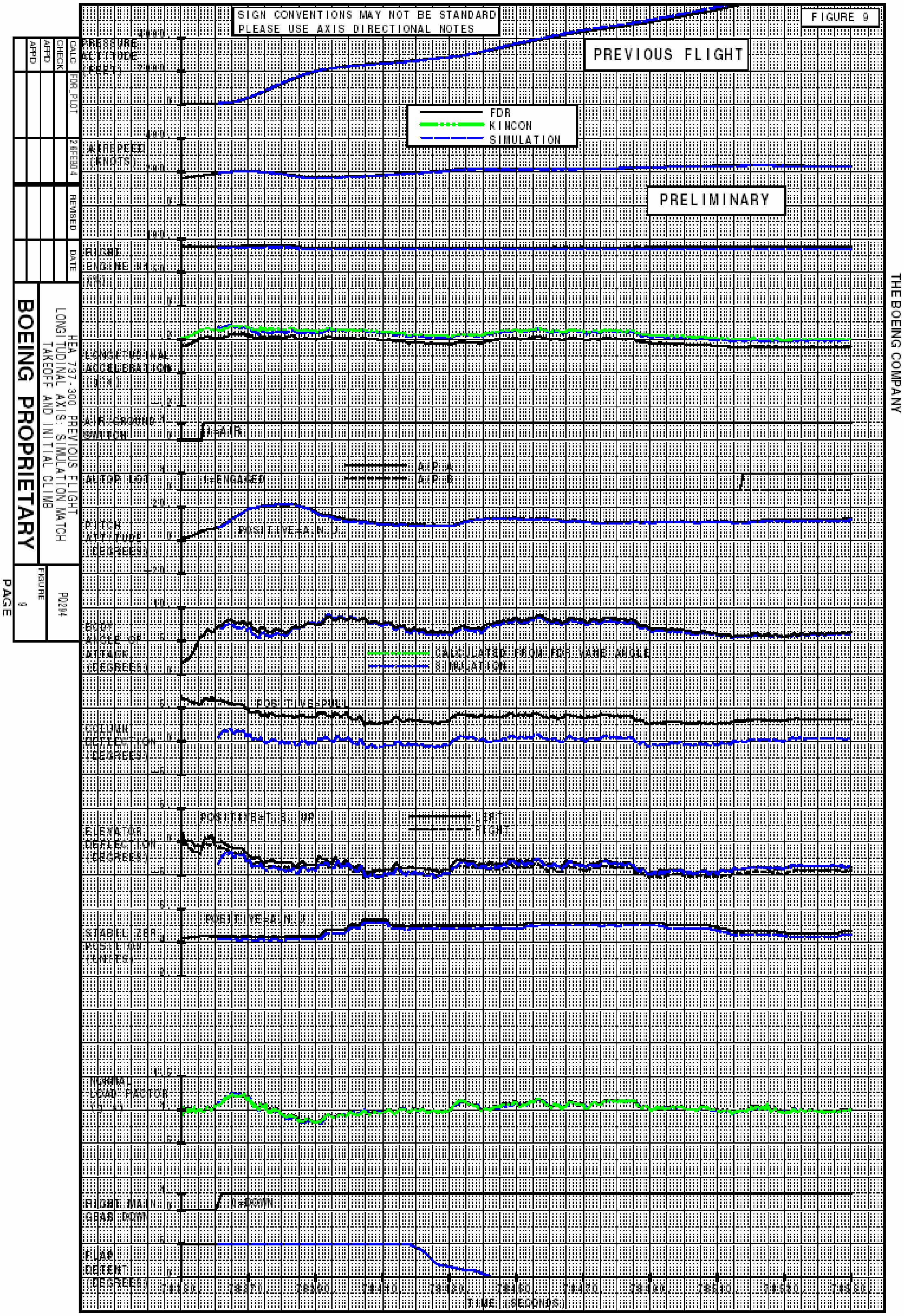

PREVIOUS FLIGHT
PRELIMINARY
FDR
KINCON
SIMULATION
PRESSURE ALTITUDE (FEET)
AIRSPEED (KNOTS)
RIGHT ENGINE N1 (%)
AIR/GROUND SWITCH
1=AIR
AUTOPILOT
1=ENGAGED
A/P A
A/P B
ROLL ATTITUDE (DEGREES)
POSITIVE=RIGHT
CTRL WHEEL DEFLECTION (DEGREES)
LEFT AILERON DEFLECTION (DEGREES)
POSITIVE=T.E. UP
SIMULATION AILERON IS AN AVERAGE AILERON DEFLECTION WITH NO FLOAT
SIMULATION: RIGHT = -(LEFT AILERON)
RIGHT AILERON DEFLECTION (DEGREES)
NEGATIVE=T.E. UP
FLIGHT SPOILER DEFLECTION (DEGREES)
SIM LEFT OUTBOARD
SIM LEFT INBOARD
SIM RIGHT INBOARD
SIM RIGHT OUTBOARD
LATERAL ACCELERATION (g's)
MAGNETIC HEADING (DEGREES)
RUDDER PEDAL (DEGREES)
RUDDER DEFLECTION (DEGREES)
TIME (SECONDS)
78350. 78370. 78390. 78410. 78430. 78450. 78470. 78490. 78510. 78530. 78550.
THE BOEING COMPANY
BOEING PROPRIETARY
HEA 737-300 PREVIOUS FLIGHT
LATERAL AXIS: SIMULATION MATCH
TAKEOFF AND INITIAL CLIMB
CALC
CHECK
APPD
APPD
FDR PLOT
24FEB04
REVISED
DATE
FIGURE
PD294
PAGE



PREVIOUS FLIGHT
PRELIMINARY
HORIZONTAL WIND DIRECTION (DEGREES)
HORIZONTAL WIND SPEED (KNOTS)
FDR
KINCON
SIMULATION
VERTICAL WIND (FT/SEC)
POSITIVE=UPDRAFT
BODY ANGLE-OF-ATTACK (DEGREES)
POSITIVE=A.N.U.
AERODYNAMIC SIDESLIP ANGLE (DEGREES)
POSITIVE=NOSE LEFT OF RELATIVE WIND
DRIFT ANGLE (DEGREES)
DRIFT=GROUND TRACK - HEADING
FDR, FMC DRIFT (FMC DRIFT = IRU DRIFT + PHI * [THETA-GAMMA], WHERE PHI, THETA, GAMMMA ARE IN RADIANS)
CALCULATED INERTIAL DRIFT
ROLL ATTITUDE (DEGREES)
POSITIVE=RIGHT
PITCH ATTITUDE (DEGREES)
POSITIVE=A.N.U.
LONGITUDINAL ACCELERATION (g's)
LATERAL ACCELERATION (g's)
POSITIVE=RIGHT
NORMAL LOAD FACTOR (g's)
TIME (SECONDS)
78350. 78370. 78390. 78410. 78430. 78450. 78470. 78490. 78510. 78530. 78550.
CALC CHECK APPD APPD
FDR PLOT
24FEB04
REVISED
DATE
HEA 737-300 PREVIOUS FLIGHT TIME ALIGNED FDR DATA WINDS
BOEING PROPRIETARY
FIGURE
PQ284
PAGE

HEA_PQ294_prevfltSIM.pdf (26 Feb 2004, base lines, FDR-Kincon-Sim prvious flight)




SIGN CONVENTIONS MAY NOT BE STANDARD
PLEASE USE AXIS DIRECTIONAL NOTES
FIGURE 9
PREVIOUS FLIGHT
FDR
KINCON
SIMULATION
PRELIMINARY
PRESSURE ALTITUDE (FEET)
AIRSPEED (KNOTS)
RIGHT ENGINE N1 (%)
LONGITUDINAL ACCELERATION
AIR-GROUND SWITCH
1=AIR
AUTOPILOT
1=ENGAGED
A.P. A
A.P. B
PITCH ATTITUDE (DEGREES)
POSITIVE=A.N.U.
BODY ANGLE OF ATTACK (DEGREES)
CALCULATED FROM FDR VANE ANGLE
SIMULATION
POSITIVE=PULL
ELEVATOR DEFLECTION (DEGREES)
POSITIVE=T.E. UP
LEFT
RIGHT
STABILIZER POSITION (UNITS)
RIGHT MAIN GEAR DOWN
1=DOWN
FLAP DETENT (DEGREES)
TIME (SECONDS)
HEA 737-300 PREVIOUS FLIGHT
LONGITUDINAL AXIS: SIMULATION MATCH
TAKEOFF AND INITIAL CLIMB
BOEING PROPRIETARY
THE BOEING COMPANY
CALC
CHECK
APPD
APPD
REVISED
DATE
FIGURE
PAGE

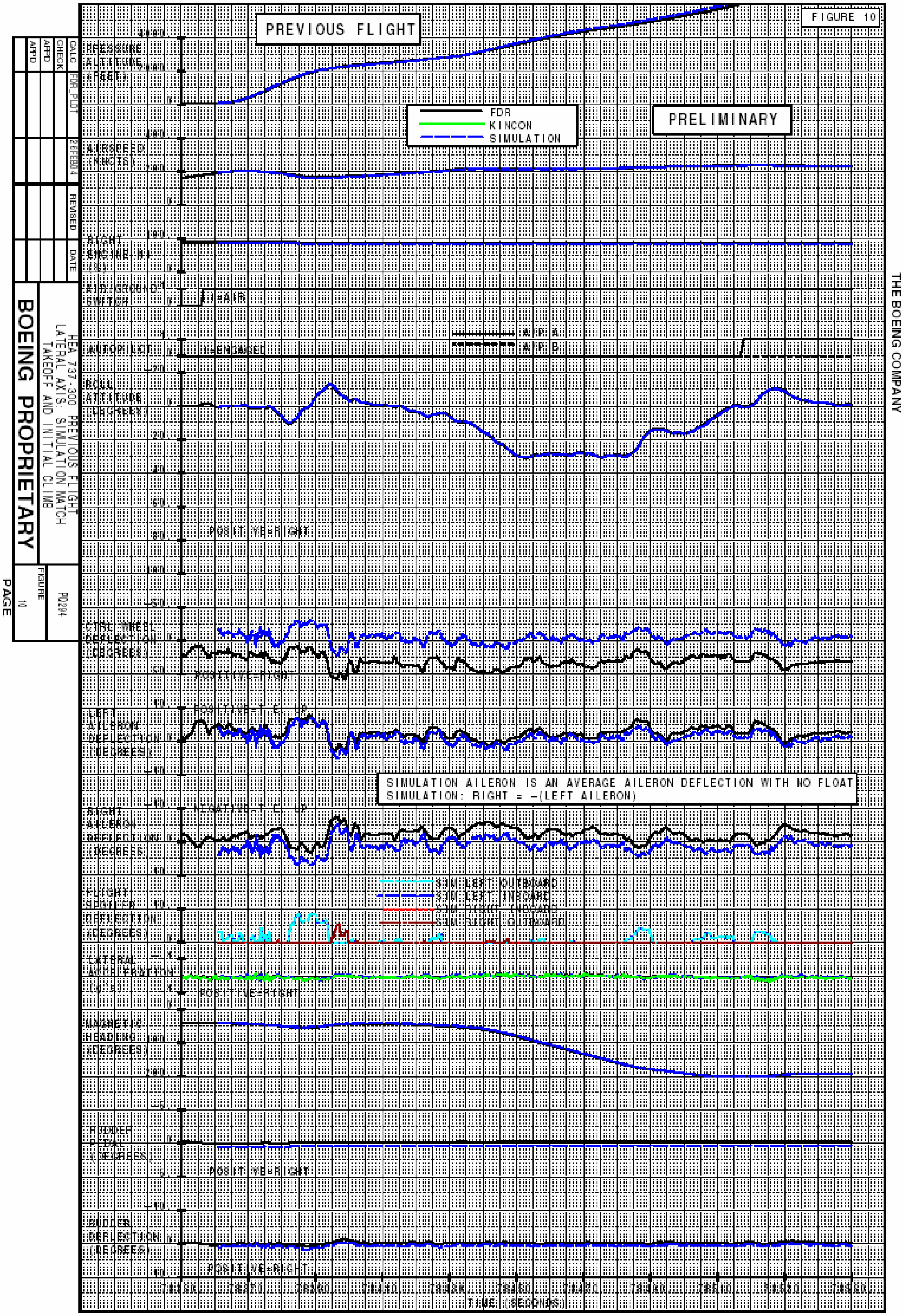
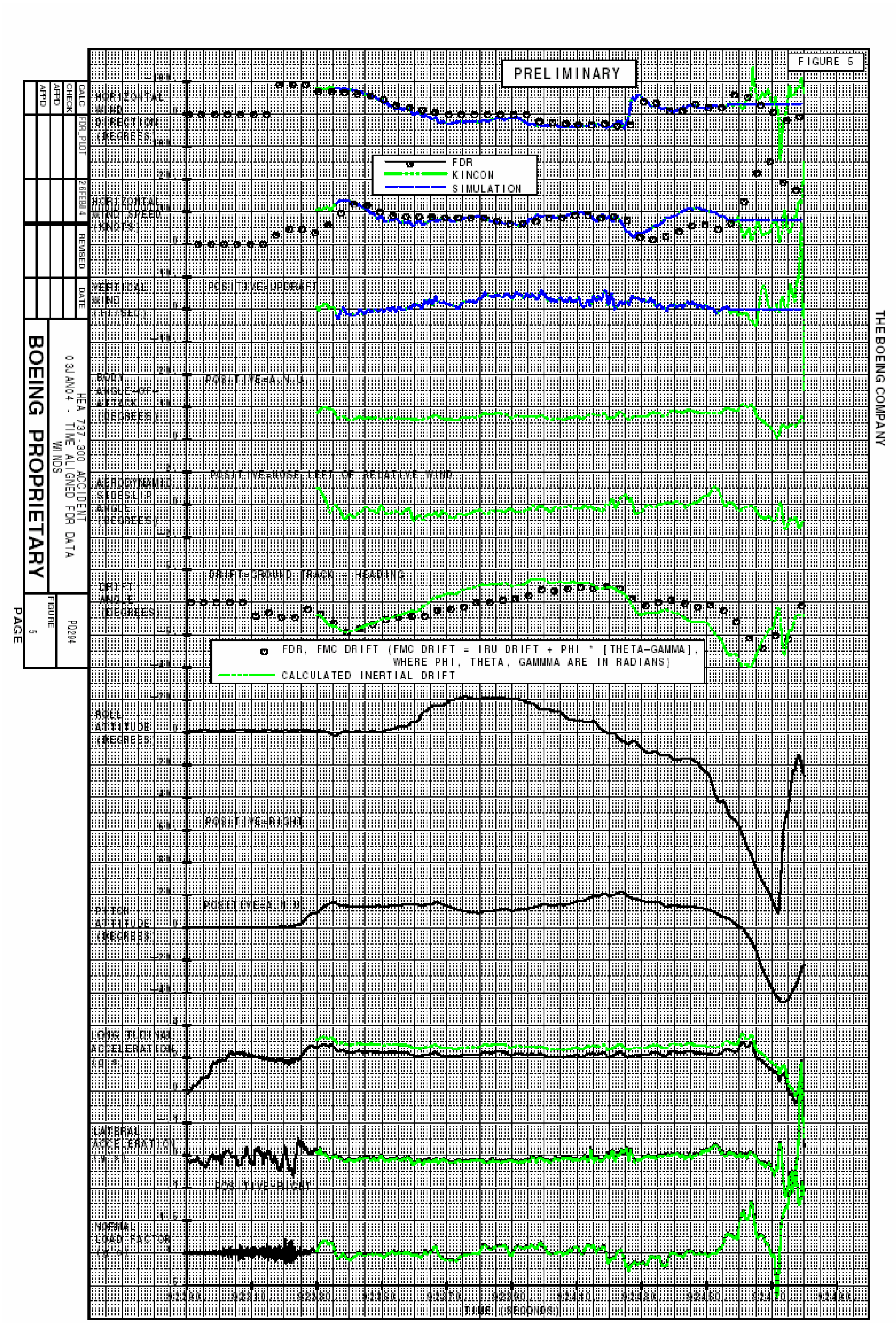
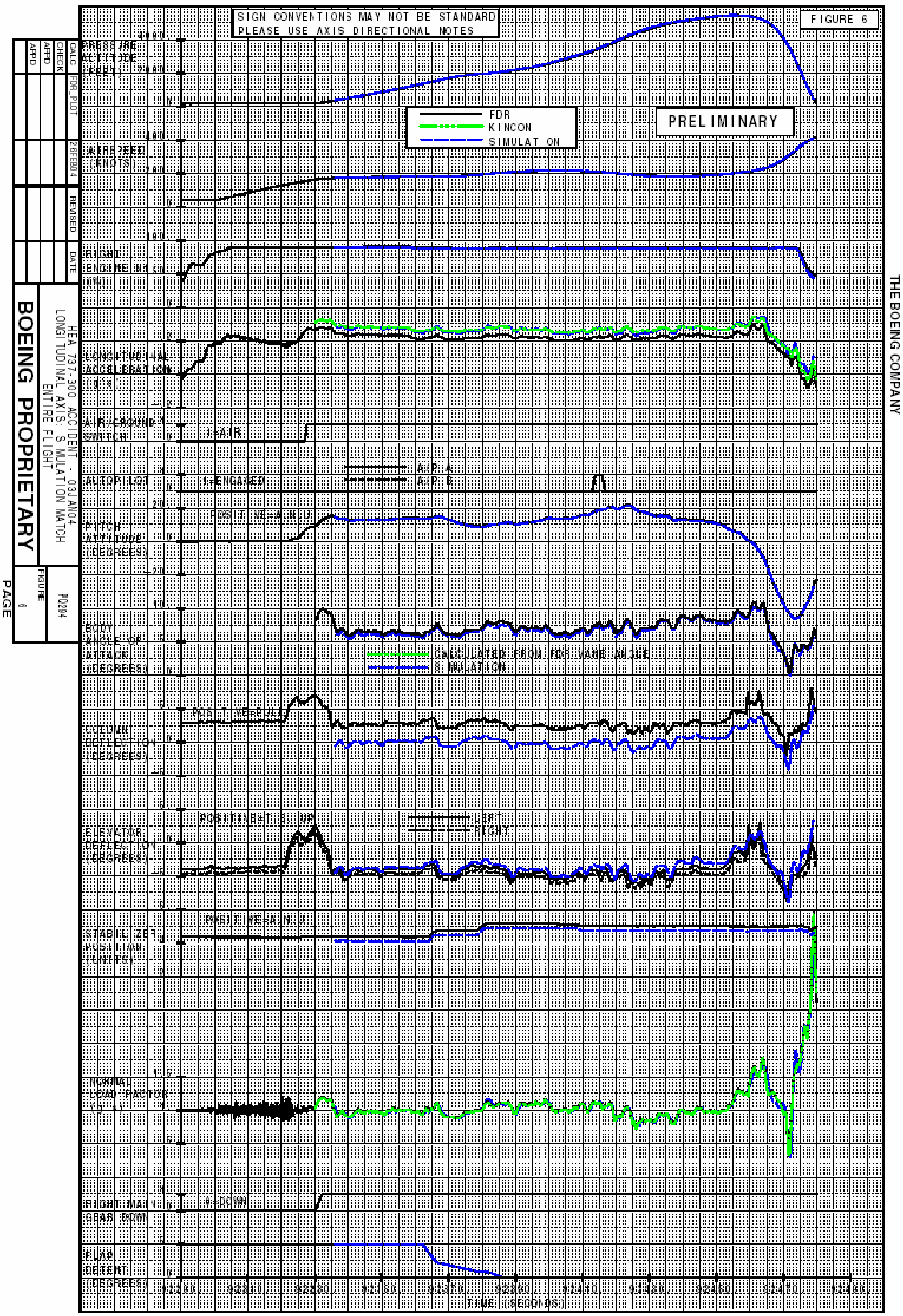


FIGURE 10
PREVIOUS FLIGHT
PRELIMINARY
FDR
KINCON
SIMULATION
A/P A
A/P B
SIMULATION AILERON IS AN AVERAGE AILERON DEFLECTION WITH NO FLOAT
SIMULATION: RIGHT = -(LEFT AILERON)
TIME (SECONDS)
HEA 737-300 PREVIOUS FLIGHT
LATERAL AXIS: SIMULATION MATCH
TAKEOFF AND INITIAL CLIMB
BOEING PROPRIETARY
CALC
CHECK
APPD
REVISED
DATE
FIGURE
PAGE
THE BOEING COMPANY

HEA_PQ294_baselineSIM.pdf (26 Feb 2004, base lines, FDR-Kincon-Sim)




SIGN CONVENTIONS MAY NOT BE STANDARD
PLEASE USE AXIS DIRECTIONAL NOTES
FIGURE 6
PRELIMINARY
FDR
KINCON
SIMULATION
PRESSURE ALTITUDE (FEET)
AIRSPEED (KNOTS)
RIGHT ENGINE N1 (%)
LONGITUDINAL ACCELERATION (G'S)
AIR-GROUND SWITCH
AUTOPILOT
A/P A
A/P B
PITCH ATTITUDE (DEGREES)
BODY ANGLE OF ATTACK (DEGREES)
CALCULATED FROM FDR VANE ANGLE
SIMULATION
COLUMN DEFLECTION (DEGREES)
ELEVATOR DEFLECTION (DEGREES)
LEFT
RIGHT
STABILIZER POSITION (UNITS)
NORMAL LOAD FACTOR (G'S)
RIGHT MAIN GEAR DOWN
FLAP DETENT (DEGREES)
TIME (SECONDS)
HEA 737-300 ACCIDENT - 03JAN04
LONGITUDINAL AXIS: SIMULATION MATCH
ENTIRE FLIGHT
BOEING PROPRIETARY
FIGURE 6
PAGE
THE BOEING COMPANY

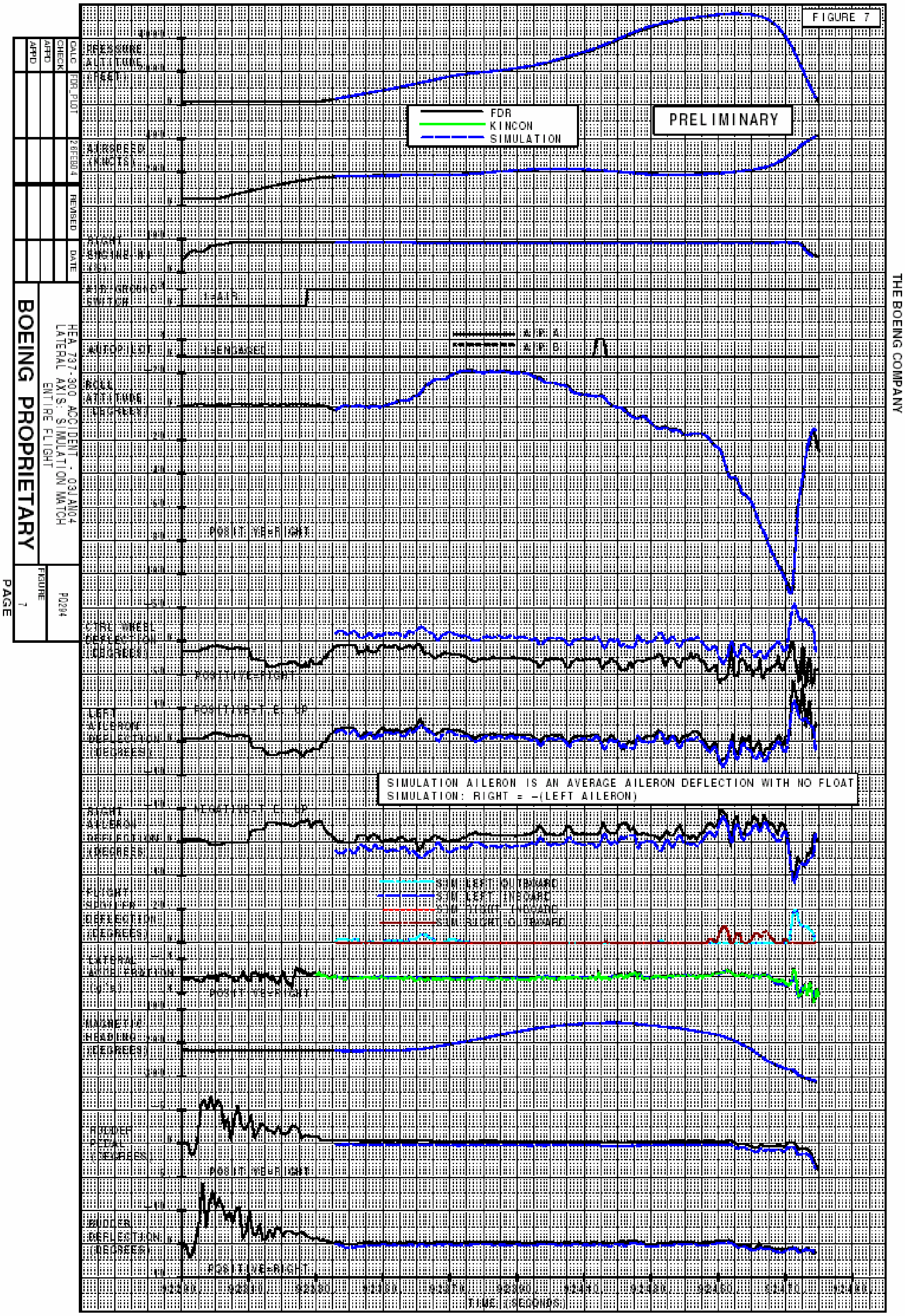
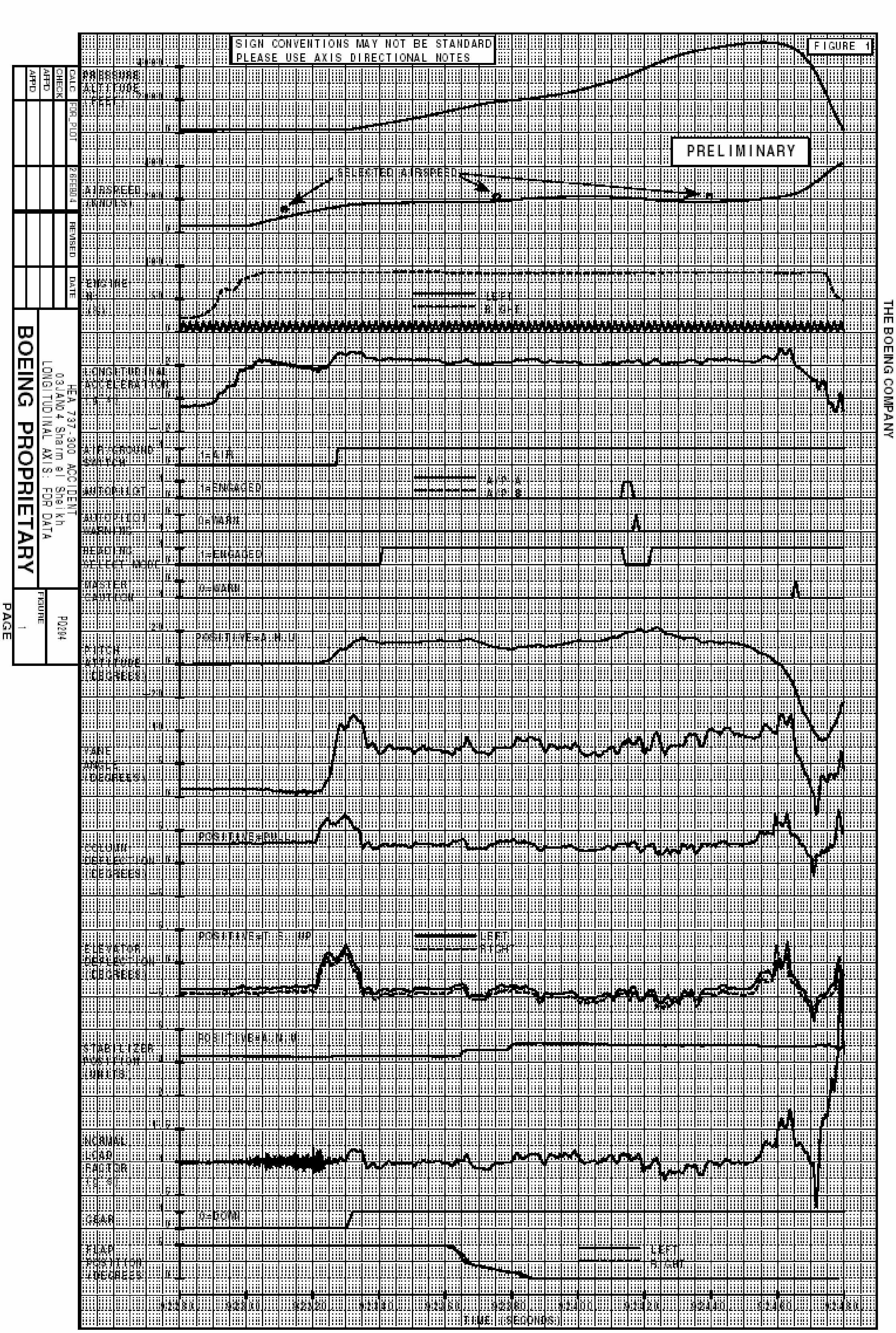
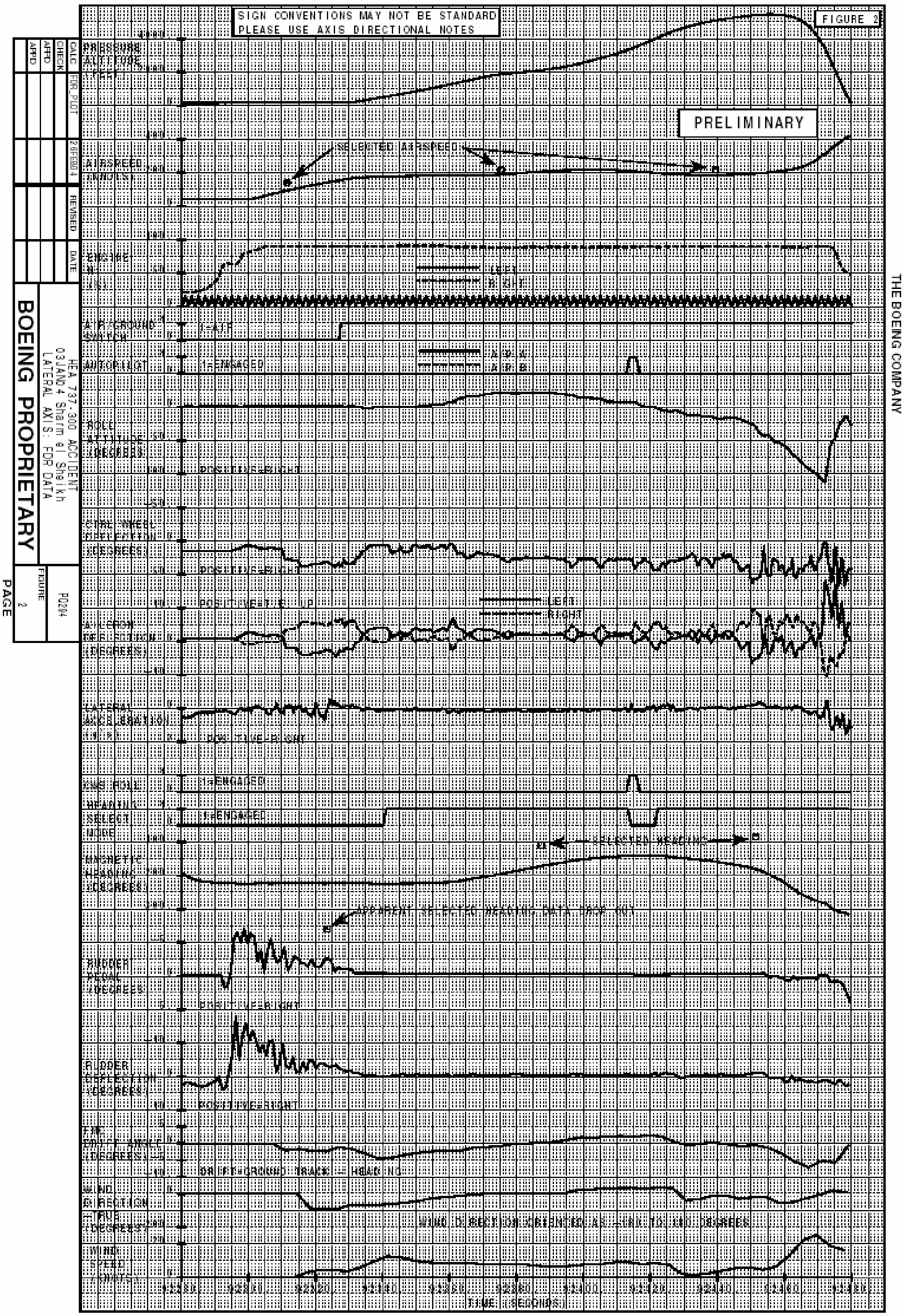


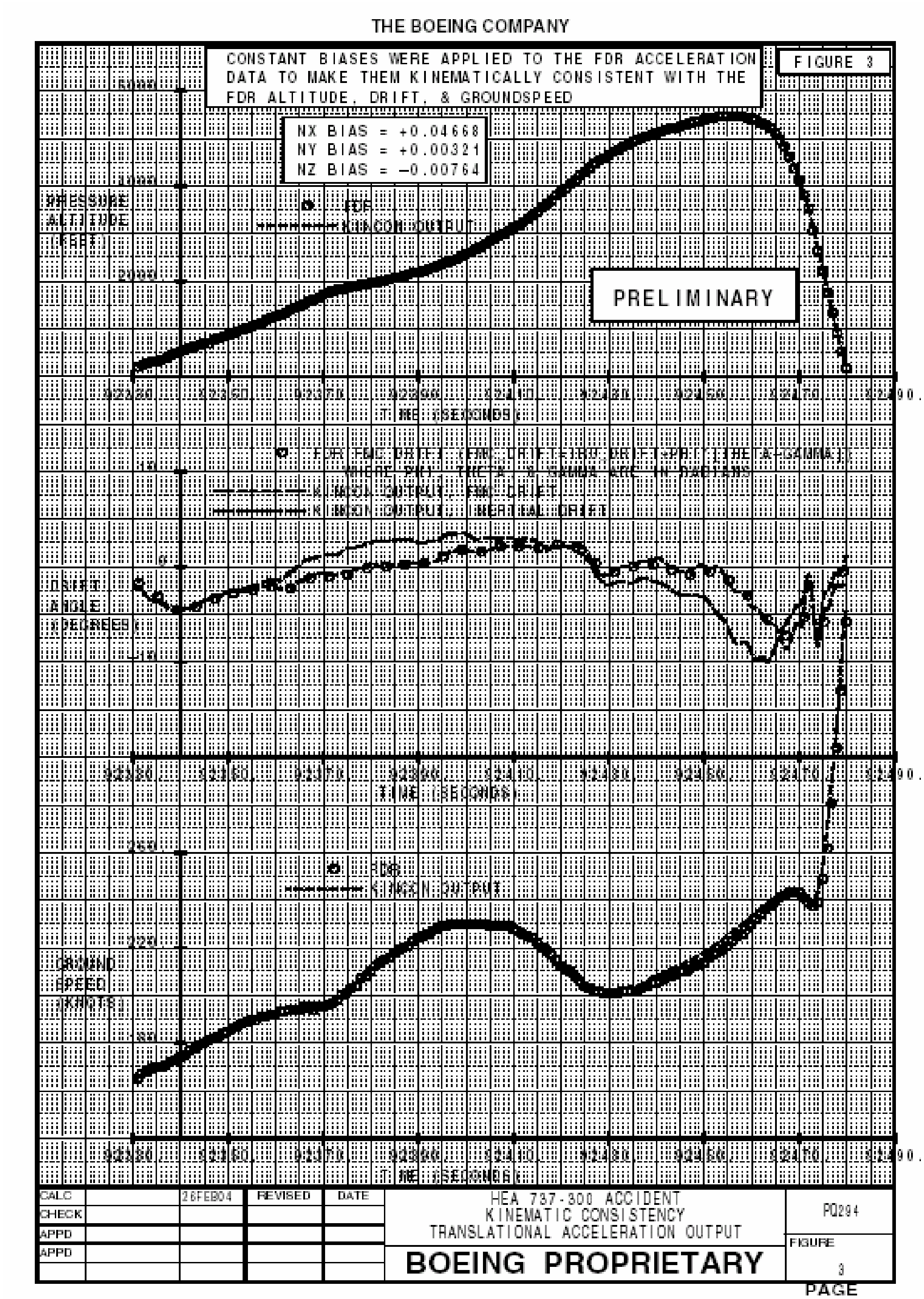
FIGURE 7
PRELIMINARY
FDR
KINCON
SIMULATION
SIMULATION AILERON IS AN AVERAGE AILERON DEFLECTION WITH NO FLOAT
SIMULATION: RIGHT = -(LEFT AILERON)
HEA 737-300 ACCIDENT - 03JAN04
LATERAL AXIS: SIMULATION MATCH
ENTIRE FLIGHT
BOEING PROPRIETARY
THE BOEING COMPANY
PD294
FIGURE 7
PAGE

HEA_PQ294_FDR_data.pdf (FDR Data accident flight - Boeing -26 Feb 04 Fig's 1, 2)

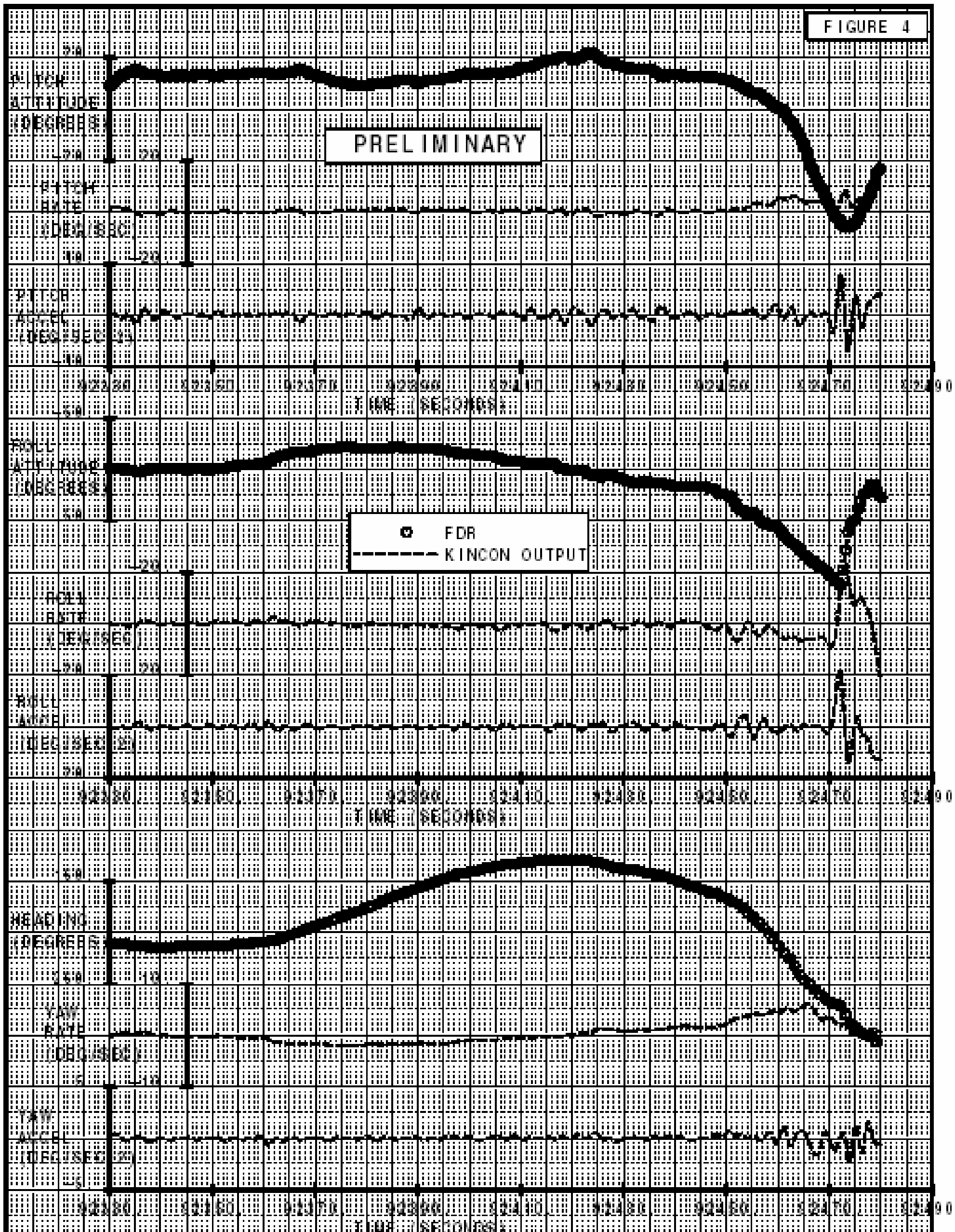



SIGN CONVENTIONS MAY NOT BE STANDARD
PLEASE USE AXIS DIRECTIONAL NOTES
FIGURE 2
PRELIMINARY
PRESSURE ALTITUDE (FEET)
SELECTED AIRSPEED
AIRSPEED (KNOTS)
ENGINE N1 (%)
LEFT
RIGHT
AIR/GROUND SWITCH
1=AIR
AUTOPILOT
1=ENGAGED
A/P A
A/P B
ROLL ATTITUDE (DEGREES)
POSITIVE=RIGHT
CTRL WHEEL DEFLECTION (DEGREES)
POSITIVE=RIGHT
POSITIVE=T.E. UP
AILERON DEFLECTION (DEGREES)
LATERAL ACCELERATION (G'S)
POSITIVE=RIGHT
CWS ROLL
1=ENGAGED
HEADING SELECT MODE
1=ENGAGED
SELECTED HEADING
MAGNETIC HEADING (DEGREES)
APPARENT SELECTED HEADING DATA DROP OUT
RUDDER PEDAL (DEGREES)
POSITIVE=RIGHT
RUDDER DEFLECTION (DEGREES)
POSITIVE=RIGHT
DRIFT ANGLE (DEGREES)
DRIFT=GROUND TRACK - HEADING
WIND DIRECTION -TRUE (DEGREES)
WIND DIRECTION ORIENTED AS -180 TO 180 DEGREES
WIND SPEED (KNOTS)
TIME (SECONDS)
CALC
CHECK
APPD
APPD
FOR PLOT
20FEB04
REVISED
DATE
FLASH 737-300 ACCIDENT
03JAN04 Sharm el Sheikh
LATERAL AXIS: FDR DATA
BOEING PROPRIETARY
FIGURE 2
PAGE
THE BOEING COMPANY

HEA_PQ294_kincon (includes roll rate).pdf (FDR Data accident flight - plotted by Boeing (some selected parameters)-26 Feb 04 Fig's 3, 4



THE BOEING COMPANY



CALC		26FEB04	REVISED	DATE	HEA 737-300 ACCIDENT KINEMATIC CONSISTENCY DERIVED ANGULAR PARAMETERS	PQ294
CHECK						
APPD						FIGURE
APPD					**BOEING PROPRIETARY**	4

PAGE

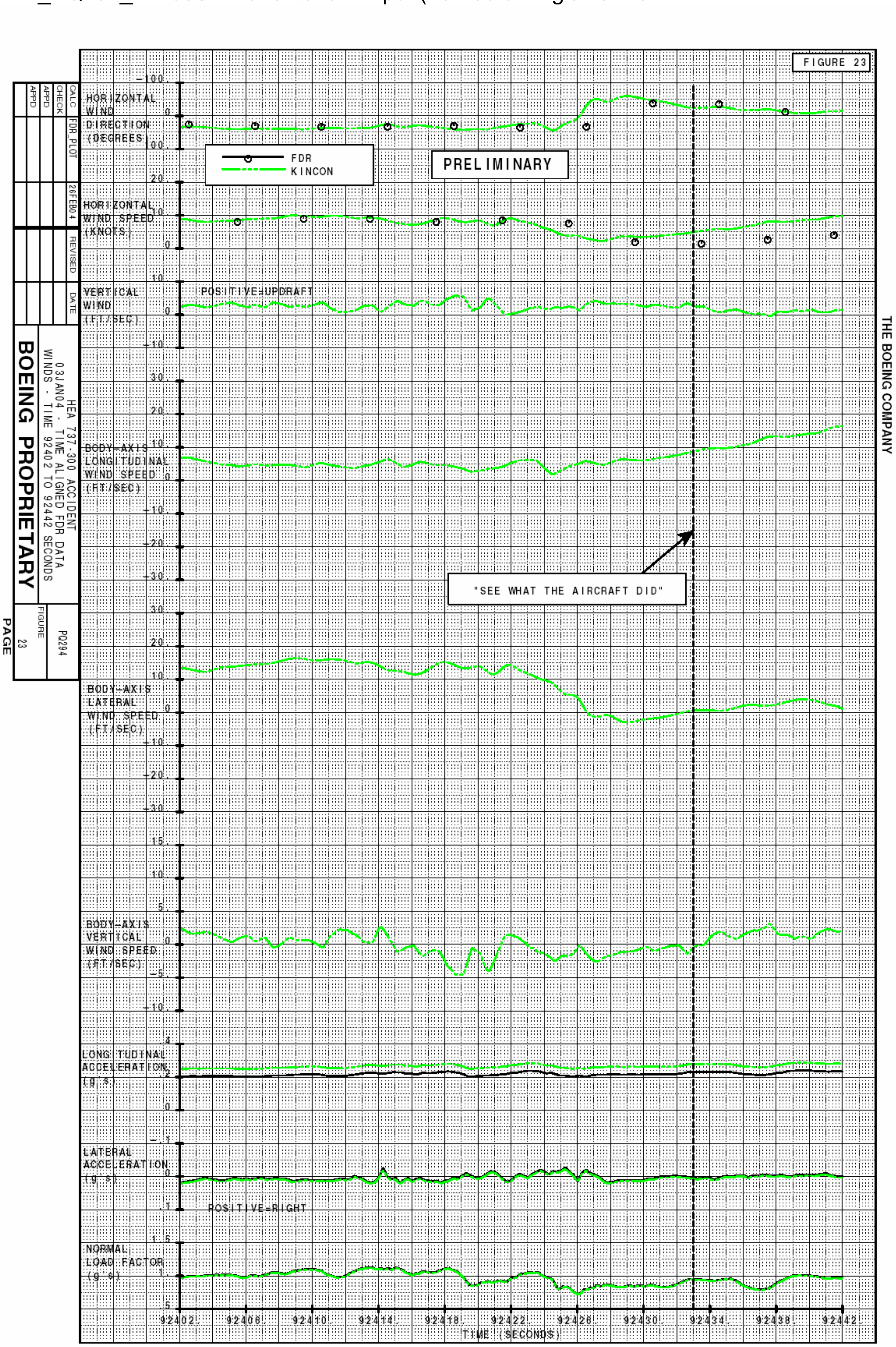
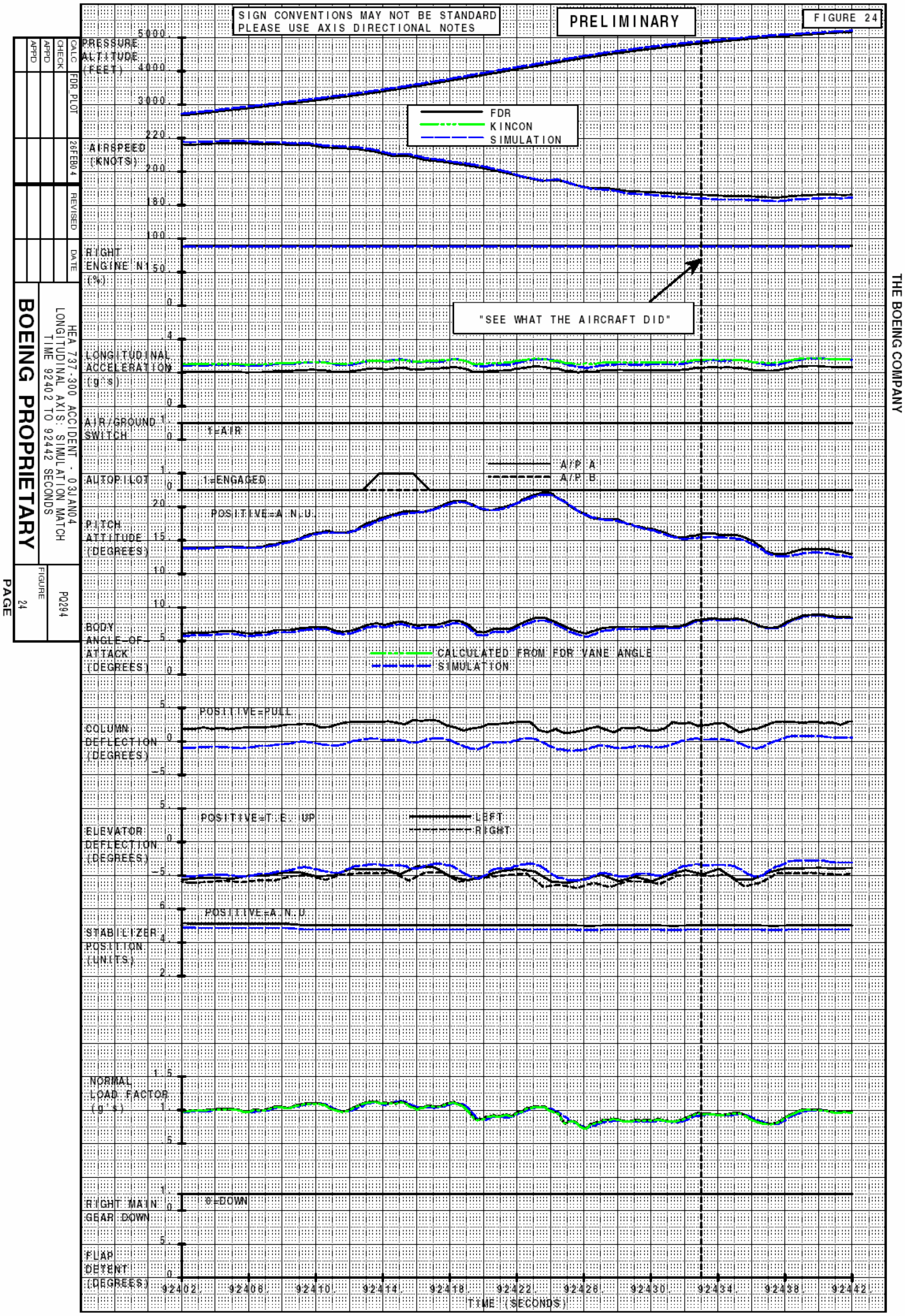


FIGURE 23
HORIZONTAL WIND DIRECTION (DEGREES)
FDR
KINCON
PRELIMINARY
HORIZONTAL WIND SPEED (KNOTS)
VERTICAL WIND (FT/SEC)
POSITIVE=UPDRAFT
BODY-AXIS LONGITUDINAL WIND SPEED (FT/SEC)
"SEE WHAT THE AIRCRAFT DID"
BODY-AXIS LATERAL WIND SPEED (FT/SEC)
BODY-AXIS VERTICAL WIND SPEED (FT/SEC)
LONGITUDINAL ACCELERATION (g's)
LATERAL ACCELERATION (g's)
POSITIVE=RIGHT
NORMAL LOAD FACTOR (g's)
92402. 92406. 92410. 92414. 92418. 92422. 92426. 92430. 92434. 92438. 92442.
TIME (SECONDS)
CALC
CHECK
APPD
APPD
FDR PLOT
26FEB04
REVISED
DATE
HEA 737-300 ACCIDENT
03JAN04 - TIME ALIGNED FDR DATA
WINDS - TIME 92402 TO 92442 SECONDS
BOEING PROPRIETARY
PQ294
FIGURE
23
PAGE
THE BOEING COMPANY


SIGN CONVENTIONS MAY NOT BE STANDARD
PLEASE USE AXIS DIRECTIONAL NOTES
PRELIMINARY
FIGURE 24
PRESSURE ALTITUDE (FEET)
AIRSPEED (KNOTS)
FDR
KINCON
SIMULATION
RIGHT ENGINE N1 (%)
"SEE WHAT THE AIRCRAFT DID"
LONGITUDINAL ACCELERATION (g's)
AIR/GROUND SWITCH
1=AIR
AUTOPILOT
1=ENGAGED
A/P A
A/P B
PITCH ATTITUDE (DEGREES)
POSITIVE=A.N.U.
BODY ANGLE-OF-ATTACK (DEGREES)
CALCULATED FROM FDR VANE ANGLE
SIMULATION
COLUMN DEFLECTION (DEGREES)
POSITIVE=PULL
ELEVATOR DEFLECTION (DEGREES)
POSITIVE=T.E. UP
LEFT
RIGHT
STABILIZER POSITION (UNITS)
POSITIVE=A.N.U.
NORMAL LOAD FACTOR (g's)
RIGHT MAIN GEAR DOWN
0=DOWN
FLAP DETENT (DEGREES)
TIME (SECONDS)
HEA 737-300 ACCIDENT - 03JAN04
LONGITUDINAL AXIS: SIMULATION MATCH
TIME 92402 TO 92442 SECONDS
BOEING PROPRIETARY
FDR PLOT
26FEB04
P0294
24
PAGE
THE BOEING COMPANY

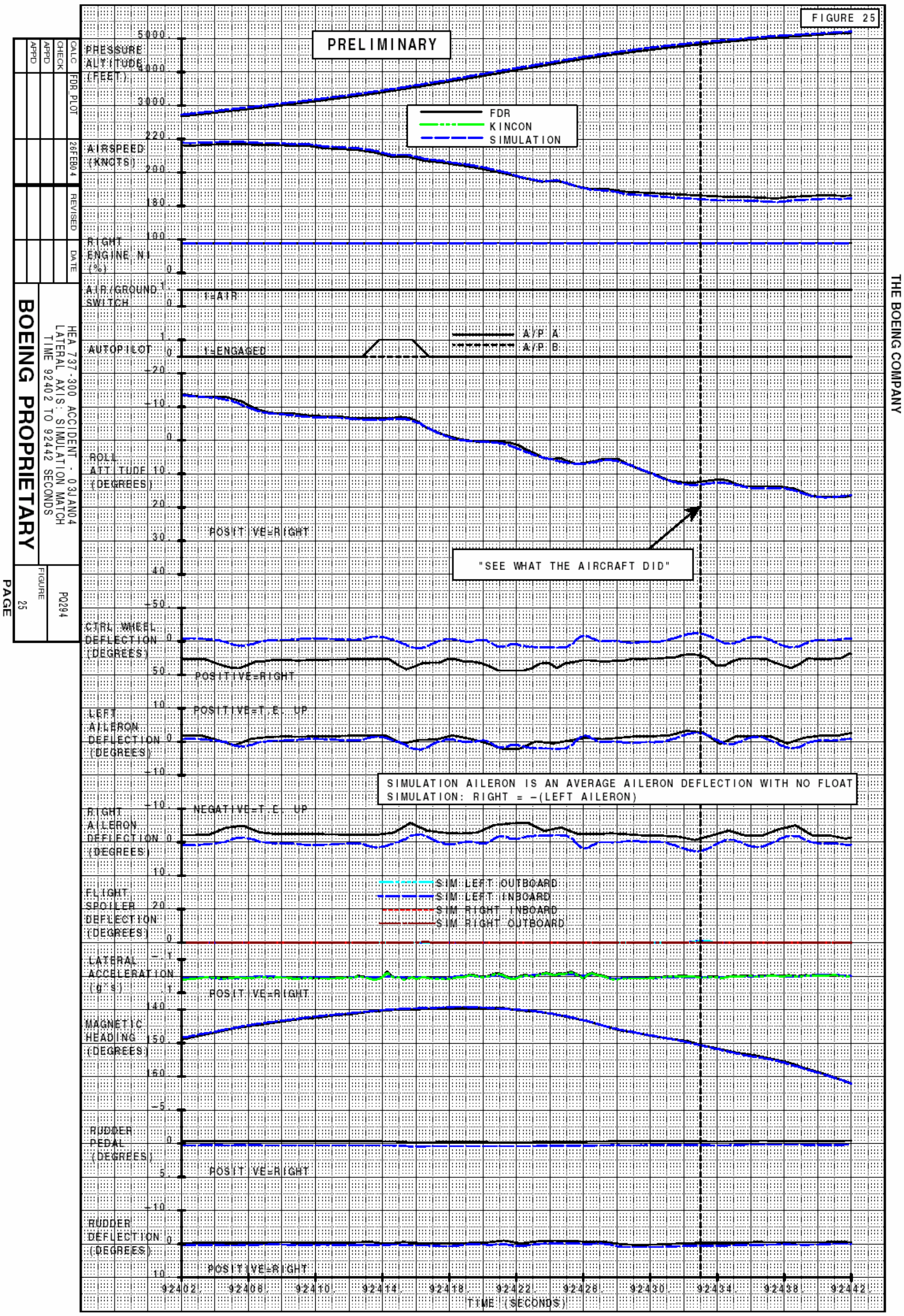
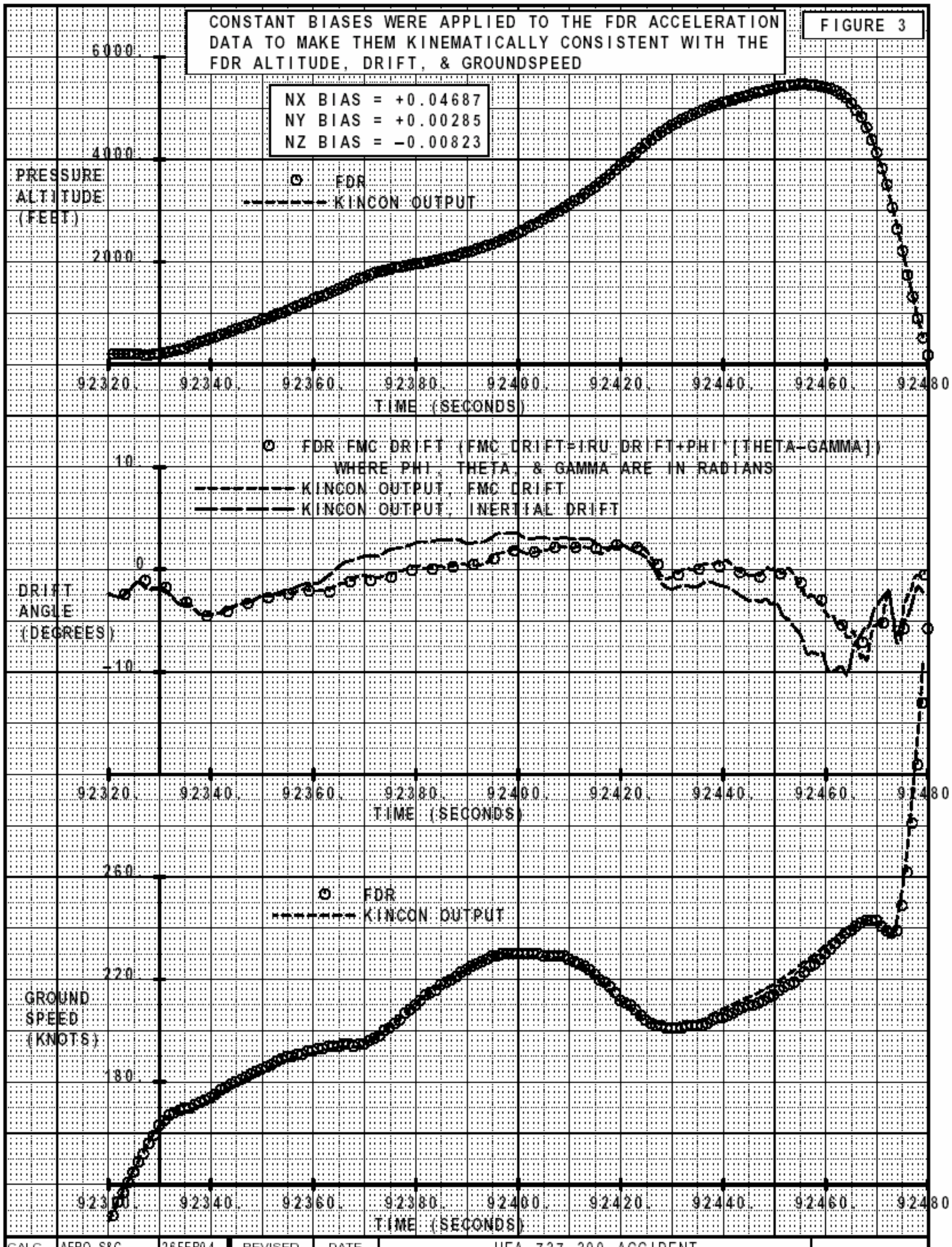


FIGURE 25
PRELIMINARY
PRESSURE ALTITUDE (FEET)
AIRSPEED (KNOTS)
RIGHT ENGINE N1 (%)
AIR/GROUND SWITCH
1=AIR
AUTOPILOT
1=ENGAGED
A/P A
A/P B
FDR
KINCON
SIMULATION
ROLL ATTITUDE (DEGREES)
POSITIVE=RIGHT
"SEE WHAT THE AIRCRAFT DID"
CTRL WHEEL DEFLECTION (DEGREES)
POSITIVE=RIGHT
LEFT AILERON DEFLECTION (DEGREES)
POSITIVE=T.E. UP
SIMULATION AILERON IS AN AVERAGE AILERON DEFLECTION WITH NO FLOAT
SIMULATION: RIGHT = -(LEFT AILERON)
RIGHT AILERON DEFLECTION (DEGREES)
NEGATIVE=T.E. UP
FLIGHT SPOILER DEFLECTION (DEGREES)
SIM LEFT OUTBOARD
SIM LEFT INBOARD
SIM RIGHT INBOARD
SIM RIGHT OUTBOARD
LATERAL ACCELERATION (g's)
POSITIVE=RIGHT
MAGNETIC HEADING (DEGREES)
RUDDER PEDAL (DEGREES)
POSITIVE=RIGHT
RUDDER DEFLECTION (DEGREES)
POSITIVE=RIGHT
92402 92406 92410 92414 92418 92422 92426 92430 92434 92438 92442
TIME (SECONDS)
CALC FDR PLOT 26FEB04
CHECK
APPD
APPD
REVISED
DATE
BOEING PROPRIETARY
HEA 737-300 ACCIDENT - 03JAN04
LATERAL AXIS: SIMULATION MATCH
TIME 92402 TO 92442 SECONDS
PD294
FIGURE 25
PAGE
THE BOEING COMPANY

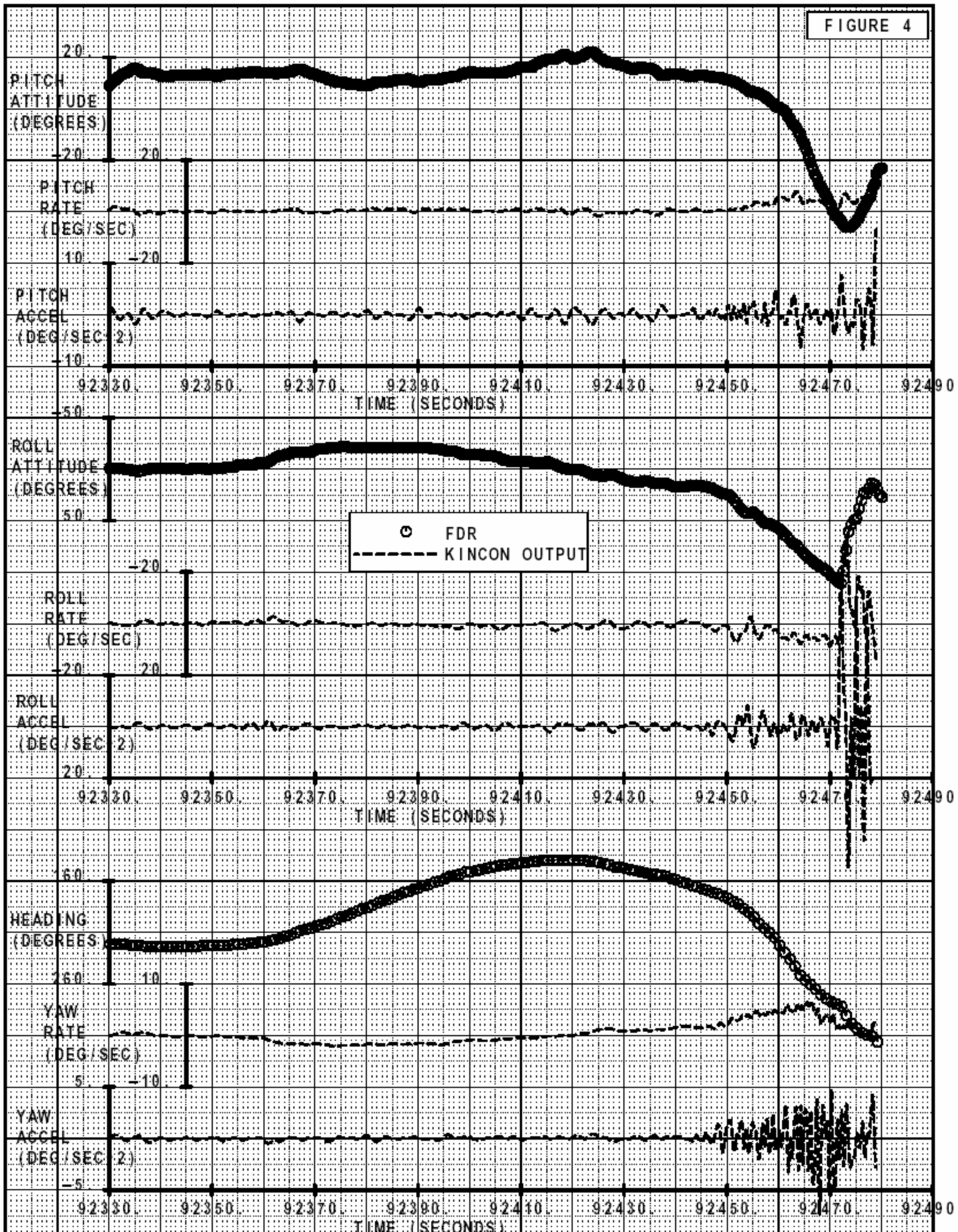
17871 encl 4 (B-H200-17871-ASI 31 March 2004).pdf (enclosure 4 (B-H200-17871-ASI 31 March 2004). Boeing plots

THE BOEING COMPANY Enclosure 4 to B-H200-17871-ASI



CALC	AERO S&C	26FEB04	REVISED	DATE	HEA 737-300 ACCIDENT KINEMATIC CONSISTENCY TRANSLATIONAL ACCELERATION OUTPUT	PQ294
CHECK			AERO S&C	31MAR04		
APPD						FIGURE
APPD					BOEING PROPRIETARY	3 REV A

PAGE



CALC	AERO S&C	26FEB04	REVISED	DATE	HEA 737-300 ACCIDENT KINEMATIC CONSISTENCY DERIVED ANGULAR PARAMETERS	PQ294
CHECK			AERO S&C	31MAR04		
APPD						FIGURE
APPD					**BOEING PROPRIETARY**	4 REV A

PAGE

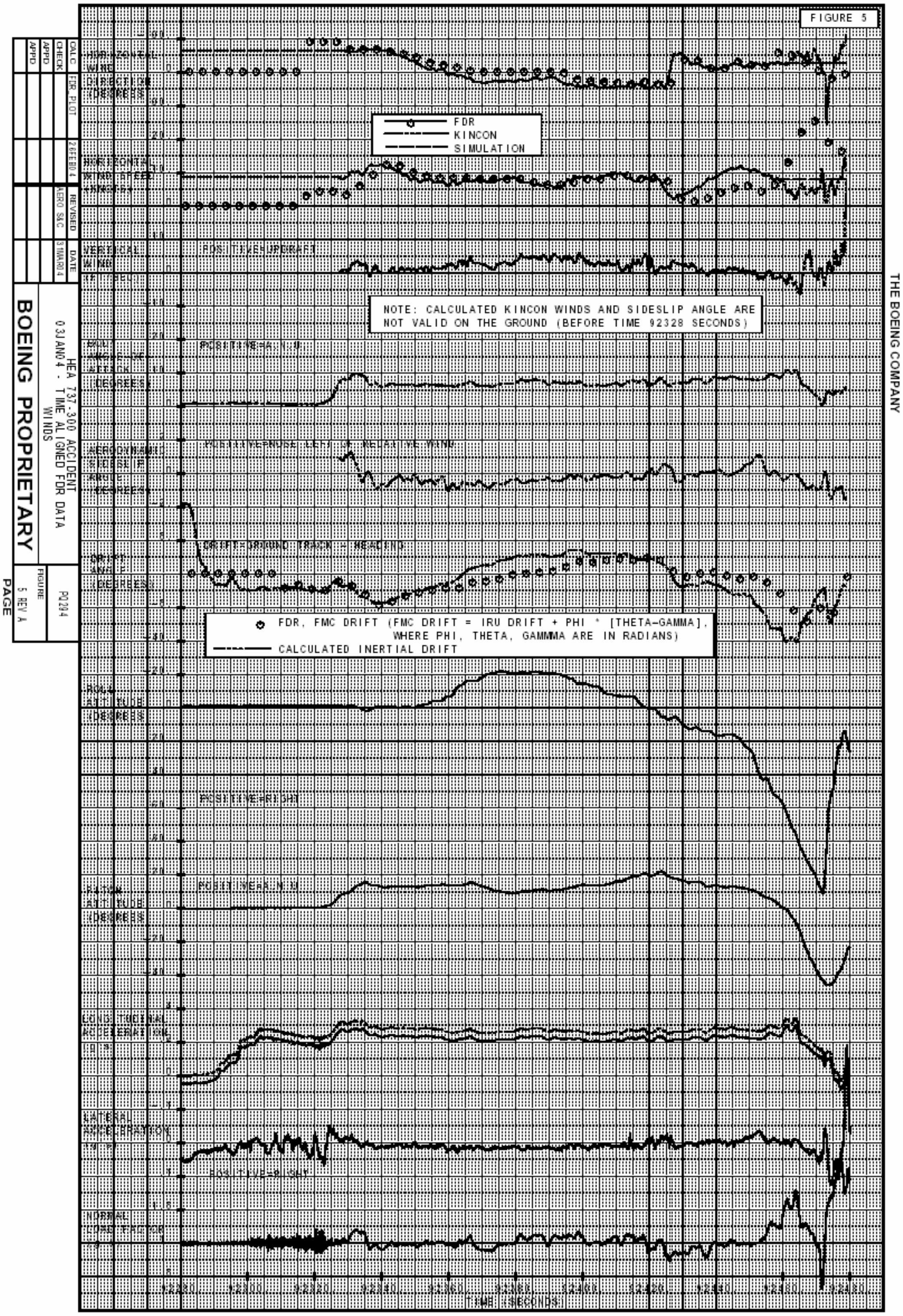
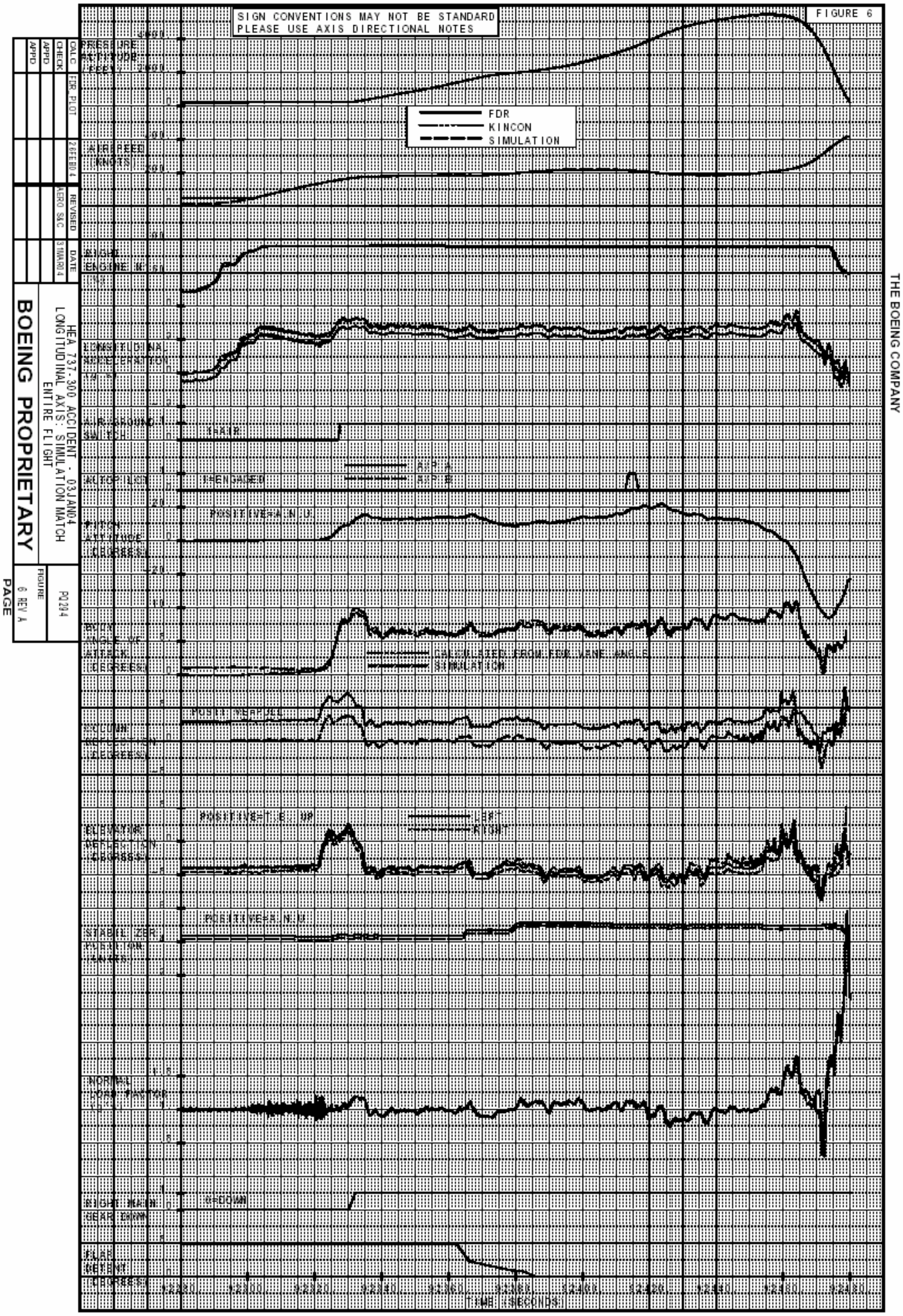


FIGURE 5
FDR
KINCON
SIMULATION
NOTE: CALCULATED KINCON WINDS AND SIDESLIP ANGLE ARE NOT VALID ON THE GROUND (BEFORE TIME 92328 SECONDS)
FDR, FMC DRIFT (FMC DRIFT = IRU DRIFT + PHI * [THETA-GAMMA], WHERE PHI, THETA, GAMMA ARE IN RADIANS)
CALCULATED INERTIAL DRIFT
BOEING PROPRIETARY
HEA 737-300 ACCIDENT
03JAN04 - TIME ALIGNED FDR DATA
WINDS
THE BOEING COMPANY


SIGN CONVENTIONS MAY NOT BE STANDARD
PLEASE USE AXIS DIRECTIONAL NOTES
FIGURE 6
FDR
KINCON
SIMULATION
POSITIVE=A.N.U.
CALCULATED FROM FDR VANE ANGLE
SIMULATION
POSITIVE=T.E. UP
TIME (SECONDS)
HEA 737-300 ACCIDENT - 03JAN04
LONGITUDINAL AXIS: SIMULATION MATCH
ENTIRE FLIGHT
BOEING PROPRIETARY
THE BOEING COMPANY

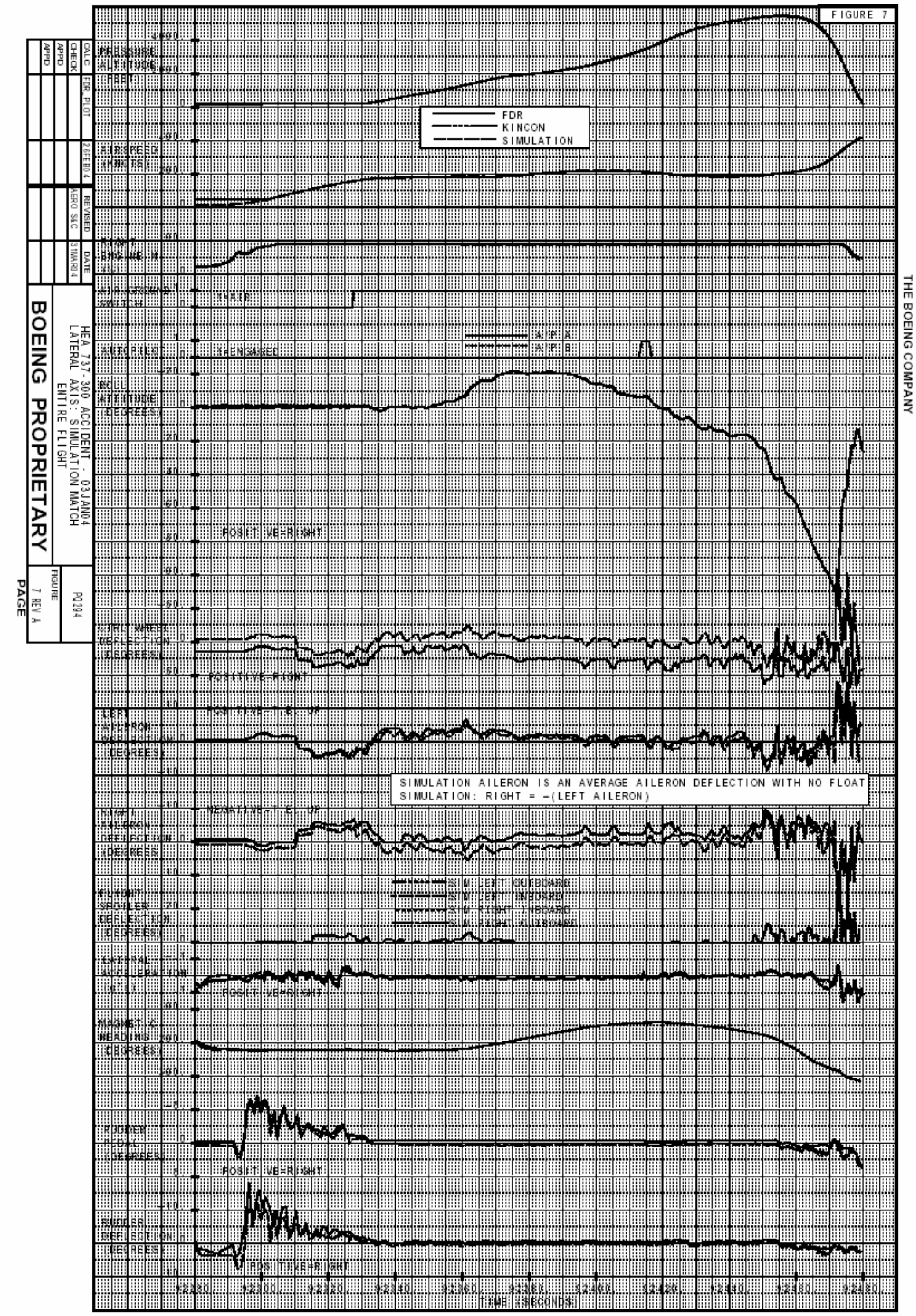
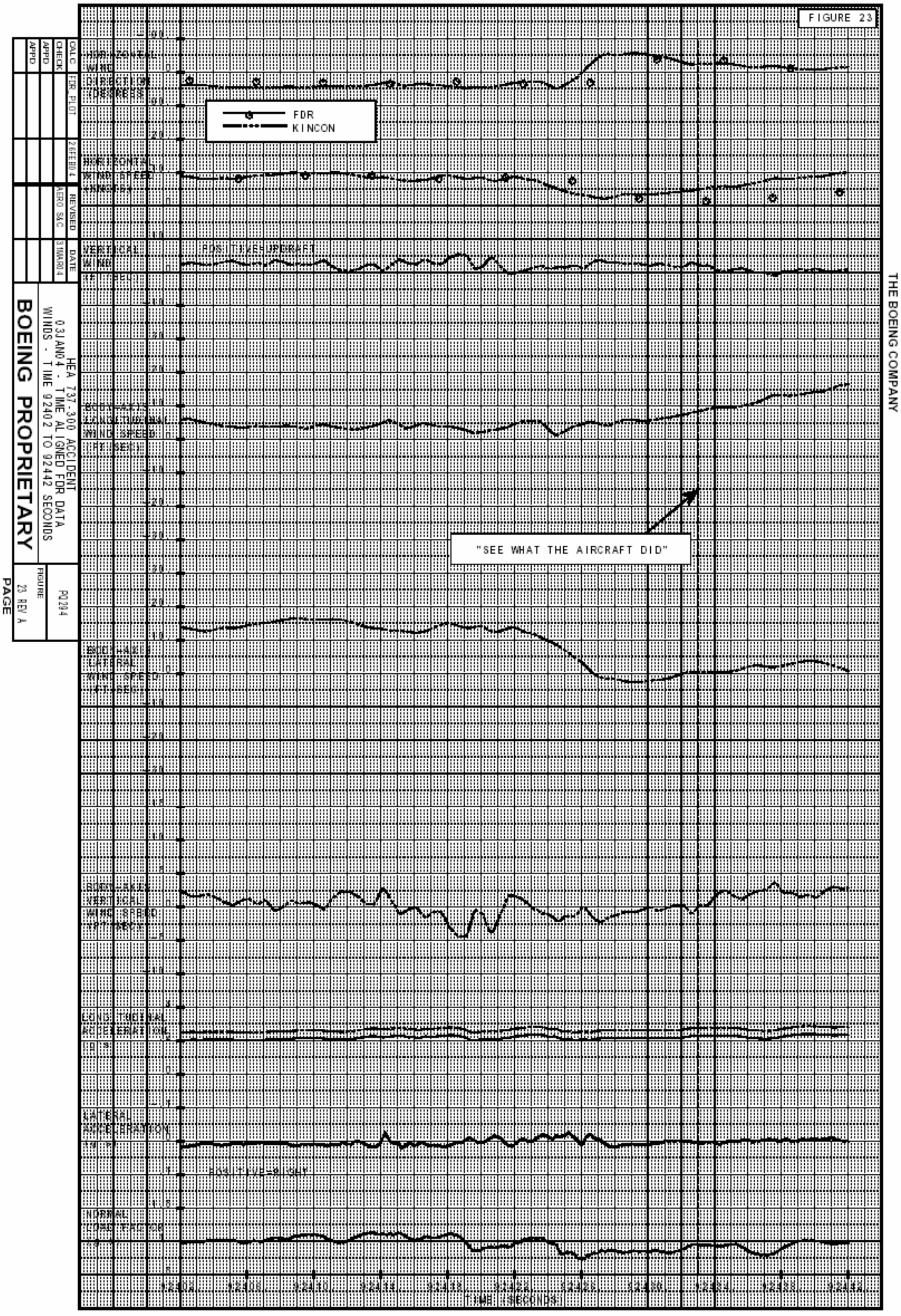
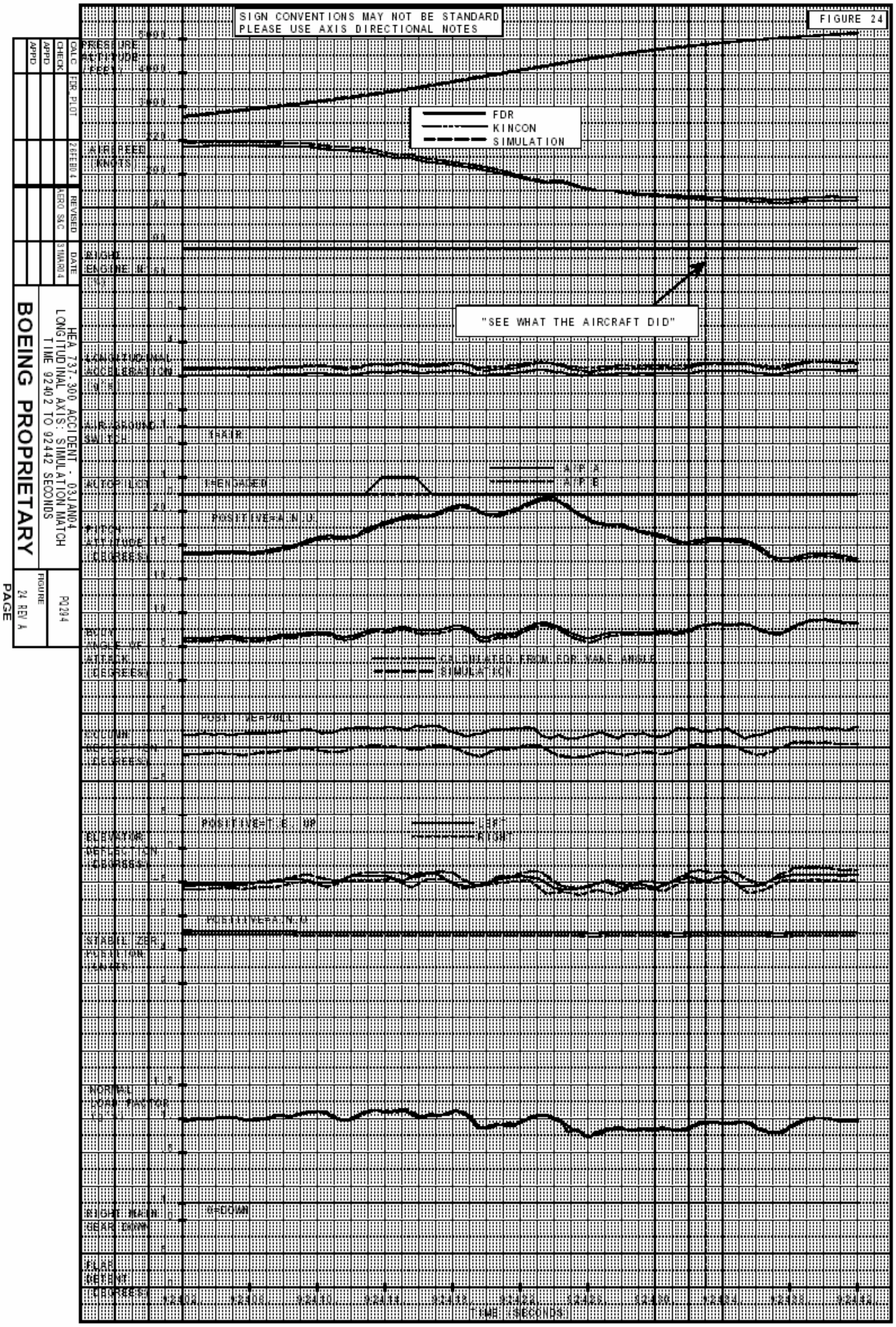


FIGURE 7
PRESSURE ALTITUDE (FEET)
FDR
KINCON
SIMULATION
AIRSPEED (KNOTS)
AIR/GROUND SWITCH
AUTOPILOT
A/P A
A/P B
ROLL ATTITUDE (DEGREES)
POSITIVE=RIGHT
LEFT AILERON DEFLECTION (DEGREES)
SIMULATION AILERON IS AN AVERAGE AILERON DEFLECTION WITH NO FLOAT
SIMULATION: RIGHT = -(LEFT AILERON)
RIGHT AILERON DEFLECTION (DEGREES)
FLIGHT SPOILER DEFLECTION (DEGREES)
LATERAL ACCELERATION
MAGNETIC HEADING (DEGREES)
RUDDER PEDAL (DEGREES)
RUDDER DEFLECTION (DEGREES)
TIME (SECONDS)
BOEING PROPRIETARY
HEA 737-300 ACCIDENT - 03JAN04
LATERAL AXIS: SIMULATION MATCH
ENTIRE FLIGHT
THE BOEING COMPANY

Enclosure 4 to B-H200-17871-ASI





THE BOEING COMPANY

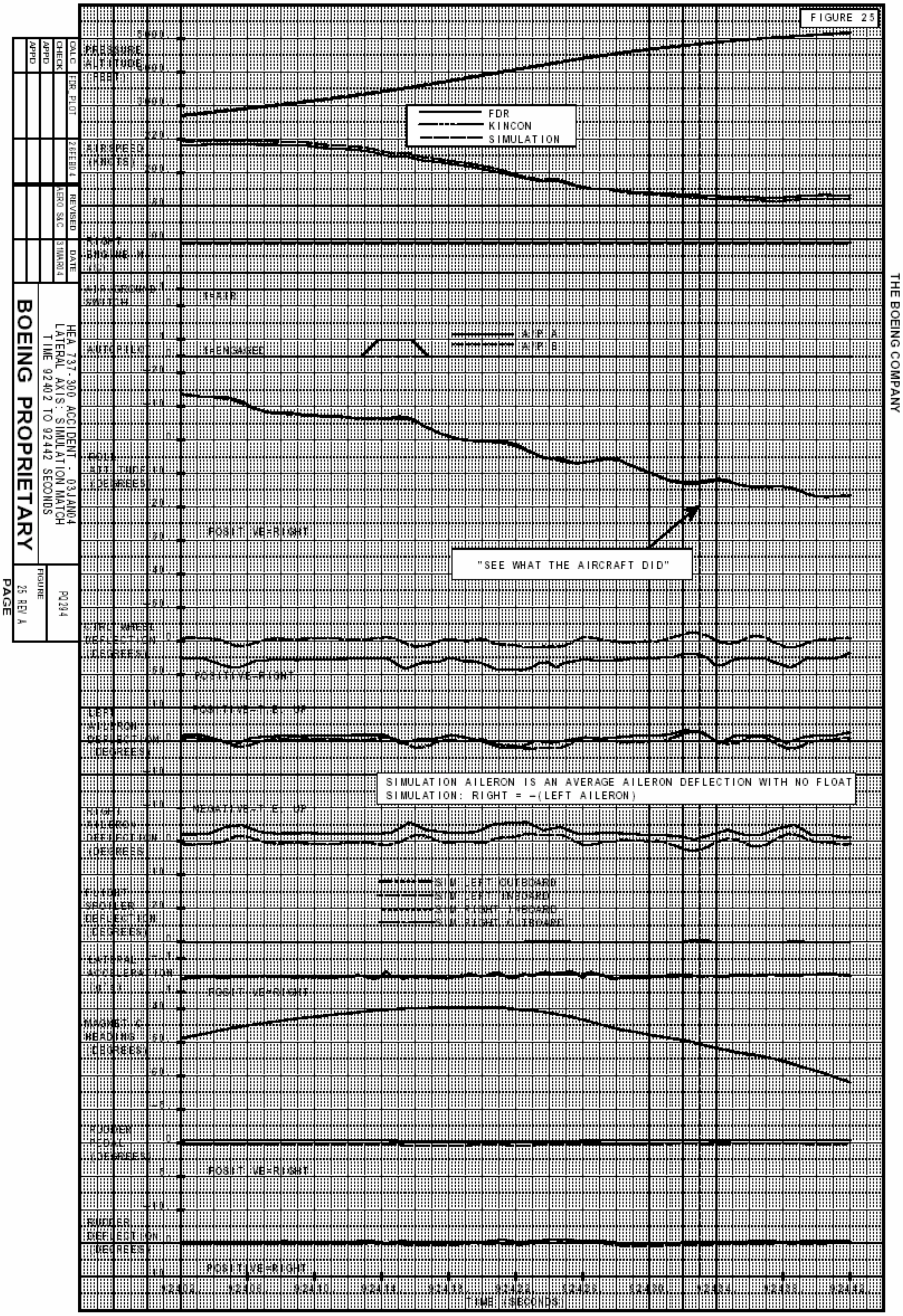


FIGURE 25
FDR
KINCON
SIMULATION
"SEE WHAT THE AIRCRAFT DID"
SIMULATION AILERON IS AN AVERAGE AILERON DEFLECTION WITH NO FLOAT
SIMULATION: RIGHT = −(LEFT AILERON)
TIME (SECONDS)
THE BOEING COMPANY
HEA 737-300 ACCIDENT - 03JAN04
LATERAL AXIS: SIMULATION MATCH
TIME 92402 TO 92442 SECONDS
BOEING PROPRIETARY
PAGE

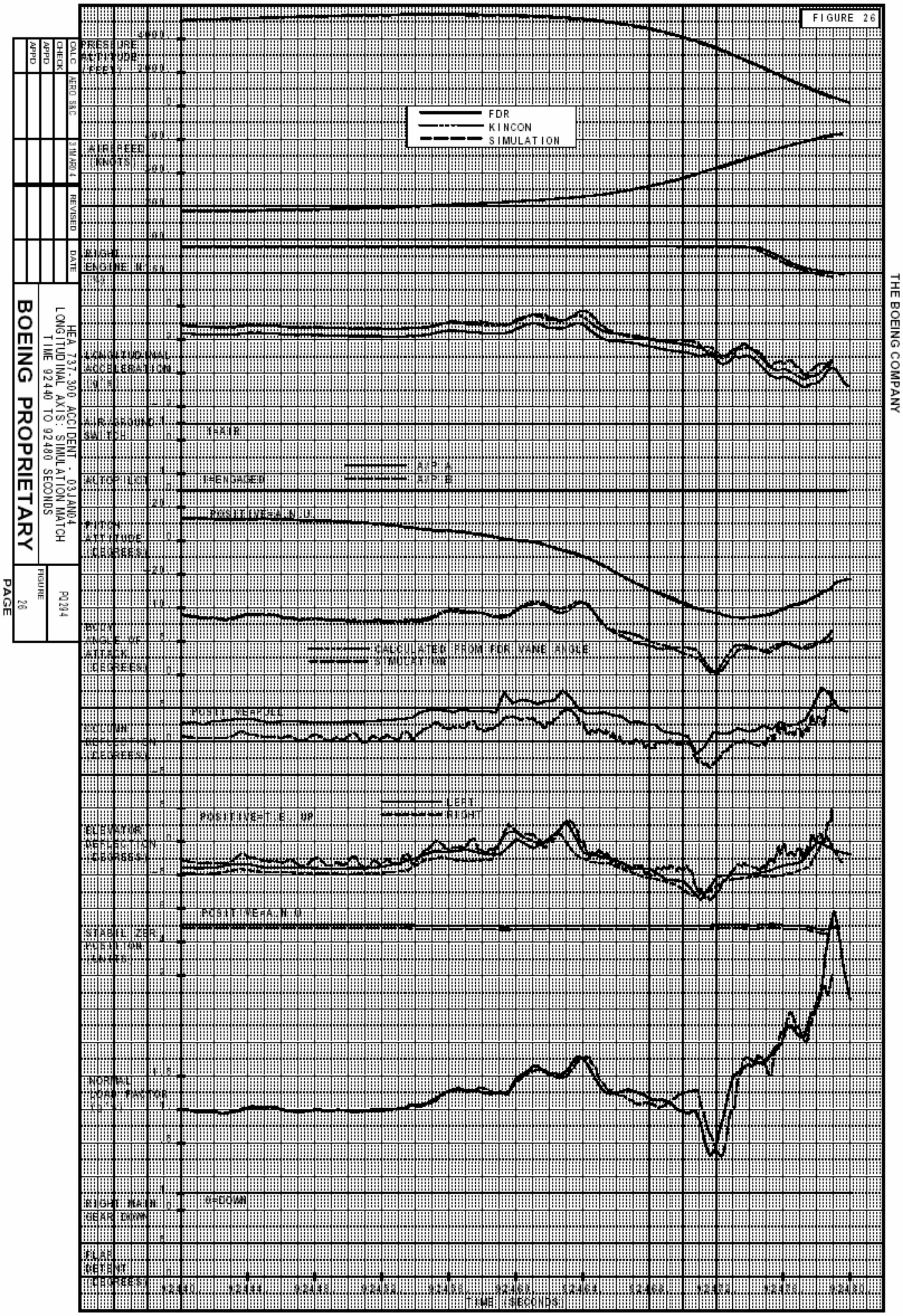


FIGURE 26
FDR
KINCON
SIMULATION
PRESSURE ALTITUDE (FEET)
AIRSPEED (KNOTS)
LONGITUDINAL ACCELERATION
AIR/GROUND SWITCH
AUTOPILOT
PITCH ATTITUDE (DEGREES)
CALCULATED FROM FDR VANE ANGLE
SIMULATION
LEFT
RIGHT
POSITIVE=T.E. UP
ELEVATOR DEFLECTION (DEGREES)
NORMAL LOAD FACTOR
TIME (SECONDS)
HEA 737-300 ACCIDENT - 03JAN04
LONGITUDINAL AXIS: SIMULATION MATCH
TIME 92440 TO 92480 SECONDS
BOEING PROPRIETARY
THE BOEING COMPANY
CALC
CHECK
APPD
APPD
AERO S&C
REVISED
DATE
FIGURE
26
PAGE

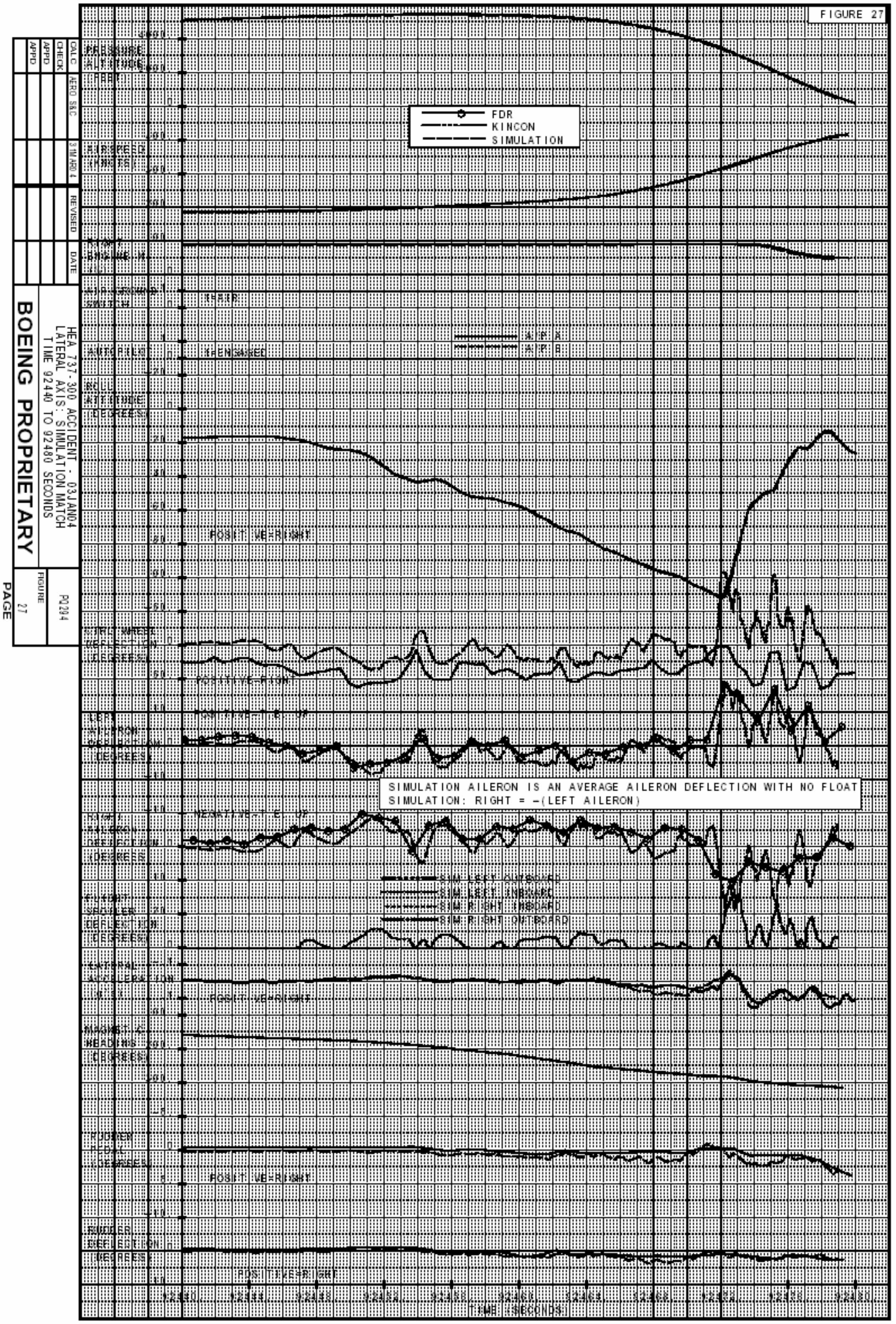
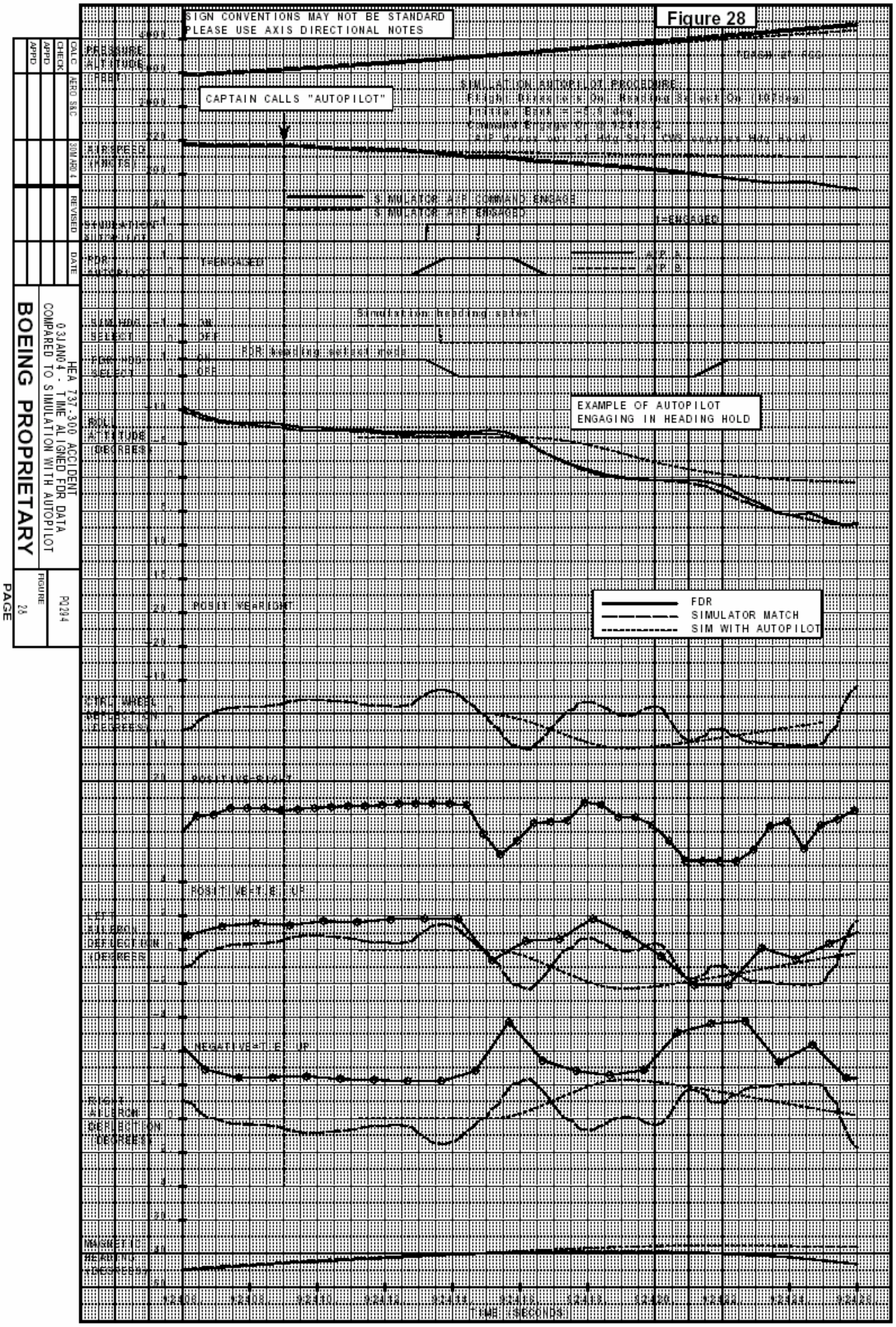


FIGURE 27
FDR
KINCON
SIMULATION
A/P A
A/P B
PRESSURE ALTITUDE (FEET)
AIRSPEED (KNOTS)
ROLL ATTITUDE (DEGREES)
POSITIVE=RIGHT
SIMULATION AILERON IS AN AVERAGE AILERON DEFLECTION WITH NO FLOAT
SIMULATION: RIGHT = -(LEFT AILERON)
SIM LEFT OUTBOARD
SIM LEFT INBOARD
SIM RIGHT INBOARD
SIM RIGHT OUTBOARD
RUDDER DEFLECTION (DEGREES)
POSITIVE=RIGHT
TIME (SECONDS)
THE BOEING COMPANY
BOEING PROPRIETARY
HEA 737-300 ACCIDENT - 03JAN04
LATERAL AXIS: SIMULATION MATCH
TIME 92440 TO 92480 SECONDS
FIGURE 27
PAGE

Figure 28



THE BOEING COMPANY

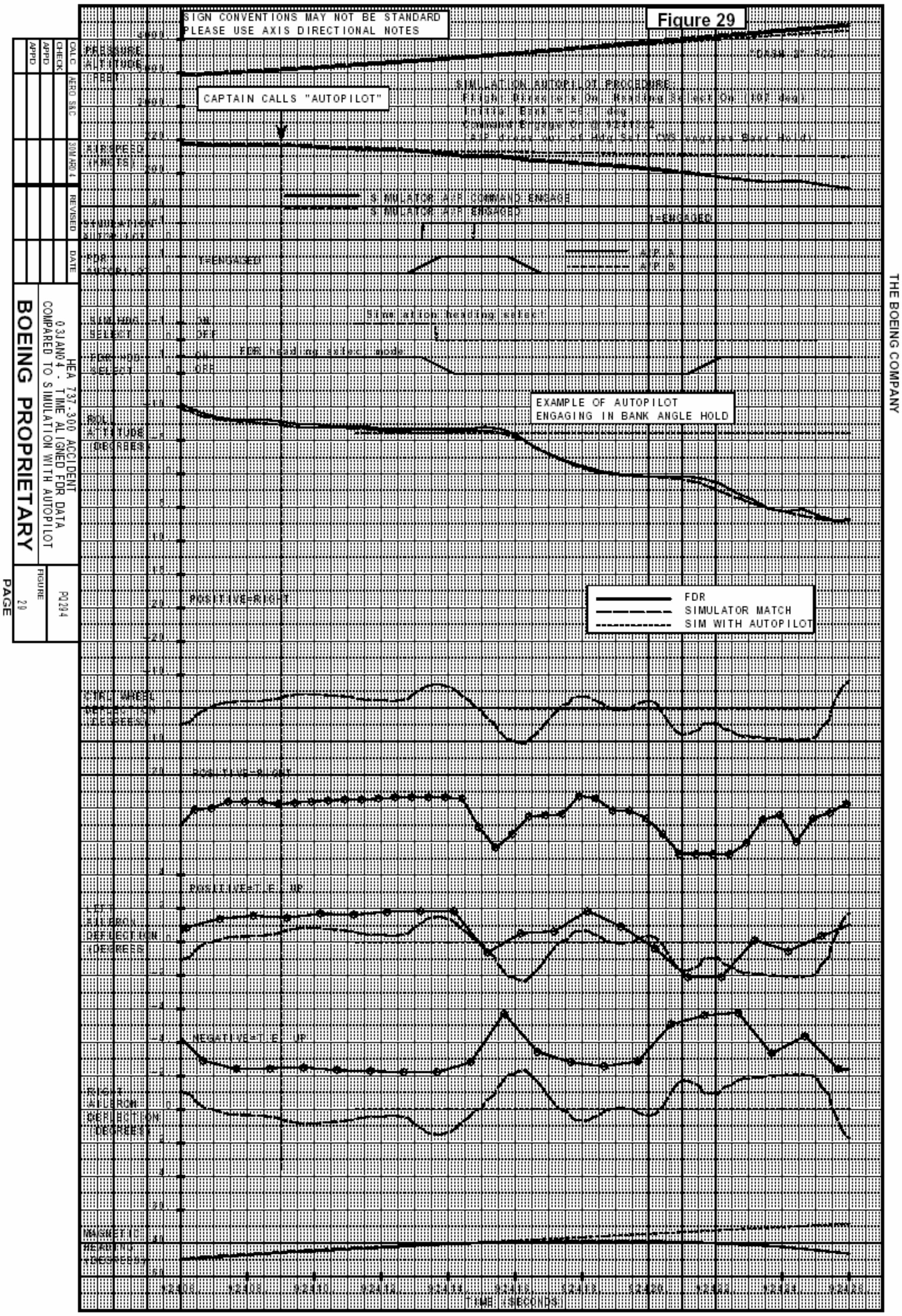
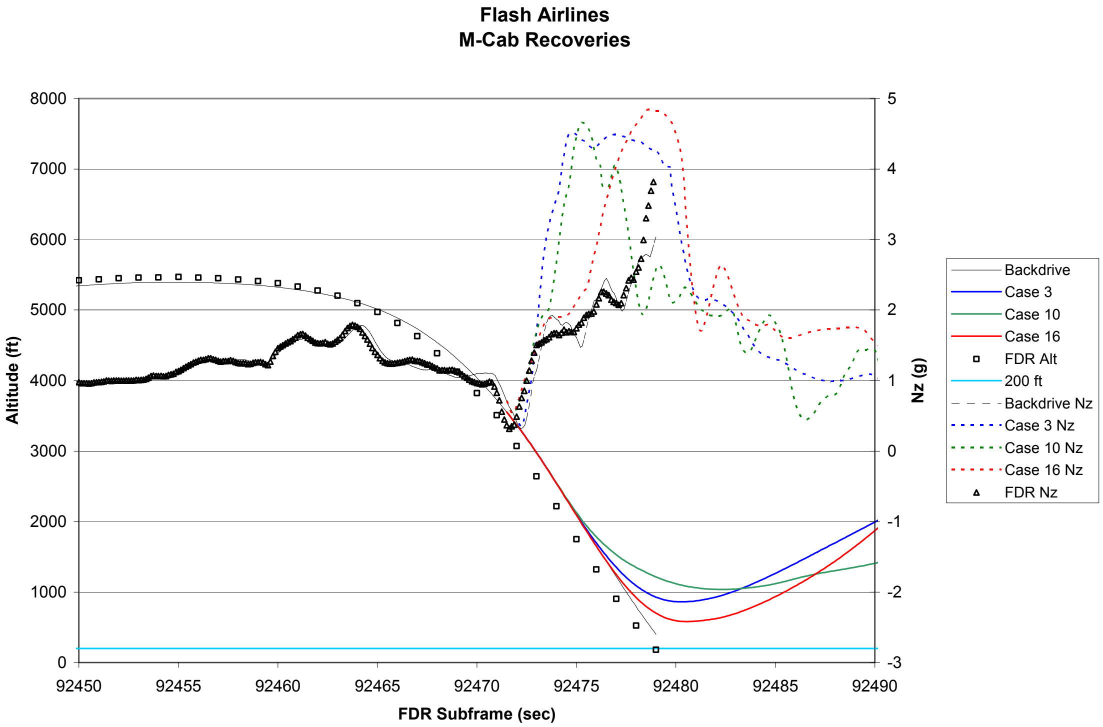
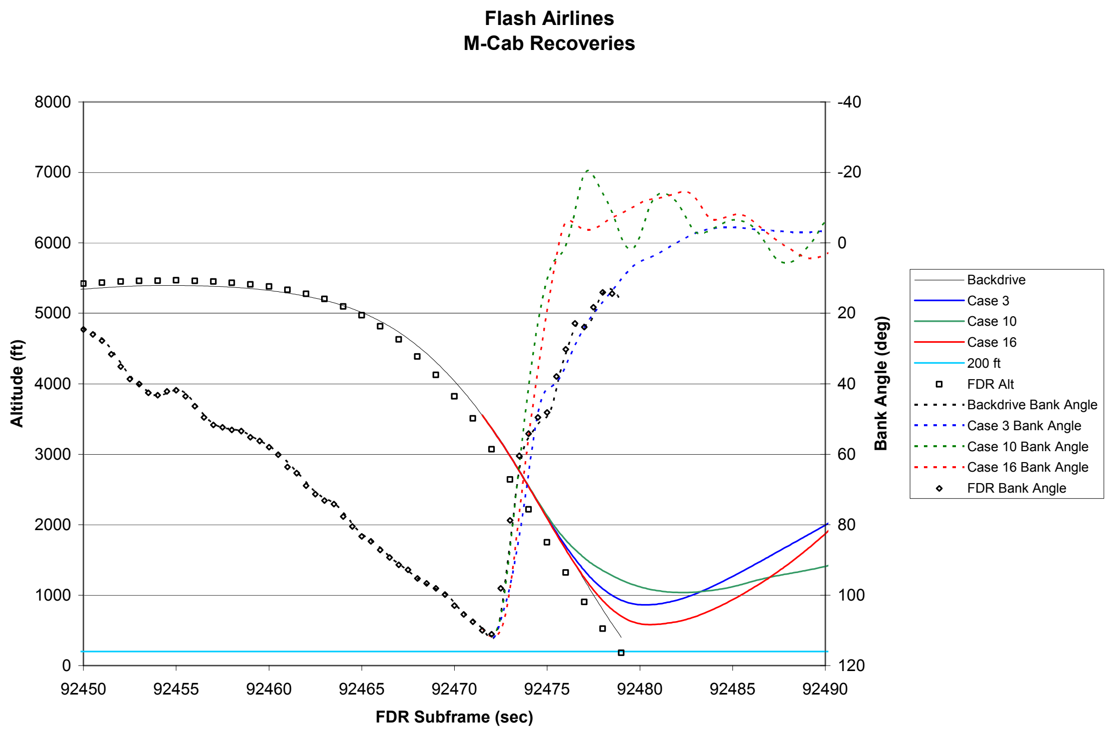


Figure 29
SIGN CONVENTIONS MAY NOT BE STANDARD
PLEASE USE AXIS DIRECTIONAL NOTES
CAPTAIN CALLS "AUTOPILOT"
SIMULATION AUTOPILOT PROCEDURE
PRESSURE ALTITUDE (FEET)
AIRSPEED (KNOTS)
SIMULATOR A/P COMMAND ENGAGE
SIMULATOR A/P ENGAGED
1=ENGAGED
FDR AUTOPILOT
1=ENGAGED
A/P A
A/P B
SIM HDG SELECT
ON
OFF
FDR HDG SELECT
FDR heading select mode
Simulation heading select
EXAMPLE OF AUTOPILOT
ENGAGING IN BANK ANGLE HOLD
ROLL ATTITUDE (DEGREES)
POSITIVE=RIGHT
FDR
SIMULATOR MATCH
SIM WITH AUTOPILOT
CTRL WHEEL DEFLECTION (DEGREES)
POSITIVE=T.E. UP
LEFT AILERON DEFLECTION (DEGREES)
NEGATIVE=T.E. UP
RIGHT AILERON DEFLECTION (DEGREES)
MAGNETIC HEADING (DEGREES)
TIME (SECONDS)
BOEING PROPRIETARY
HEA 737-300 ACCIDENT
03JAN04 - TIME ALIGNED FDR DATA
COMPARED TO SIMULATION WITH AUTOPILOT
CALC
CHECK
APPD
APPD
AERO S&C
REVISED
DATE
FIGURE
29
PAGE
THE BOEING COMPANY

M Cab Recovery (Piloted Recovery.xls)




Flash Airlines
M-Cab Recoveries
Altitude (ft)
Bank Angle (deg)
FDR Subframe (sec)
8000
7000
6000
5000
4000
3000
2000
1000
0
-40
-20
0
20
40
60
80
100
120
92450
92455
92460
92465
92470
92475
92480
92485
92490
Backdrive
Case 3
Case 10
Case 16
200 ft
FDR Alt
Backdrive Bank Angle
Case 3 Bank Angle
Case 10 Bank Angle
Case 16 Bank Angle
FDR Bank Angle

Simulation Scenario (Simulation Scenario Status20 Sep.,04.xls)

Flash Airlines Requested Simulation Scenarios			Last Updated 7 Sept 04			
				29-Jul-04	20-Sep-04	
No.	Scenario	M-Cab Status	Comments	MCA Comments	MCA Comment	Presentation
1	Use M-cab like a training simulator (manual flight with no backdrive)	Available now	The M-cab is capable of performing like a training simulator. However, it does not have an "instructor's station" to insert pre-programmed malfunctions like many training simulators do. Therefore, if pre-programmed malfunctions are desired in the M-cab, advance notice is required to ensure the correct routines can be loaded and available.	OK MCA will advise if any such pre-programmed malfunctions are desired.	OK	Boeing
2	Backdrive of accident flight (from FDR data)	Available now	The full backdrive from the FDR data is available. A "breakout" switch will be installed that will allow manual pilot inputs at any point in the scenario.	OK	OK	Boeing
3a	Slat extend (mid) fault	In work	No aero extend data			Boeing
3b	Slat extend (full) fault	In work	This scenario will be available in the cab. It is the same scenario for which plots were provided in March at the Cairo meeting, **except that we will insert the fault at flaps up**.		MCA requests to perform fault insertion simultaneously with breakout and then attempt to fly accident flight path. The intention is to compare FDR aileron to aileron required to fly accident profile with fault.	Boeing
4	Spoiler hardover fault	In work	Same as #3b except at time 92444		MCA requests that fault be inserted at A/P engage (92415)	Boeing
5	Spoiler float fault	In work	Same as #3b except at time 92444		MCA requests that fault be inserted at A/P engage (92415)	Boeing
6	Slat "float" (assumed actuator detached and/or jammed/cocked slat)	Not available	The position of a floating slat is determined by the airload on the slat and friction within the system. We do not currently have that data available for the accident flight airspeed and altitude conditions. The airloads will either extend the slat, retract the slat, or will be insuffficent to overcome system friction. Therefore, we believe the airplane level roll response will be bounded by the reponse to a slat fully extended fault such as #3a above. We are currently searching for additional aero data as requested by the MCA. **We have not been able to locate any additional aero data requested by the MCA.**	Is there any additional aero data available for the effects of slats at other positions (i.e. between up and mid, between mid and full, or cocked)?	OK, Must be done or at least mid posn.	Boeing
7	Hardover on one aileron PCU	In work	A hardover of one aileron PCU will result in both aileron PCUs commanding full aileron, spoiler and control wheel hardover. We intend to demonstrate this scenario in the same manner as #3a **above by inserting the fault at time 92444.**	OK	OK	Boeing
8	Aileron trim runaway	Available now	Aileron trim runaway can be simulated by manually moving the aileron trim control in the cab during manual flight. This can be done as part of #1 above.	OK	OK	Boeing
9	A/P with MCP erroneous selected heading	In work	This scenario will result in the autopilot flying to the erroneous selected heading. This scenario can be simulated initializing the simulator at time 92395, then running open loop. At that point, the autopilot can be engaged and the desired "erroneous" selected heading can be entered on the MCP.	OK	OK	Honeywell
10a	A/P with MCP Selected Heading knob mechanically inoperative, such that it does not transfer pilot commands. (Selected heading window and output to FCC constant regardless of knob movement)	Not required	This scenario has the same effect as #9 above and can be simulated in the same way.		OK	Honeywell
10b	A/P with one or more segments in the MCP selected heading LCD window inoperative leading to improper indicaiton (e.g. displaying 6 instead of 8)	Not required	The result of this fault will be that the apparent value in the heading window can be different than the value transmitted to the EADI for display of the heading bug and to the FCC for use in autopilot heading select mode. Although we will not be able to simulate a different value in the selected heading window, we believe that this fault can be simulated in the same way as #9 above.		OK	Honeywell

11	A/P Actuator hardover	In work	This scenario will result in a "hardover" to the autopilot actuator authority limit (60 deg with the autopilot force limited not engaged). We can simulate this scenario by introducing the fault and "breaking out" simultaneously at 92415 (A/P initial engage)	OK	OK	Boeing
12a	A/P Actuator ARM Solenoid valve failed open with A/P disconnected	Not required	With the arm solenoid open, the autopilot mod piston can move in response to FCC commands, but as the detend solenoid is not open, the mod piston is not coupled to the ailerons and the A/P actuator cannot command aileron motion. We do not believe it is necessary to simulate this secenario.		OK	Boeing
12b	A/P Actuator Detent Solenoid failed open with A/P disconnected	Not required	The arm and detent solenoids are in series. If the arm solenoid is closed, no hydrualic fluid is available to allow the detent pistons to couple the mod piston to the ailerons. The A/P actuator cannot command aileron motion. If this fault exists when the autopilot is trying to engage, the engagement may occur with a jolt as the mod piston would be coupled to the ailerons before the position synchronization is complete. We do not believe it is necessary to simulate this scenario.		OK	Boeing
12c	A/P Actuator both arm and detent solenoid open with A/P disconnected	Not required	This is the normal condition when the autopilot is engaged. The transfer valve spool moves the mod piston moves in response to commands from the FCC and the detent pistons are pressurized to couple the actuator to the ailerons. If the autopilot is not engaged, the FCC commands the tranfer valve to hold the autopilot actuator in the neutral (ailerons faired) position. Normal autopilot breakout is still available to override the autopilot. Without pilot intervention, the net result would be the same as letting go of the wheel and letting it center. We do not believe it is necessary to simulate this condition.		OK, Must be done	Boeing
12d	A/P Actuator triple fault (arm and detent solenoid open, transfer valve jam off center)	See #11	This triple fault will result in an A/P actuator hardover. The force limit of the actuator still operates normally. The hardover condition is the same as #11 above.		OK	Boeing
12e	A/P Actuator quadruple fault (arm and detent solenoid open, transfer valve jam, pressure regulator jam)	See #11	This quadruple fault will result in an A/P actuator hardover. Because the pressure regulator is jammed, the relief valve operates and limits detent piston pressure. The wheel force required to overcome the actuator increases from 16 lbs of wheel to approximately 20 lbs of wheel.		OK, transfer valve jamed at different posn	Boeing
12f	A/P Actuator quadruple fault (arm and detent solenoid open, transfer valve jam, relief valve jam)	See #11	This quadruple fault will result in an A/P actuator hardover. Although the relief valve is jammed (stuck to the pressure regulator slide), the pressure regulator limits detent piston pressure to the normal level. The wheel force required to overcome the actuatoris the normal 16 lbs of wheel.			Boeing
12g	A/P Actuator quintuple fault (arm and detent solenoid open, transfer valve jam, pressure regulator and pressure relief valve)	In work	This quintuple fault will result in an A/P actuator hardover. In this scenario, neither the pressure regulator nor the relief valve can reduce the detent piston pressure which reaches hydrualic system pressure (3000 psi). Wheel force required to overcome the actuator increases from 16 lbs of wheel to approximately 80 lbs of wheel.		MCA requests to observe this fault (feel the forces) or the highest forces possible in the M-cab.	Boeing
13	A/P with IRU shutdown	Not required	The response of the autopilot to an IRU shutdown is to disconnect. We do not believe it is necessary to simulator this scenario.	OK	OK	Honeywell
14	A/P with Erroneous R IRU output of straight and level flight during bank (no NCD or fail warn transmitted)	In work	The autopilot will command aileron to its authority limit (20 deg with aileron force limiter). If the airplane heading crosses the selected heading the autopilot command will reverse. M-Cab simulation will not accurately reflect the wheel forces in this situation.	OK	OK	Honeywell
15a	A/P with Erroneous L IRU output of roll rate with all other parameters correct (separately and then see if possible to do at same time as above fault)	Not required	Autopilot A does not use L IRU roll rate as an input. This fault has no effect on the operation of autopilot A.	MCA requests this be changed to R IRU output of NCD for roll rate.	OK	Honeywell
15b	A/P with R IRU output of NCD for roll rate	Not required	The response of the autopilot to R IRU output of NCD for roll rate is to disconnect. We do not believe it is necessary to simulate this scenario.		OK	Honeywell
16	Autopilot spoiler sensor fault (erroneous value)	Not applicable to M-Cab	The sensed value of spoiler angle is only used by the autopilot when the flaps at 30 or beyond. This fault would have no effect on the operation of the autopilot for the accident flight.	OK	OK	Honeywell

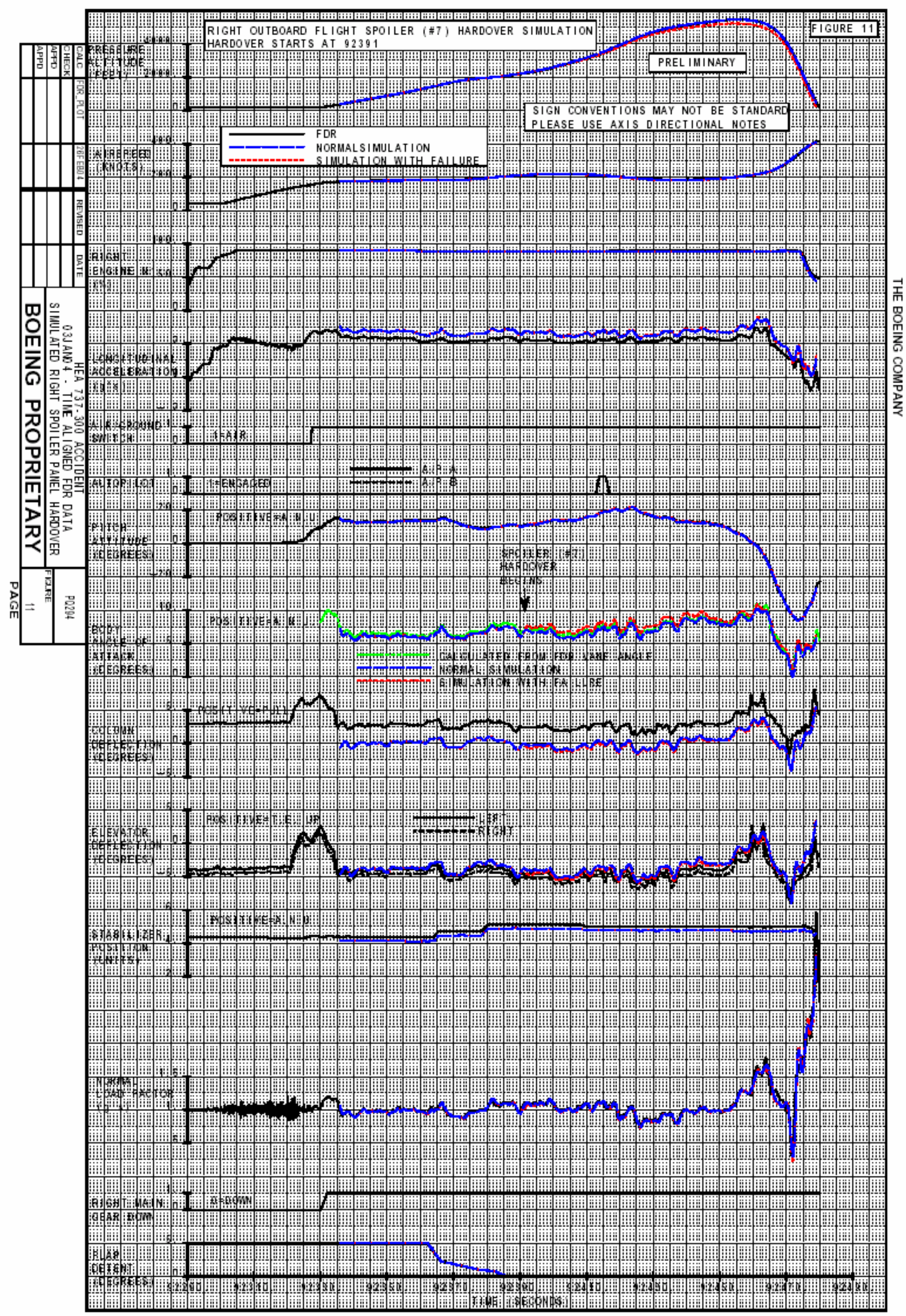
Simulation Scenario (Simulation Scenario Status 27-30 Sep, 04.xls)

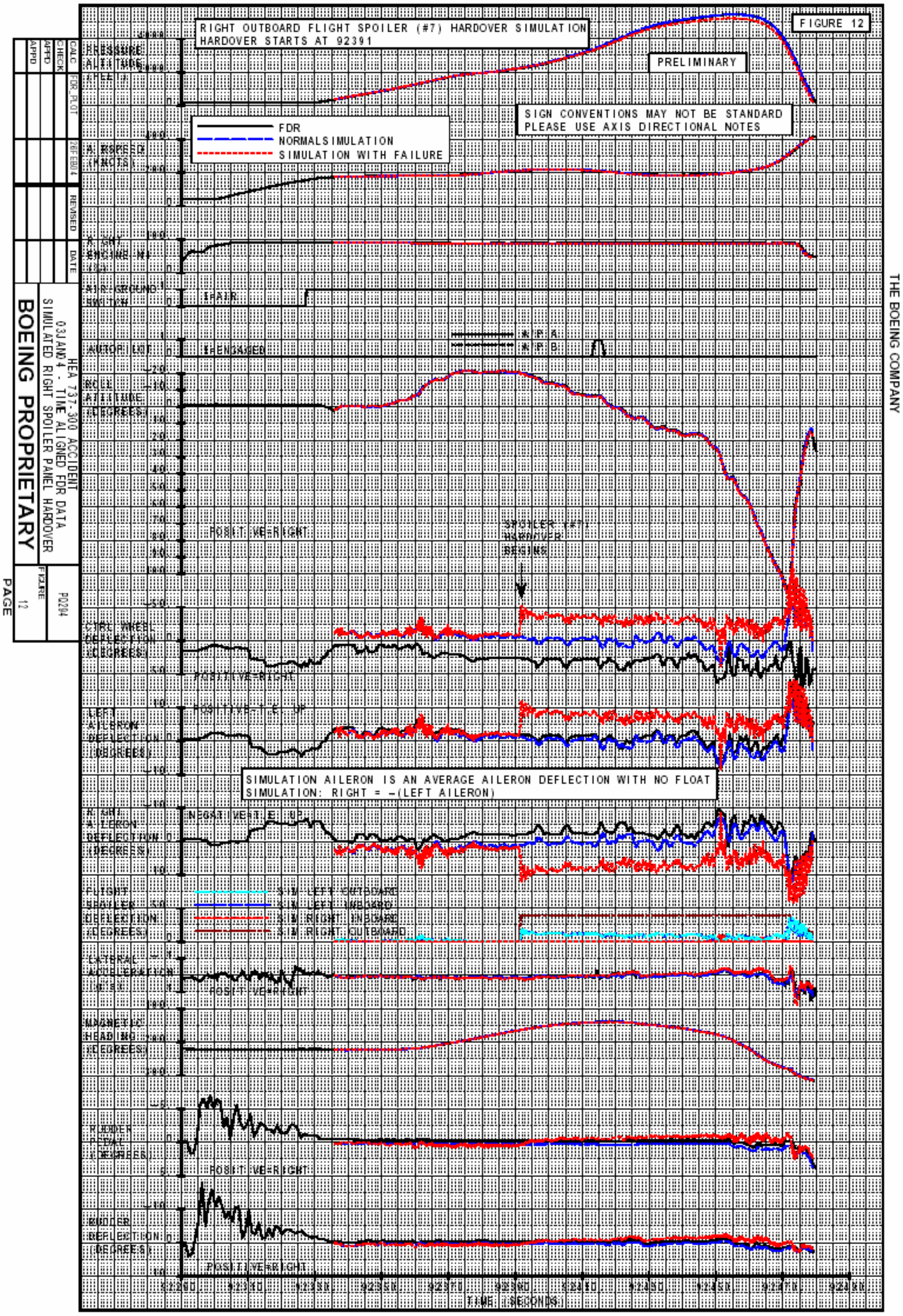
Flash Airlines Requested Simulation Scenarios				**Last Updated 21 Sept 04**		
					20-Sep-04	
No.	**Scenario**	**M-Cab Status**	**Motion**	**Comments**	**MCA Comment**	**Presentation**
1	Use M-cab like a training simulator (manual flight with no backdrive)	Available now	Yes	The M-cab is capable of performing like a training simulator. However, it does not have an "instructor's station" to insert pre-programmed malfunctions like many training simulators do. Therefore, if pre-programmed malfunctions are desired in the M-cab, advance notice is required to ensure the correct routines can be loaded and available.	OK	Boeing
2	Backdrive of accident flight (from FDR data)	Available now	Yes	The full backdrive from the FDR data is available. A "breakout" switch is installed that will allow manual pilot inputs at any point in the scenario.	OK	Boeing
3a	Slat extend (mid) fault	Not available		No aero extend data		Boeing
3b	Slat extend (full) fault	In work	No	This scenario will be available in the cab. It is the same scenario for which plots were provided in March at the Cairo meeting, **except that we will insert the fault at flaps up**.	MCA requests to perform fault insertion simultaneously with breakout and then attempt to fly accident flight path. The intention is to compare FDR aileron to aileron required to fly accident profile with fault.	Boeing
4a	Spoiler hardover fault	In work	No	Same as #3b except at time 92444	MCA requests that fault be inserted at A/P engage (92415)	Boeing
4b	Spoiler mid extend jam	Requested	No			
5	Spoiler float fault	In work	No	Same as #3b except at time 92444	MCA requests that fault be inserted at A/P engage (92415)	Boeing
6	Slat "float" (assumed actuator detached and/or jammed/cocked slat)	Not available		The position of a floating slat is determined by the airload on the slat and friction within the system. We do not have aero data available for the accident flight airspeed and altitude conditions. The airloads will either extend the slat, retract the slat, or will be insufficent to overcome system friction. Therefore, we believe the airplane level roll response will be bounded by the reponse to a slat fully extended fault such as #3b above.	OK	Boeing
7	Hardover on one aileron PCU	In work		A hardover of one aileron PCU will result in both aileron PCUs commanding full aileron, spoiler and control wheel hardover. We intend to demonstrate this scenario in the same manner as #3b **above by inserting the fault at time 92444.**	OK	Boeing
8	Aileron trim runaway	Available now	Yes	Aileron trim runaway can be simulated by manually moving the aileron trim control in the cab during manual flight. This can be doneby breaking out at 92444 and manually inputting aileron trim.	OK	Boeing
9	A/P with MCP erroneous selected heading	In work		This scenario will result in the autopilot flying to the erroneous selected heading. This scenario can be simulated initializing the simulator at time 92395, then running open loop. At that point, the autopilot can be engaged and the desired "erroneous" selected heading can be entered on the MCP.	OK	Honeywell
10a	A/P with MCP Selected Heading knob mechanically inoperative, such that it does not transfer pilot commands. (Selected heading window and output to FCC constant regardless of knob movement)	See #9		This scenario has the same effect as #9 above and can be simulated in the same way.	OK	Honeywell
10b	A/P with one or more segments in the MCP selected heading LCD window inoperative leading to improper indicaiton (e.g. displaying 6 instead of 8)	See #9		The result of this fault will be that the apparent value in the heading window can be different than the value transmitted to the EADI for display of the heading bug and to the FCC for use in autopilot heading select mode. Although we will not be able to simulate a different value in the selected heading window, we believe that this fault can be simulated in the same way as #9 above.	OK	Honeywell
10c	A/P with MCP internal processor or MUX fault resulting in dissimilar values between the selected heading window and the selected heading command to the FCC	See #9		This scenario has the same effect as #10b and can be simulated in the same manner as #9.	OK	Honeywell

11	A/P Actuator hardover	In work		This scenario will result in a "hardover" to the autopilot actuator authority limit (60 deg with the autopilot force limited not engaged). We can simulate this scenario by introducing the fault and "breaking out" simultaneously at 92415 (A/P initial engage)	OK	Boeing
12a	A/P Actuator ARM Solenoid valve failed open with A/P disconnected	Not applicable to M-Cab		With the arm solenoid open, the autopilot mod piston can move in response to FCC commands, but as the detend solenoid is not open, the mod piston is not coupled to the ailerons and the A/P actuator cannot command aileron motion. We do not believe it is necessary to simulate this secenario.	OK	Boeing
12b	A/P Actuator Detent Solenoid failed open with A/P disconnected	Not applicable to M-Cab		The arm and detent solenoids are in series. If the arm solenoid is closed, no hydrualic fluid is available to allow the detent pistons to couple the mod piston to the ailerons. The A/P actuator cannot command aileron motion. If this fault exists when the autopilot is trying to engage, the engagement may occur with a jolt as the mod piston would be coupled to the ailerons before the position synchronization is complete. We do not believe it is necessary to simulate this scenario.	OK	Boeing
12c	A/P Actuator both arm and detent solenoid open with A/P disconnected	Not applicable to M-Cab		This is the normal condition when the autopilot is engaged. The transfer valve spool moves the mod piston moves in response to commands from the FCC and the detent pistons are pressurized to couple the actuator to the ailerons. If the autopilot is not engaged, the FCC commands the tranfer valve to hold the autopilot actuator in the neutral (ailerons faired) position. Normal autopilot breakout is still available to override the autopilot. Without pilot intervention, the net result would be the same as letting go of the wheel and letting it center. We do not believe it is necessary to simulate this condition.	OK	Boeing
12d	A/P Actuator triple fault (arm and detent solenoid open, transfer valve jam off center)	See #11		This triple fault will result in an A/P actuator hardover. The force limit of the actuator still operates normally. The hardover condition is the same as #11 above.	OK	Boeing
12e	A/P Actuator quadruple fault (arm and detent solenoid open, transfer valve jam, pressure regulator jam)	In work		This quadruple fault will result in an A/P actuator hardover. Because the pressure regulator is jammed, the relief valve operates and limits detent piston pressure. The wheel force required to overcome the actuator increases from 16 lbs of wheel to approximately 20 lbs of wheel.	OK	Boeing
12f	A/P Actuator quadruple fault (arm and detent solenoid open, transfer valve jam, relief valve jam)	See #11		This quadruple fault will result in an A/P actuator hardover. Although the relief valve is jammed (stuck to the pressure regulator slide), the pressure regulator limits detent piston pressure to the normal level. The wheel force required to overcome the actuatoris the normal 16 lbs of wheel.		Boeing
12g	A/P Actuator quintuple fault (arm and detent solenoid open, transfer valve jam, pressure regulator and pressure relief valve)	In work		This quintuple fault will result in an A/P actuator hardover. In this scenario, neither the pressure regulator nor the relief valve can reduce the detent piston pressure which reaches hydraulic system pressure (3000 psi). Wheel force required to overcome the actuator increases from 16 lbs of wheel to approximately 80 lbs of wheel.	MCA requests to observe this fault (feel the forces) or the highest forces possible in the M-cab.	Boeing
13	A/P with IRU shutdown	Not applicable to M-Cab		The response of the autopilot to an IRU shutdown is to disconnect. We do not believe it is necessary to simulator this scenario.	OK	Honeywell
14	A/P with Erroneous R IRU output of straight and level flight during bank (no NCD or fail warn transmitted)	In work		The autopilot will command aileron to its authority limit (20 deg with aileron force limiter). If the airplane heading crosses the selected heading the autopilot command will reverse. M-Cab simulation will not accurately reflect the wheel forces in this situation.	OK	Honeywell
15a	A/P with Erroneous L IRU output of roll rate with all other parameters correct (separately and then see if possible to do at same time as above fault)	Not applicable to M-Cab		Autopilot A does not use L IRU roll rate as an input. This fault has no effect on the operation of autopilot A.	OK	Honeywell
15b	A/P with R IRU output of NCD for roll rate	Not applicable to M-Cab		The response of the autopilot to R IRU output of NCD for roll rate is to disconnect. We do not believe it is necessary to simulate this scenario.	OK	Honeywell
16	Autopilot spoiler sensor fault (erroneous value)	Not applicable to M-Cab		The sensed value of spoiler angle is only used by the autopilot when the flaps at 30 or beyond. This fault would have no effect on the operation of the autopilot for the accident flight.	OK	Honeywell
17	Failure of bank angle limit function in autopilot	See #14		No condition has been identified that could lead to this fault without causing an FCC shutdown. However, if it did occur, the extreme result would be an autopilot actuator hardover as the FCC seeks to achieve an excessive roll angle. As the aileron force limiter is engaged, the hardover would result in wheel offset to 20 degrees.	OK	Honeywell
18	Other FCC internal faults	See #11 or #14		No condition has been identified that could lead to this fault without causing an FCC shutdown. However, if it did occur, the extreme result would be an autopilot actuator hardover. As the aileron force limiter is engaged, the hardover would result in wheel offset to 20 degrees (AFL eng) or 60 deg (AFL not engaged).	OK	Honeywell
19	FD behavior with erroneous selected heading data from MCP	In work		We intend to implement this scenario the as part of #21 below. The desired "erroneous" selected heading can be entered using the MCP.	OK	Boeing
20	FD behavior with erroneous roll rate data from IRU	In work		The roll rate error will effectively reduce or increase the maximum bank angle for the maneuver (depending upon the sign of the roll rate error). It will also result in a steady state heading error once the turn was complete. In order for the aileron command to remain at zero the heading error and roll rate error will cancel.	OK	Honeywell

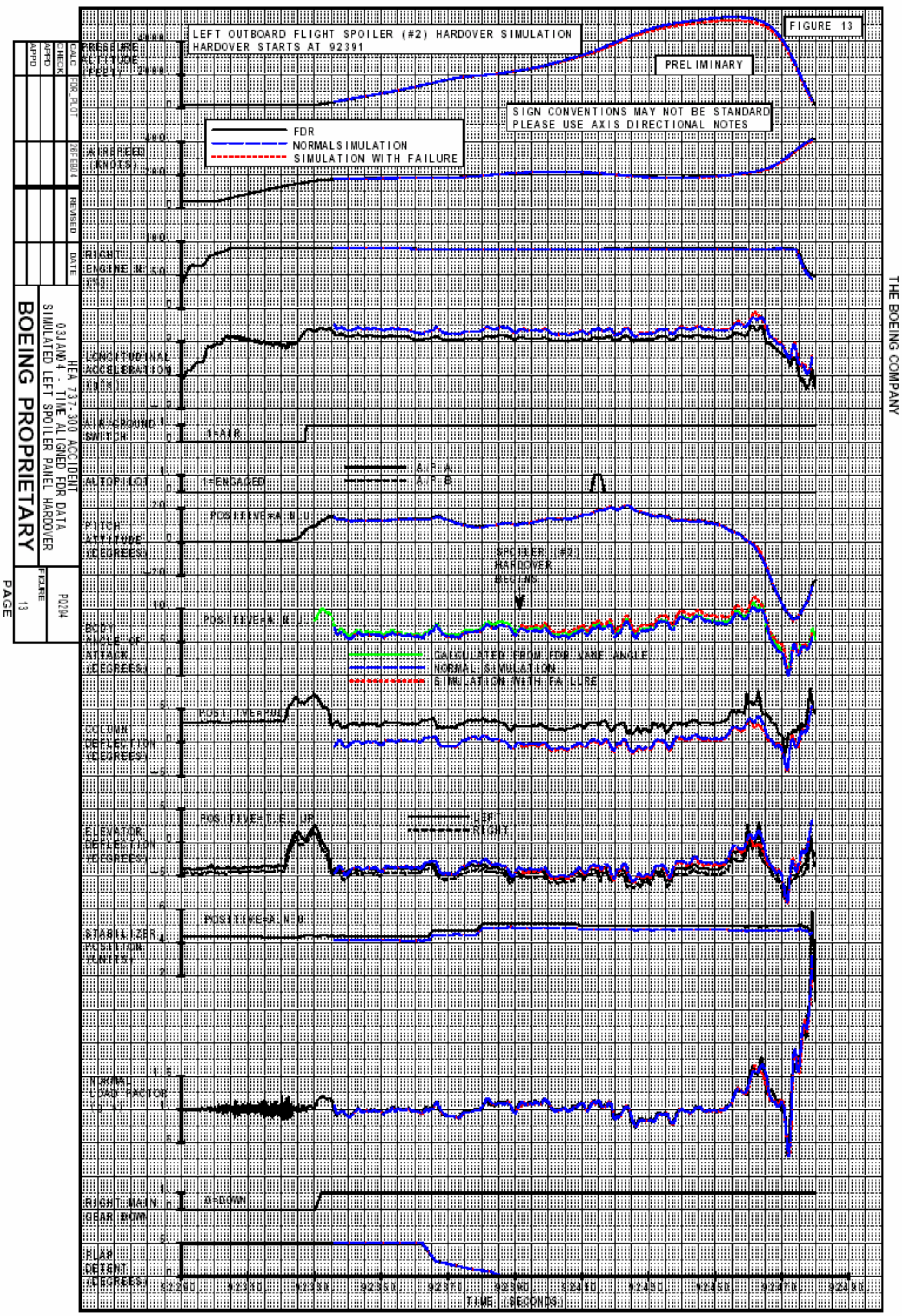
1.16.1.4. Simulated Failures:

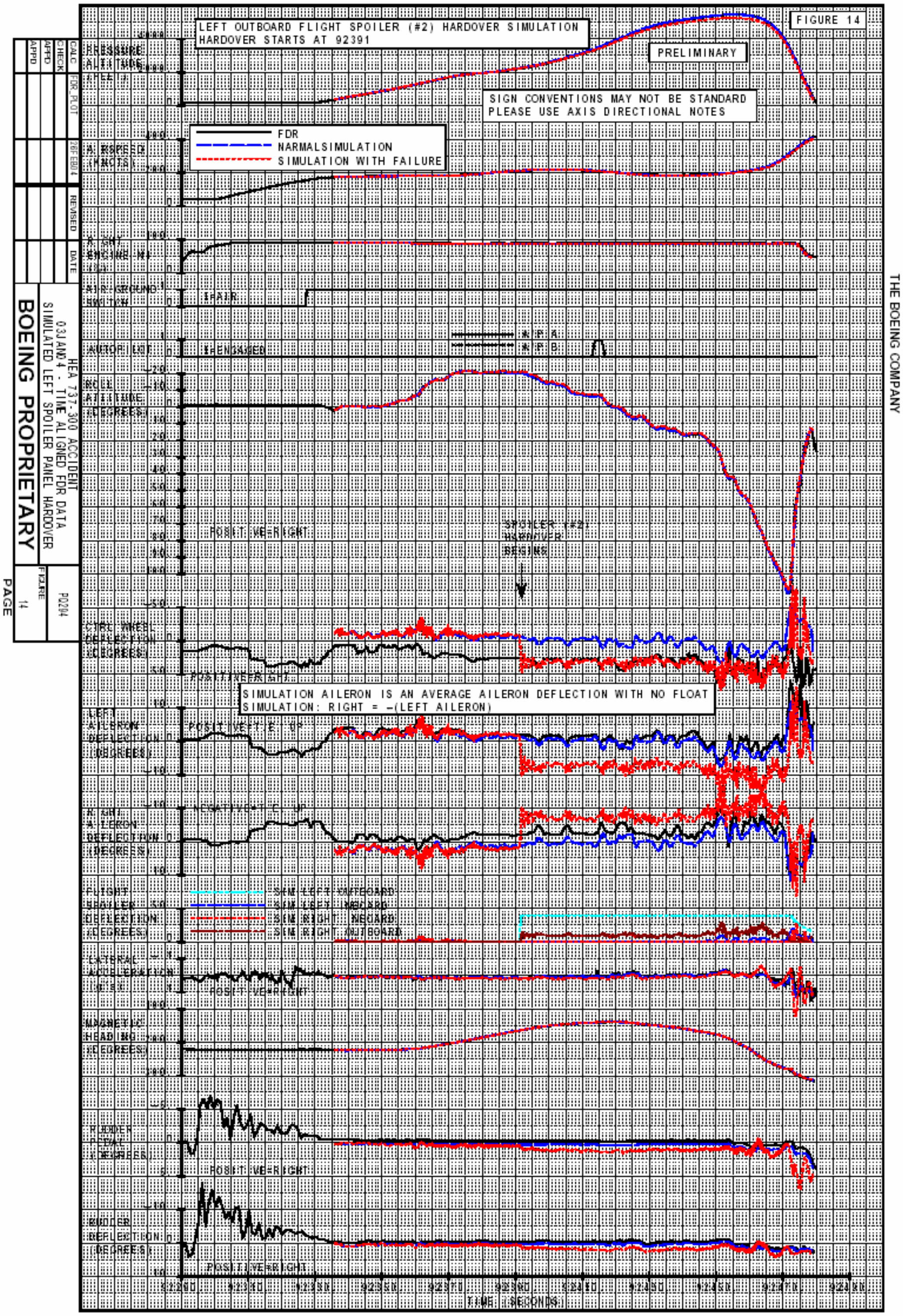
HEA_PQ294_Simulated_Failures Spoilers, LE Slats.pdf (FDR-norm simulation-simulation with spoilers failures)
Right outboard flight spoilers (#7) Hardover simulation (hardover starts at 92391)



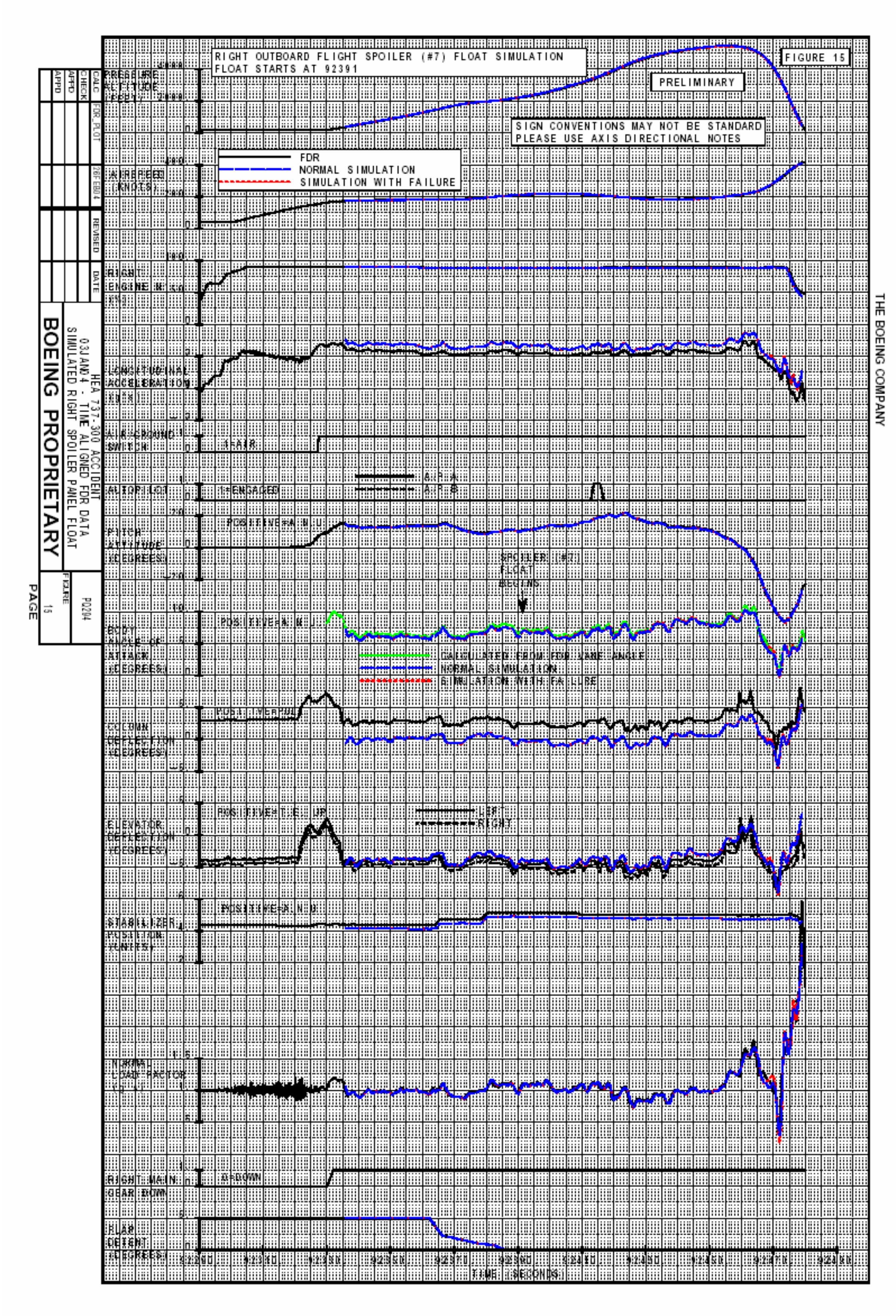

RIGHT OUTBOARD FLIGHT SPOILER (#7) HARDOVER SIMULATION
HARDOVER STARTS AT 92391
FIGURE 12
PRELIMINARY
SIGN CONVENTIONS MAY NOT BE STANDARD
PLEASE USE AXIS DIRECTIONAL NOTES
FDR
NORMAL SIMULATION
SIMULATION WITH FAILURE
PRESSURE ALTITUDE (FEET)
AIRSPEED (KNOTS)
RIGHT ENGINE N1 (%)
AIR/GROUND SWITCH
1=AIR
AUTOPILOT
1=ENGAGED
A/P A
A/P B
ROLL ATTITUDE (DEGREES)
POSITIVE=RIGHT
SPOILER (#7) HARDOVER BEGINS
CTRL WHEEL DEFLECTION (DEGREES)
POSITIVE=RIGHT
LEFT AILERON DEFLECTION (DEGREES)
POSITIVE=T.E. UP
SIMULATION AILERON IS AN AVERAGE AILERON DEFLECTION WITH NO FLOAT
SIMULATION: RIGHT = -(LEFT AILERON)
RIGHT AILERON DEFLECTION (DEGREES)
NEGATIVE=T.E. UP
FLIGHT SPOILER DEFLECTION (DEGREES)
SIM LEFT OUTBOARD
SIM LEFT INBOARD
SIM RIGHT INBOARD
SIM RIGHT OUTBOARD
LATERAL ACCELERATION (G'S)
POSITIVE=RIGHT
MAGNETIC HEADING (DEGREES)
RUDDER PEDAL (DEGREES)
POSITIVE=RIGHT
RUDDER DEFLECTION (DEGREES)
POSITIVE=RIGHT
TIME (SECONDS)
CALC
CHECK
APPD
APPD
FDR PLOT
REVISED
DATE
HEA 737-300 ACCIDENT
03JAN04 - TIME ALIGNED FDR DATA
SIMULATED RIGHT SPOILER PANEL HARDOVER
BOEING PROPRIETARY
FIGURE
12
P0204
PAGE
THE BOEING COMPANY

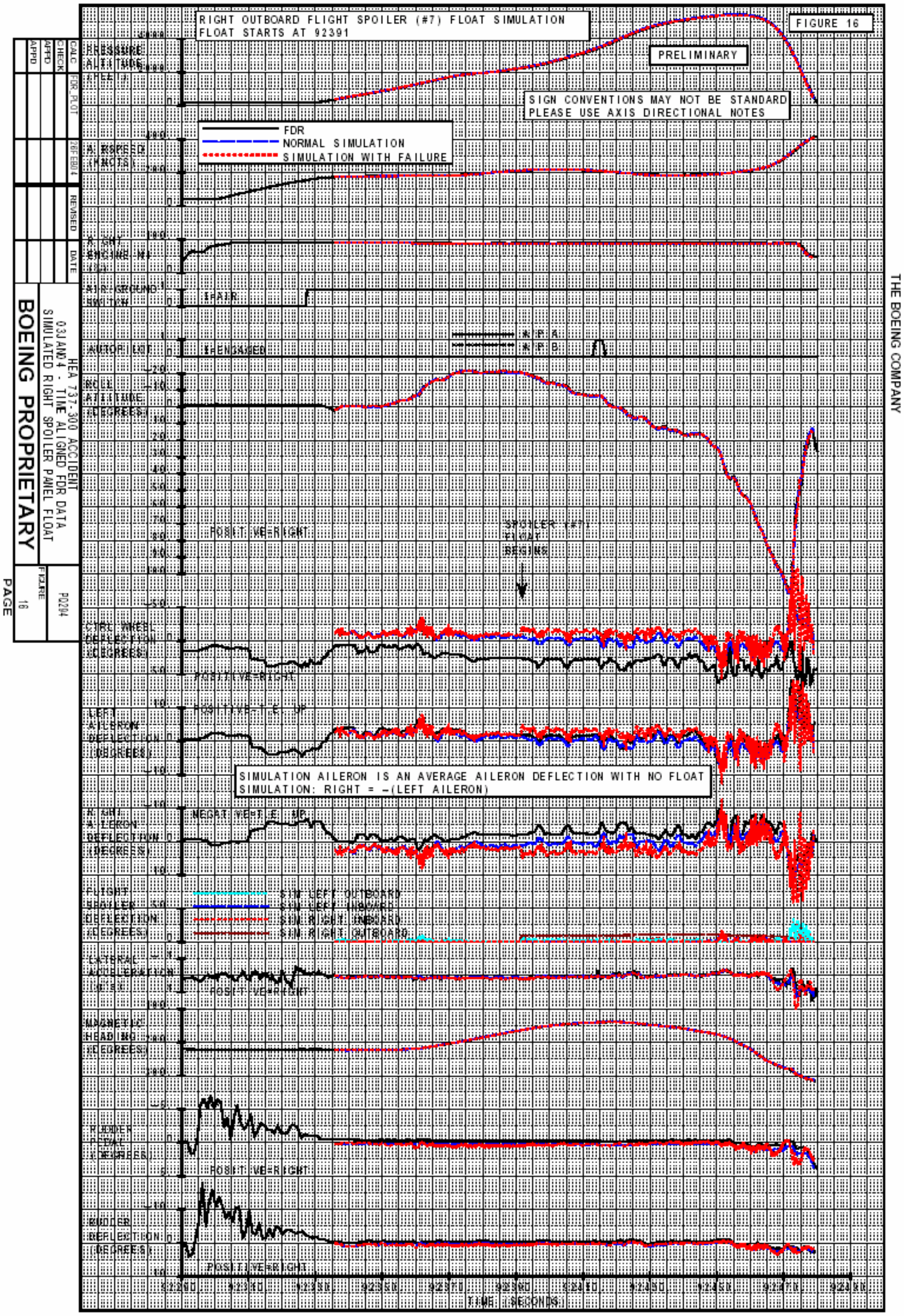
Left outboard flight spoilers (#2) Hardover simulation (hardover starts at 92391)



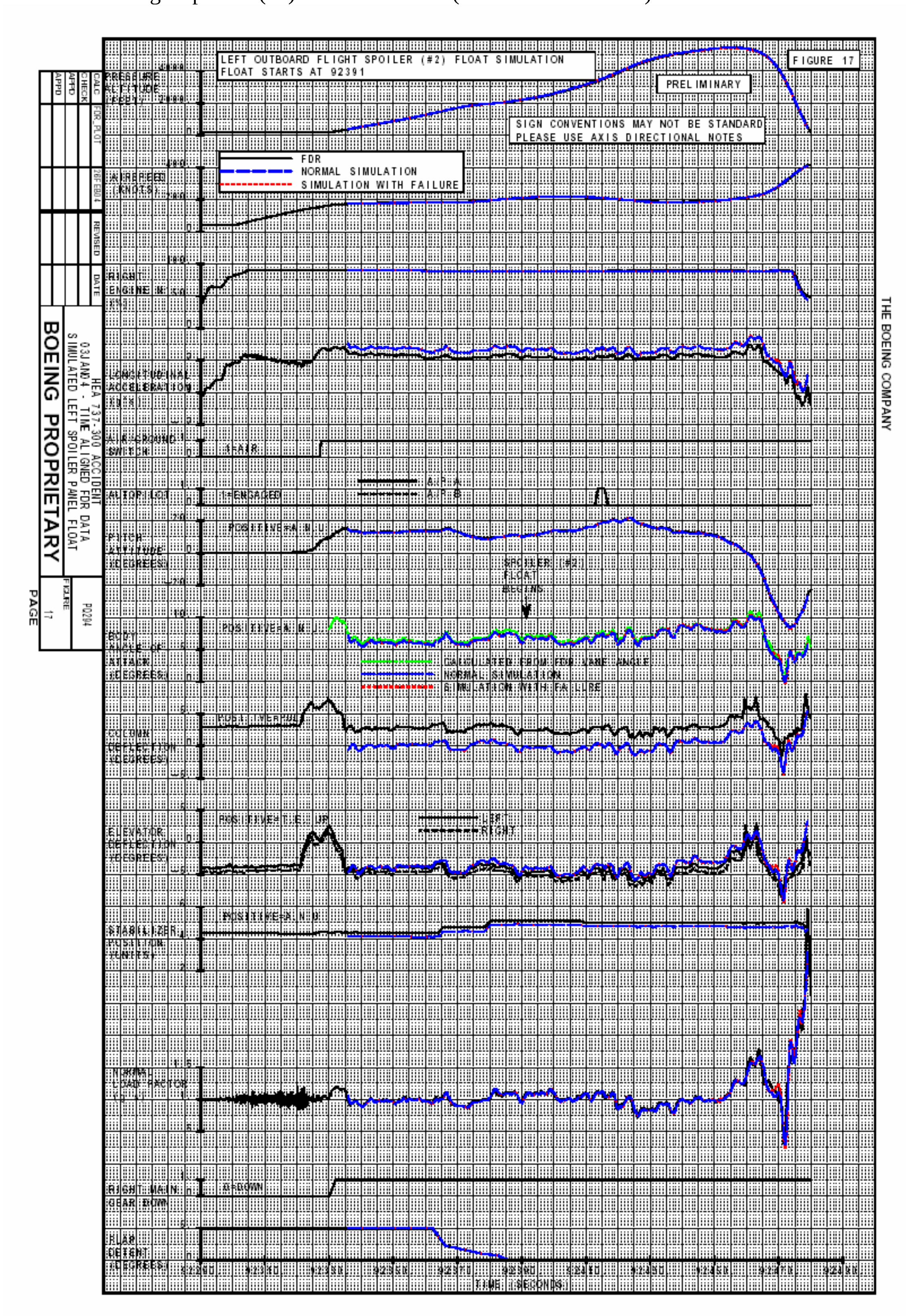

LEFT OUTBOARD FLIGHT SPOILER (#2) HARDOVER SIMULATION
HARDOVER STARTS AT 92391
FIGURE 14
PRELIMINARY
SIGN CONVENTIONS MAY NOT BE STANDARD
PLEASE USE AXIS DIRECTIONAL NOTES
FDR
NARMALSIMULATION
SIMULATION WITH FAILURE
SIMULATION AILERON IS AN AVERAGE AILERON DEFLECTION WITH NO FLOAT
SIMULATION: RIGHT = -(LEFT AILERON)
THE BOEING COMPANY
BOEING PROPRIETARY
HEA 737-300 ACCIDENT
03JAN04 . TIME ALIGNED FDR DATA
SIMULATED LEFT SPOILER PANEL HARDOVER
CALC
CHECK
APPD
APPD
FDR PLOT
26FEB04
REVISED
DATE
P0204
FIGURE
14
PAGE

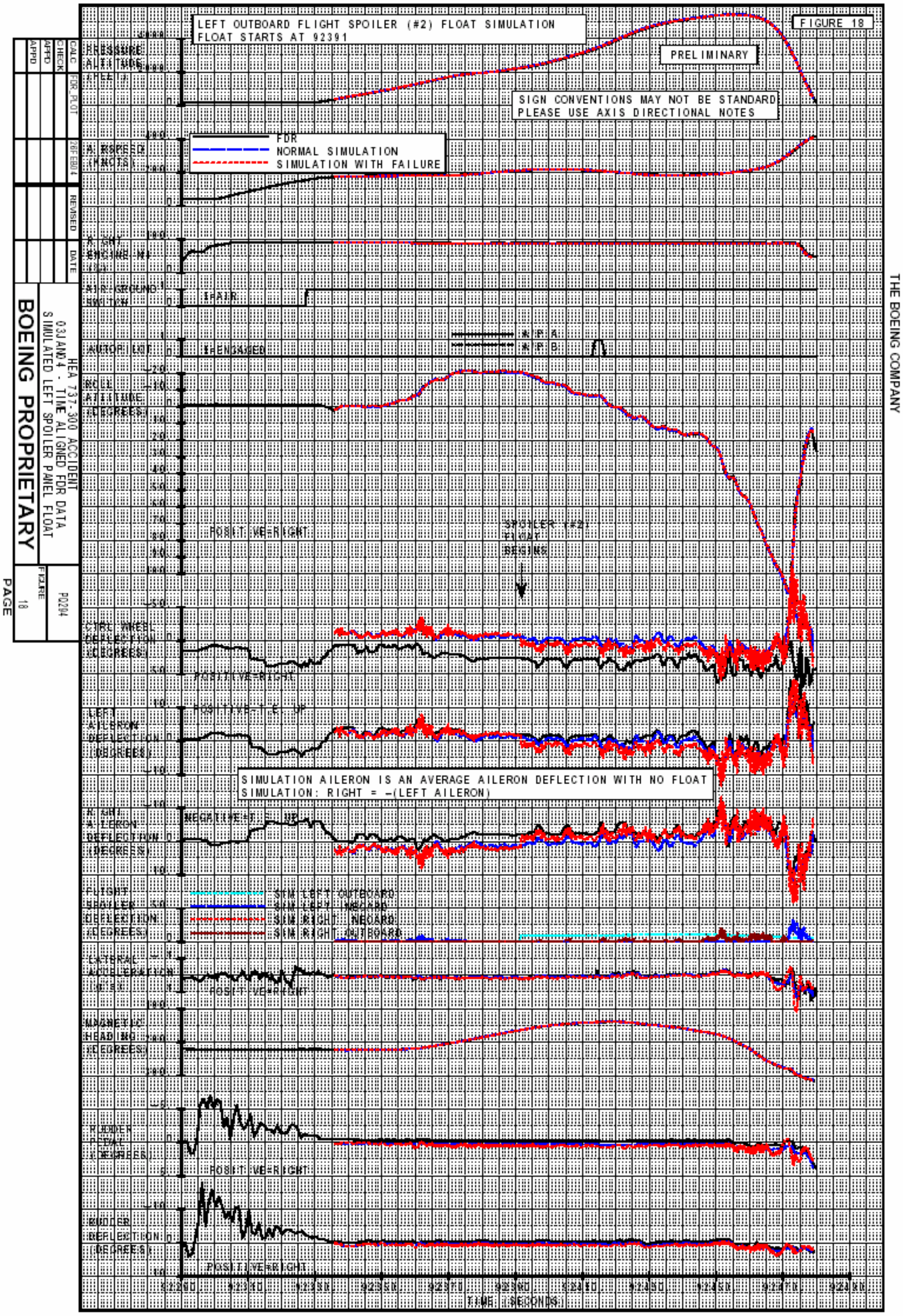
Right outboard flight spoilers (#7) Float simulation (floats starts at 92391)



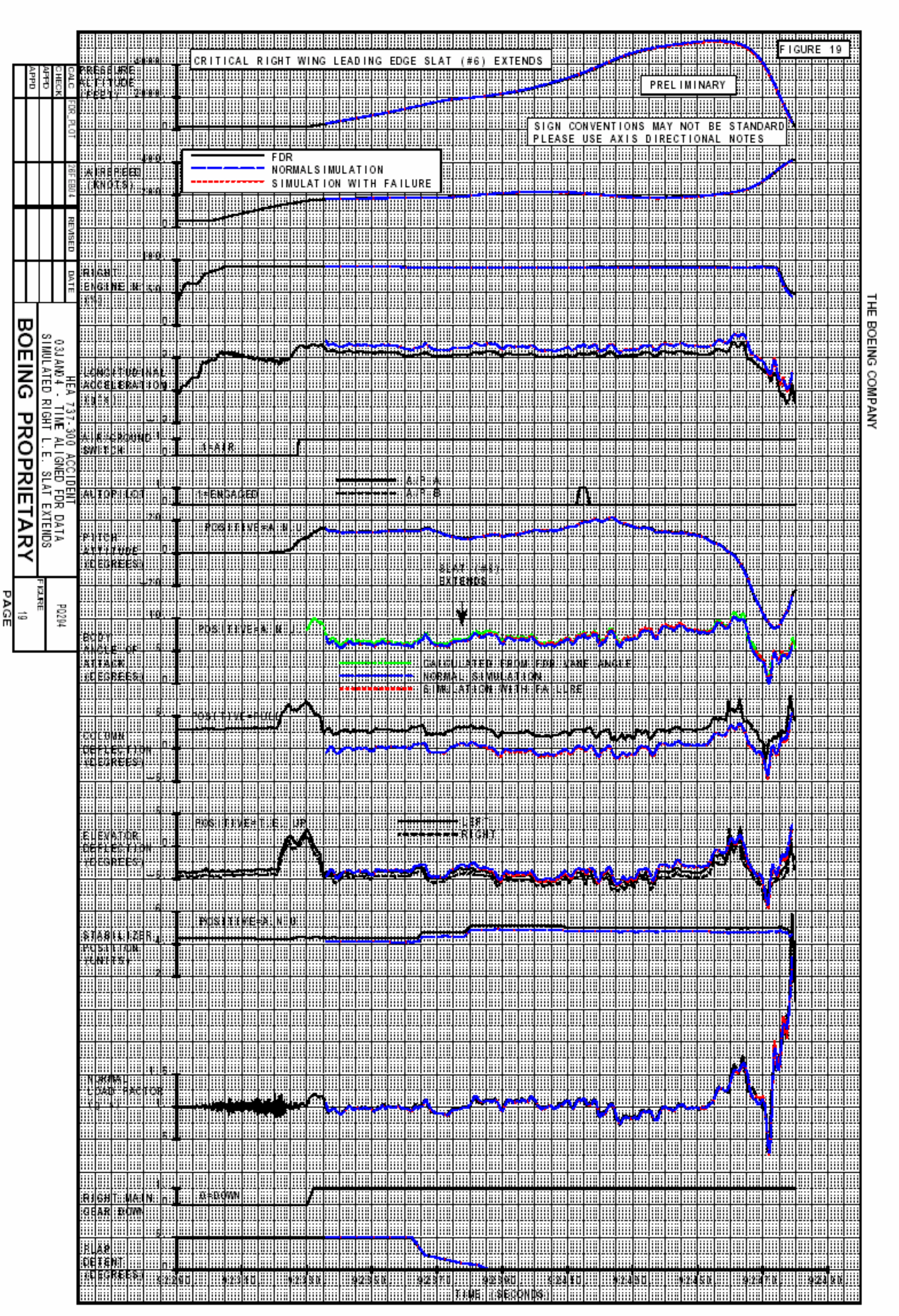

RIGHT OUTBOARD FLIGHT SPOILER (#7) FLOAT SIMULATION
FLOAT STARTS AT 92391
FIGURE 16
PRELIMINARY
SIGN CONVENTIONS MAY NOT BE STANDARD
PLEASE USE AXIS DIRECTIONAL NOTES
FDR
NORMAL SIMULATION
SIMULATION WITH FAILURE
SIMULATION AILERON IS AN AVERAGE AILERON DEFLECTION WITH NO FLOAT
SIMULATION: RIGHT = -(LEFT AILERON)
HEA 737-300 ACCIDENT
03JAN04 - TIME ALIGNED FDR DATA
SIMULATED RIGHT SPOILER PANEL FLOAT
BOEING PROPRIETARY
THE BOEING COMPANY
PAGE

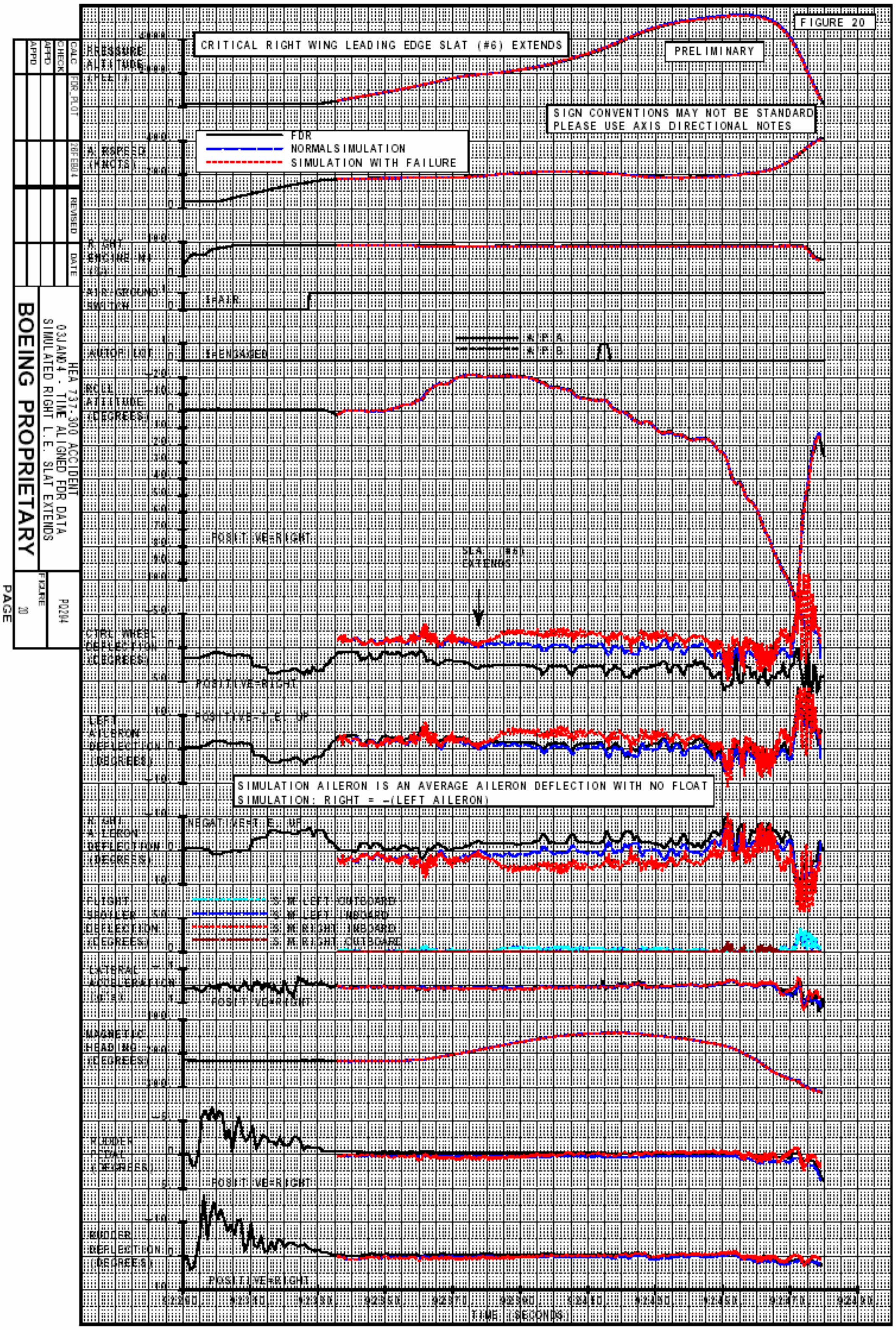
Left outboard flight spoilers (#2) Float simulation (floats starts at 92391)




LEFT OUTBOARD FLIGHT SPOILER (#2) FLOAT SIMULATION
FLOAT STARTS AT 92391
FIGURE 18
PRELIMINARY
SIGN CONVENTIONS MAY NOT BE STANDARD
PLEASE USE AXIS DIRECTIONAL NOTES
FDR
NORMAL SIMULATION
SIMULATION WITH FAILURE
PRESSURE ALTITUDE (FEET)
AIRSPEED (KNOTS)
R. ENGINE N1 (%)
AIR/GROUND SWITCH
1=AIR
AUTOPILOT
1=ENGAGED
A/P A
A/P B
ROLL ATTITUDE (DEGREES)
POSITIVE=RIGHT
SPOILER (#2) FLOAT BEGINS
CTRL WHEEL DEFLECTION (DEGREES)
POSITIVE=RIGHT
LEFT AILERON DEFLECTION (DEGREES)
POSITIVE=T.E. UP
SIMULATION AILERON IS AN AVERAGE AILERON DEFLECTION WITH NO FLOAT
SIMULATION: RIGHT = -(LEFT AILERON)
R. AILERON DEFLECTION (DEGREES)
NEGATIVE=T.E. UP
FLIGHT SPOILER DEFLECTION (DEGREES)
SIM LEFT OUTBOARD
SIM LEFT INBOARD
SIM RIGHT INBOARD
SIM RIGHT OUTBOARD
LATERAL ACCELERATION (G'S)
POSITIVE=RIGHT
MAGNETIC HEADING (DEGREES)
RUDDER PEDAL (DEGREES)
POSITIVE=RIGHT
RUDDER DEFLECTION (DEGREES)
POSITIVE=RIGHT
TIME (SECONDS)
CALC
CHECK
APPD
APPD
FDR PLOT
26FEB04
REVISED
DATE
HEA 737-300 ACCIDENT
03JAN04 - TIME ALIGNED FDR DATA
SIMULATED LEFT SPOILER PANEL FLOAT
BOEING PROPRIETARY
P0204
FIGURE 18
PAGE
THE BOEING COMPANY

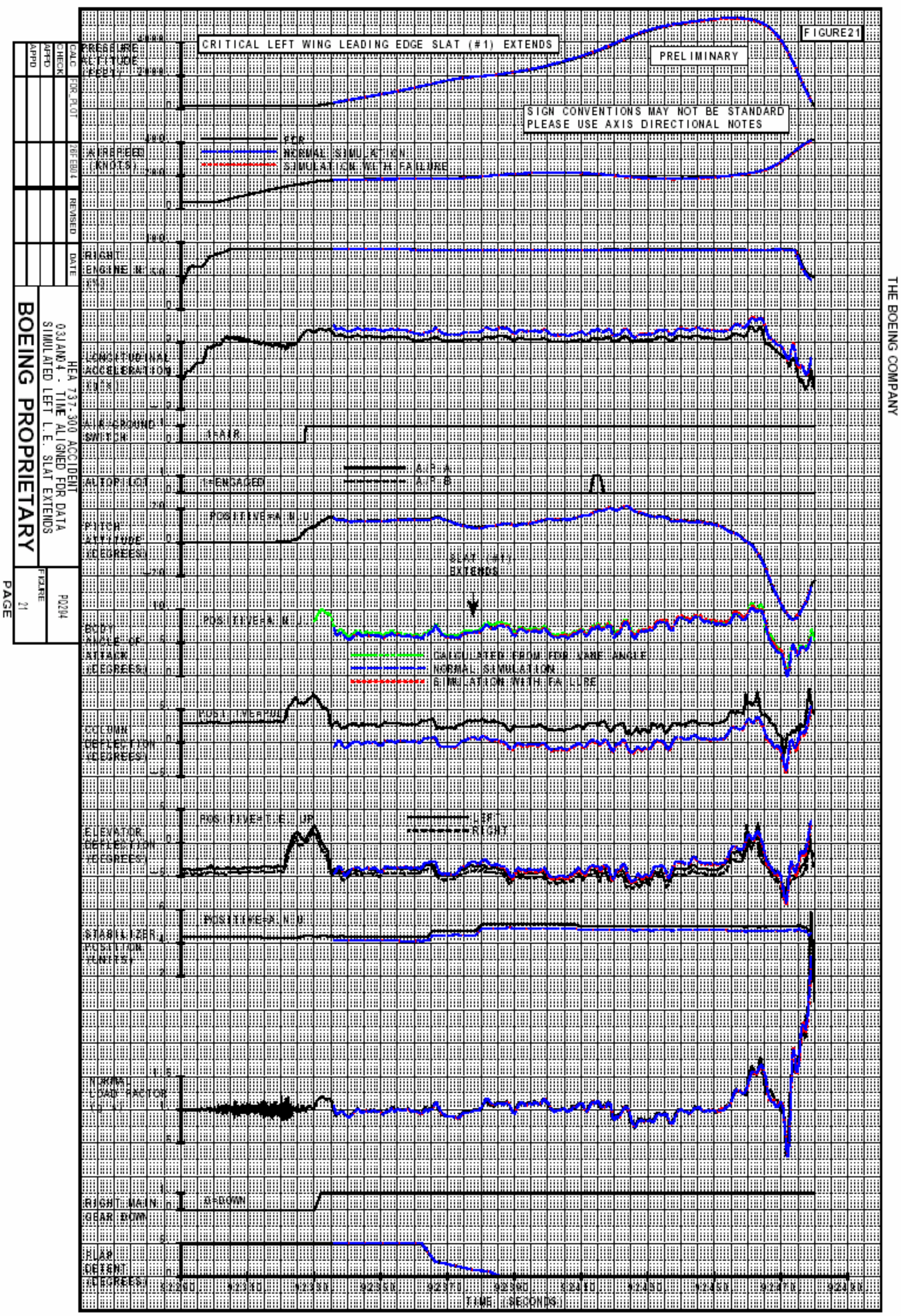
Critical right wing leading edge slat # 6 extends





THE BOEING COMPANY

Critical left wing leading edge slat # 1 extends



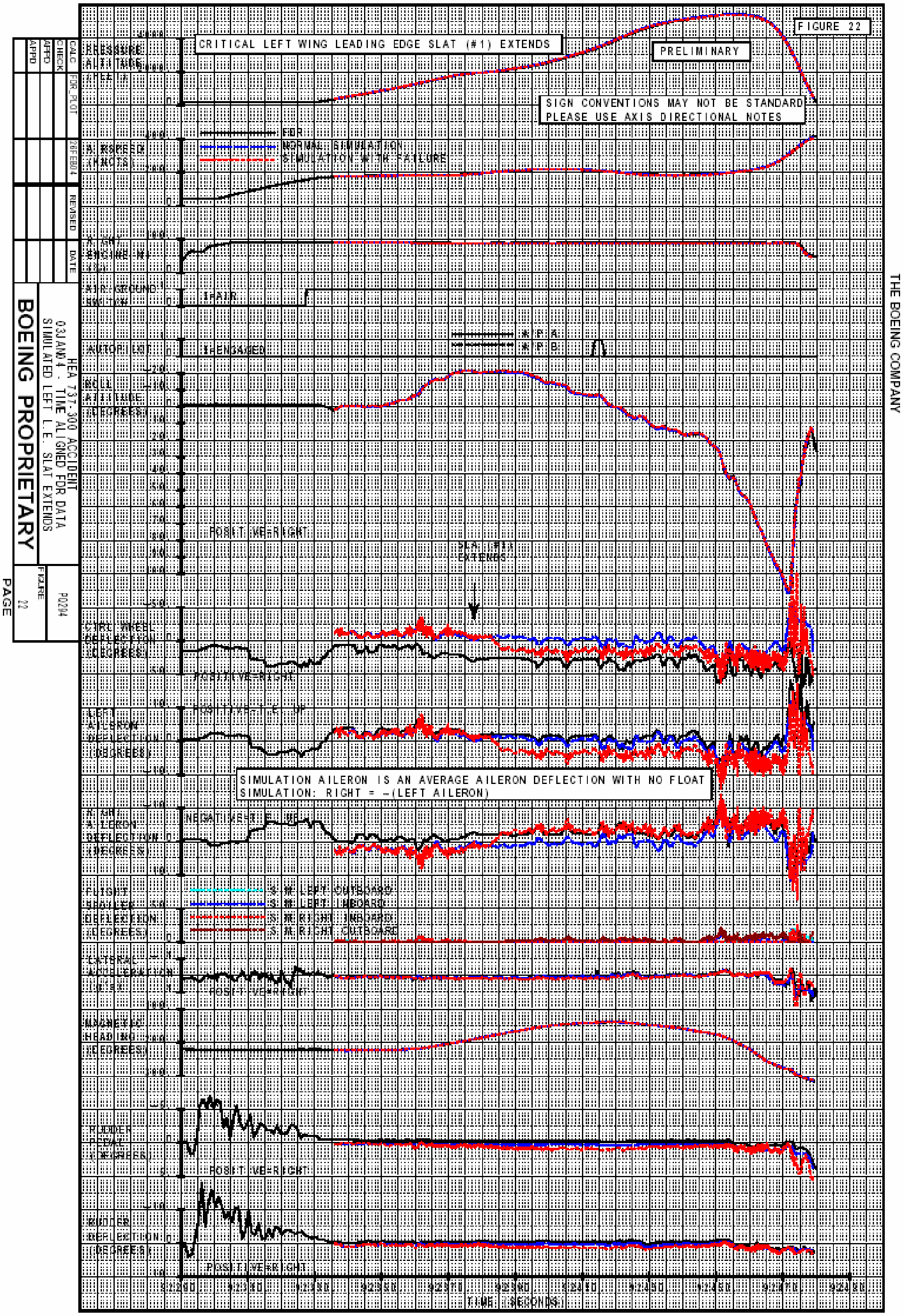
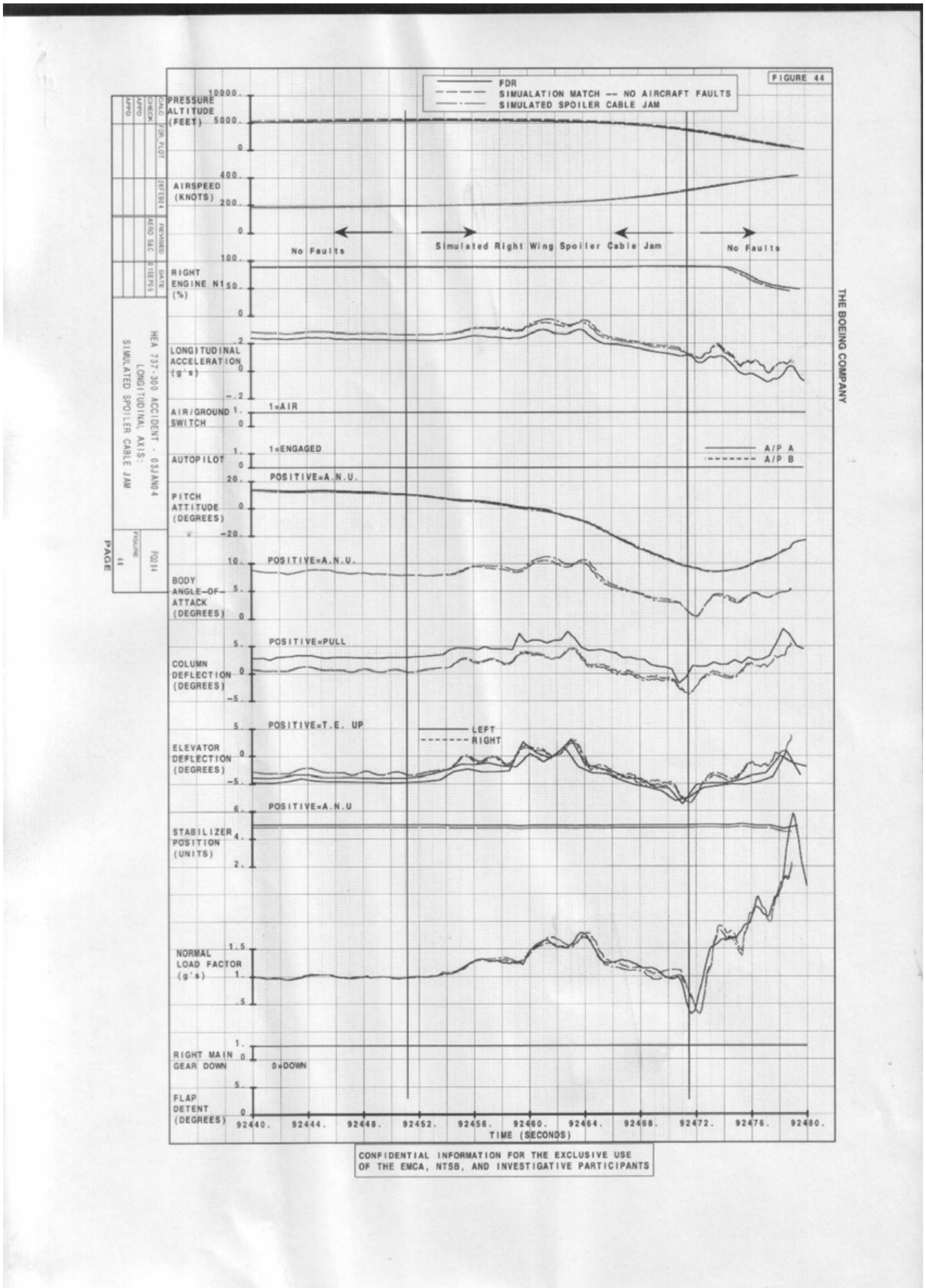


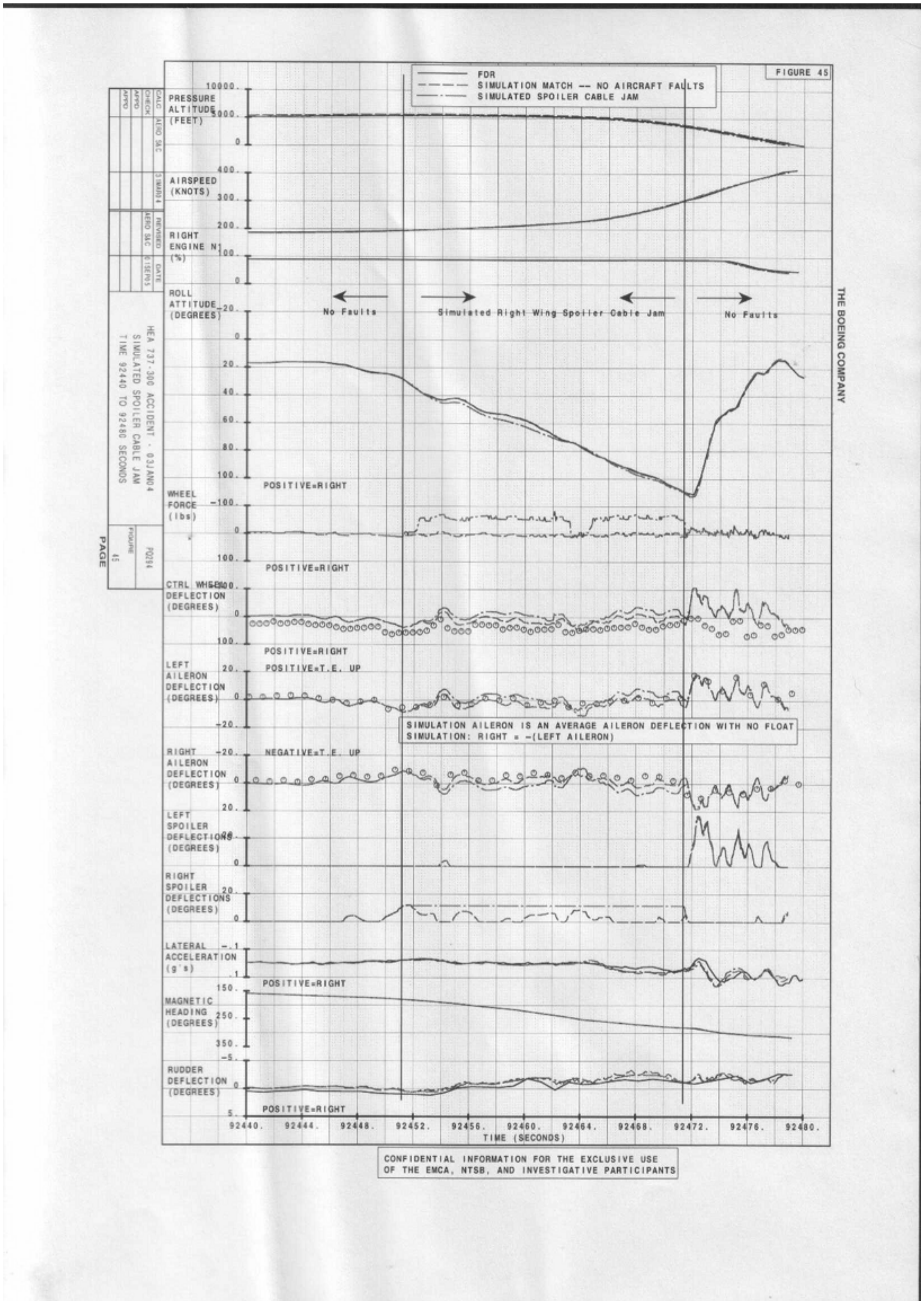
FIGURE 22
CRITICAL LEFT WING LEADING EDGE SLAT (#1) EXTENDS
PRELIMINARY
SIGN CONVENTIONS MAY NOT BE STANDARD
PLEASE USE AXIS DIRECTIONAL NOTES
FDR
NORMAL SIMULATION
SIMULATION WITH FAILURE
PRESSURE ALTITUDE
AIRSPEED (KNOTS)
ENGINE N1
AIR/GROUND SWITCH
AIR
AUTOPILOT
ENGAGED
ROLL ATTITUDE (DEGREES)
POSITIVE=RIGHT
SLAT #1 EXTENDS
CTRL WHEEL DEFLECTION (DEGREES)
LEFT AILERON DEFLECTION (DEGREES)
SIMULATION AILERON IS AN AVERAGE AILERON DEFLECTION WITH NO FLOAT
SIMULATION: RIGHT = -(LEFT AILERON)
RIGHT AILERON DEFLECTION (DEGREES)
FLIGHT SPOILER DEFLECTION (DEGREES)
LATERAL ACCELERATION
MAGNETIC HEADING (DEGREES)
RUDDER PEDAL (DEGREES)
RUDDER DEFLECTION (DEGREES)
TIME (SECONDS)
HEA 737-300 ACCIDENT
03JAN04 - TIME ALIGNED FDR DATA
SIMULATED LEFT L.E. SLAT EXTENDS
BOEING PROPRIETARY
FIGURE 22
PAGE
CALC
CHECK
APPD
APPD
REVISED
DATE
THE BOEING COMPANY

Scenario 10 - Spoiler wing cable jam (Spoiler wing cable jam) offset of the neutral position at time 92450 (maximum wheel deflection).and clears at 92472

Longitudinal Axis, simulated right wing spoiler cable jam



Lateral Axis, simulated right wing spoiler cable jam

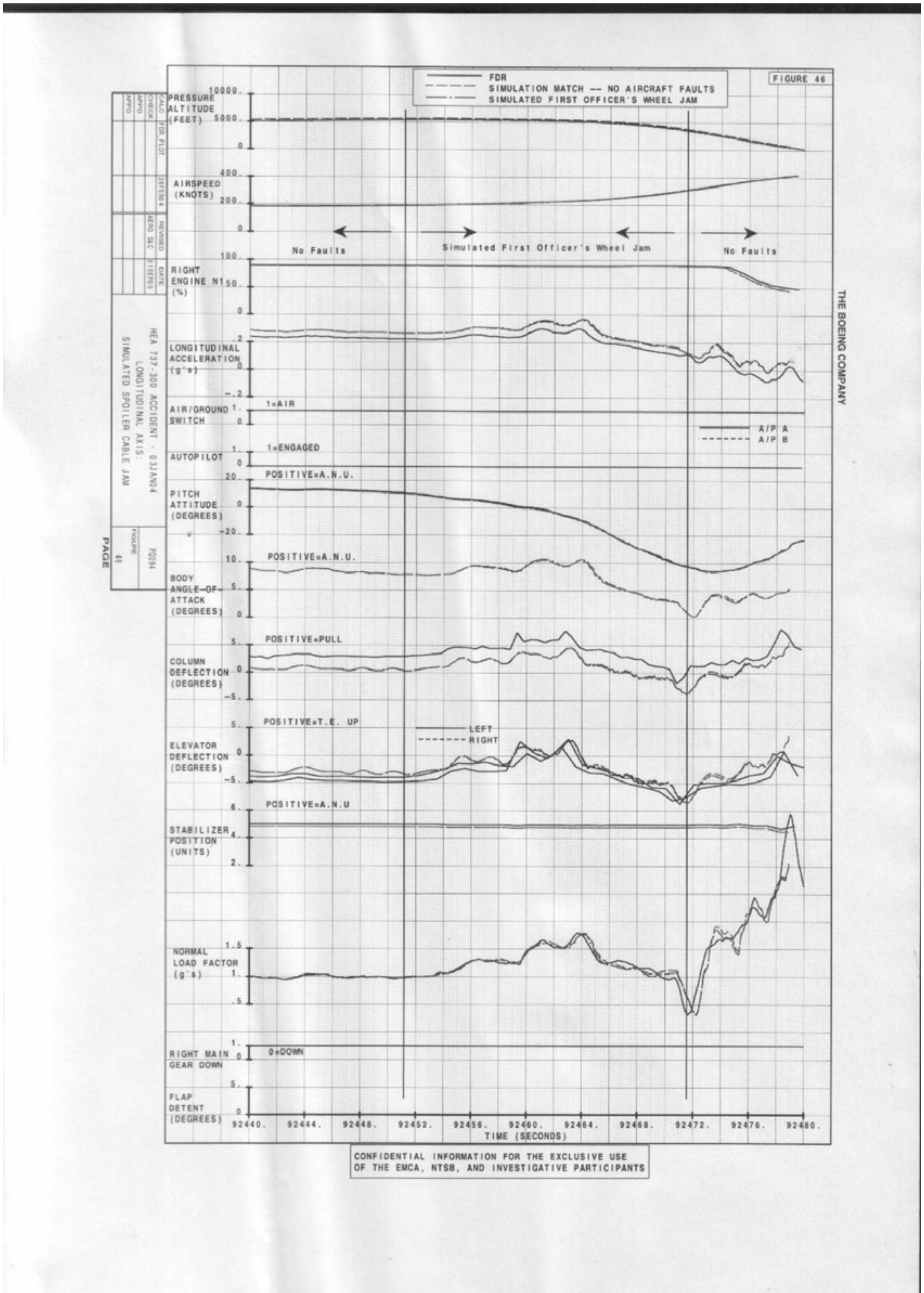


-

Scenario 10a - F/O wheel jam (F/O wheel jam) offset of the neutral position at time 92450 (maximum wheel deflection).and clears at 92472

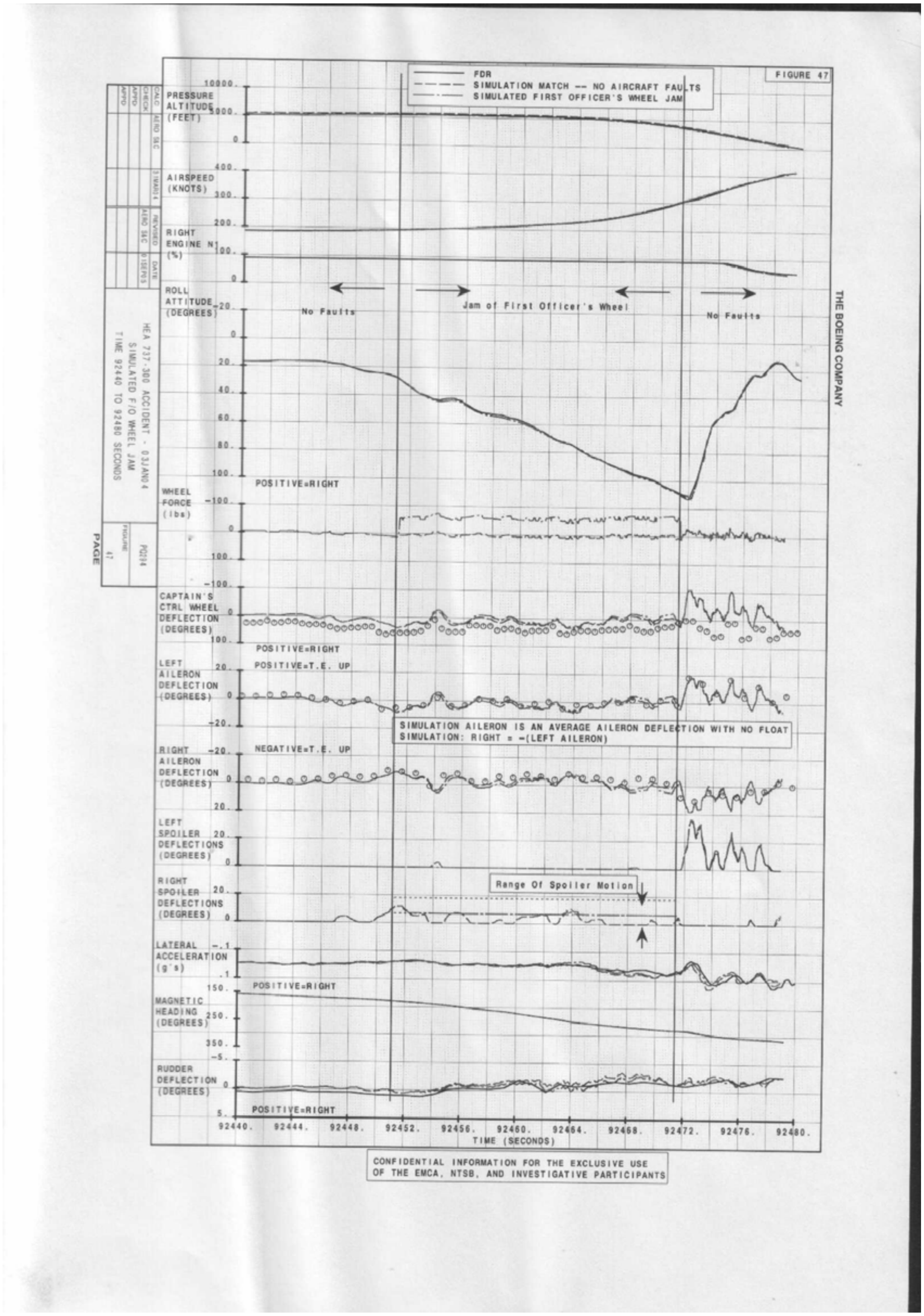
Longitudinal Axis, simulated F/O's wheel jam:

-

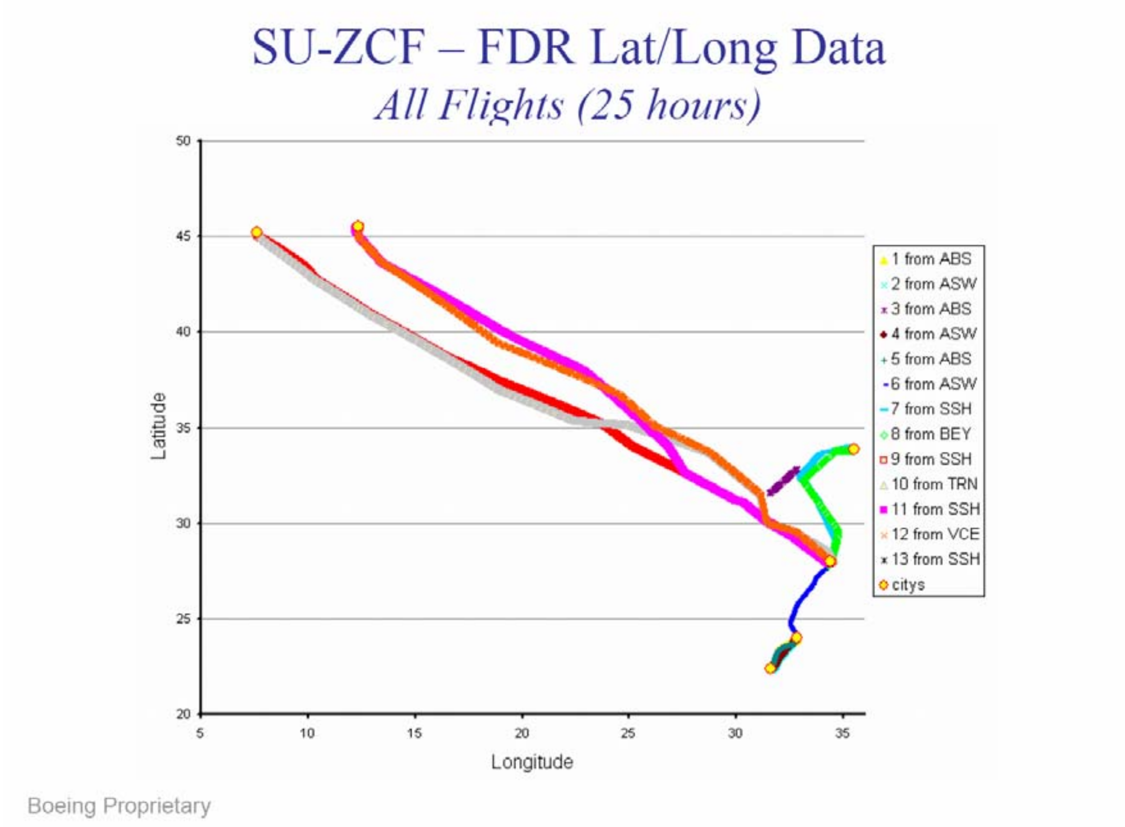


-

Lateral Axis, simulated F/O's wheel jam:

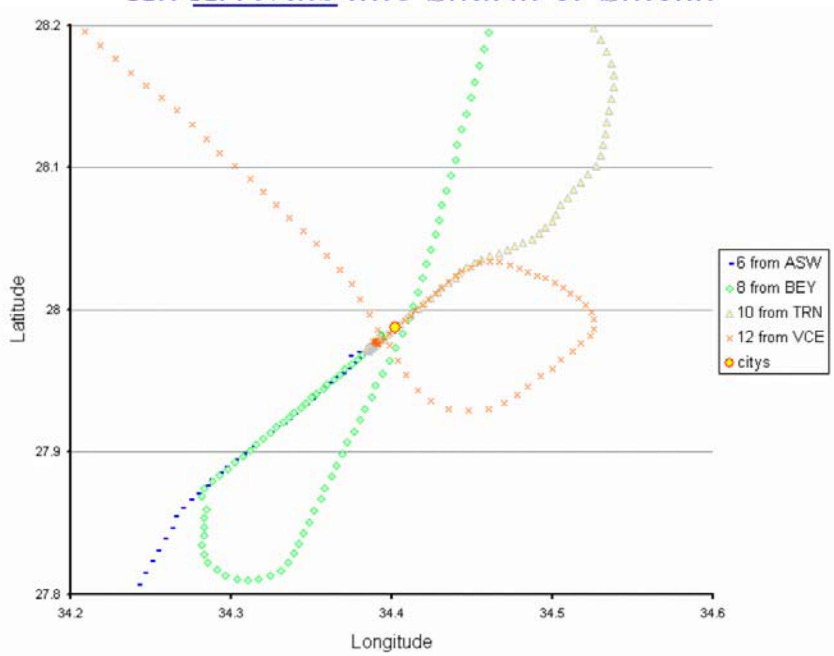


1.16.1.5. FDR 25 Hour Data- Observations (CairoMarch04Slides (March Progress Meeting - Cairo).pdf, 040301 Flash 737 Cairo Mtg (public release version).pdf)



SU-ZCF – FDR Lat/Long Data

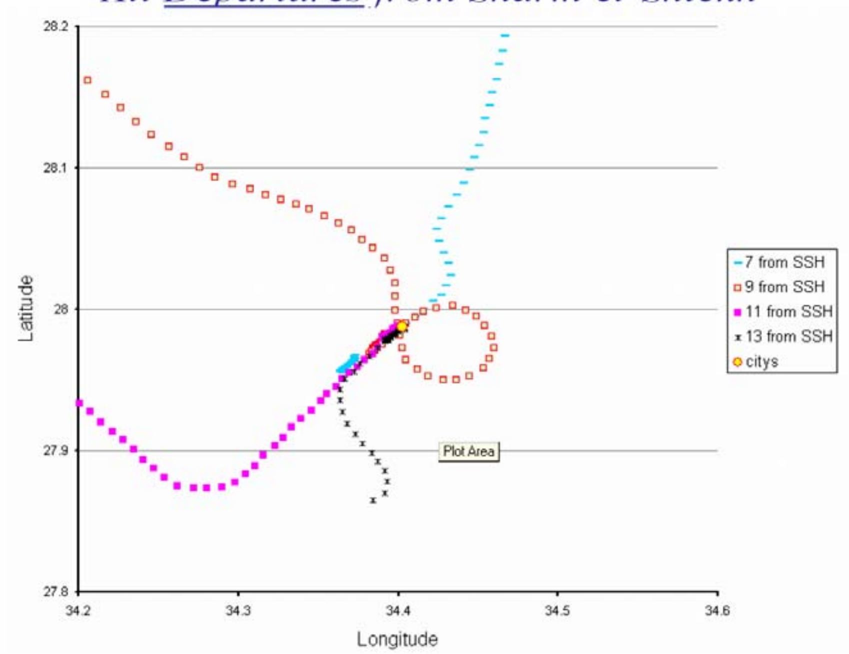
All Arrivals into Sharm el-Shiekh



Boeing Proprietary

SU-ZCF – FDR Lat/Long Data

All Departures from Sharm el-Shiekh



Boeing Proprietary

FDR 25 Hour Data

Observations

- SU-SCF Flight 9 departure from SSH
  - *Departed Rwy 4*
  - *Circling departure to over-fly VOR*

- Use of TOGA on takeoff
  - *SU-ZCF: TOGA typically engaged for ~2 sec*
  - *SU-ZCD: TOGA typically engaged for 1-2 minutes*

SU-ZCF – FDR 25 Hour Data

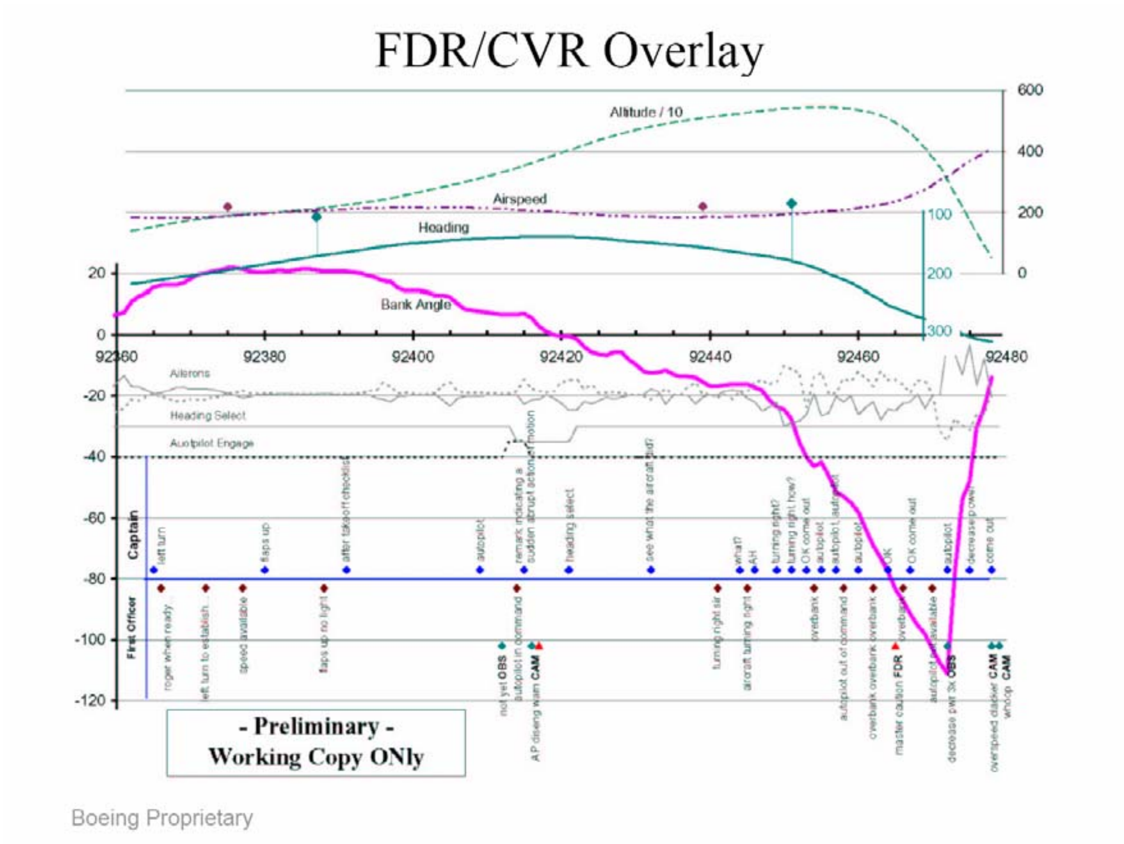
TOGA Observations

Flight	Both F/D ON?	Normal looking A/T Takeoff	First TOGA Push (1)	If Second TOGA Push (1)
1	YES	YES	1	2
2	YES	YES	0	
3	YES	YES	2	
4	NO	YES	0	
5	YES	YES	2	
6	YES	YES	1	
7	YES	YES	1	
8	YES	YES	2	
9	YES	YES	2	1
10	YES	YES	0	
11	YES	YES	2	
12	YES	YES	2	
13	YES	YES	2	

(1) Number of samples recorded for TOGA_FCC (sample intvl=1 sec)

1.16.1.6. FDR-CVR Overlay

FDR-CVROverlay.pdf, FDR-CVR Overlay 3R2.pdf (21-June 2004, 040301 Flash 737 Cairo Mtg (public release version).pdf)

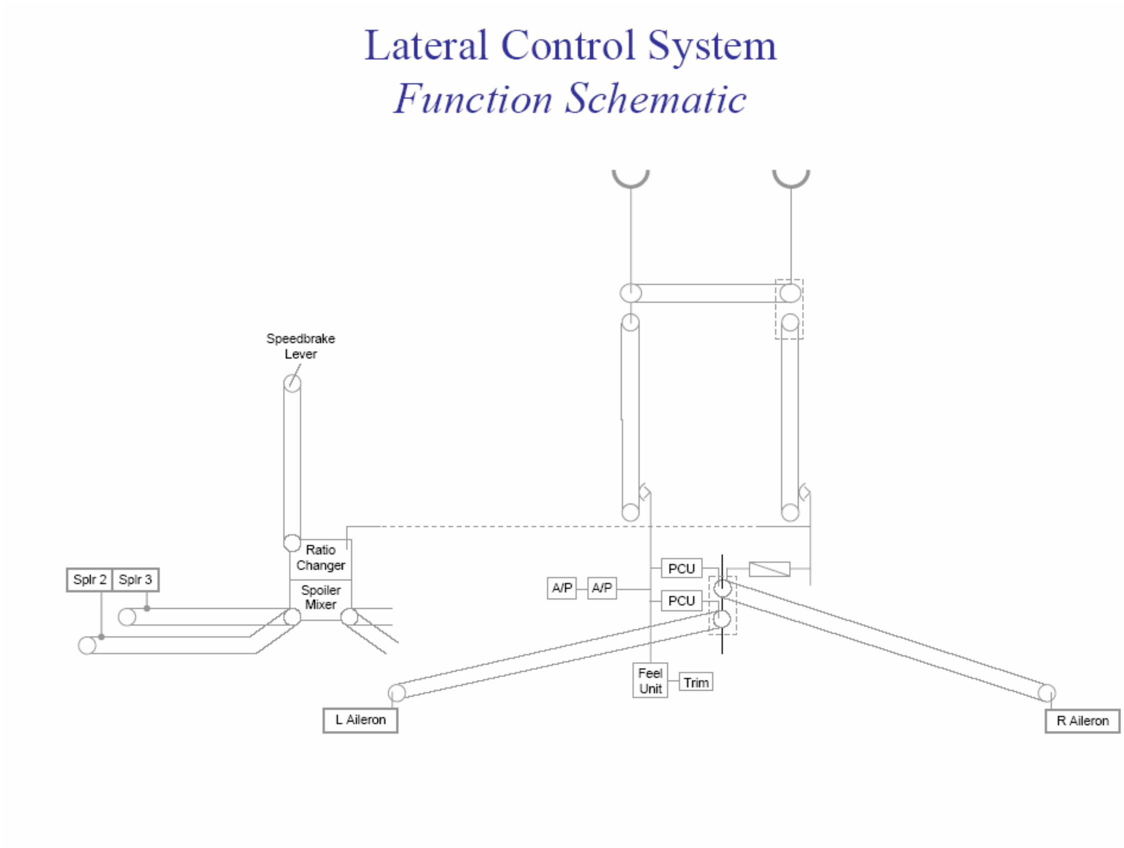


1.16.1.7. Ailerons system

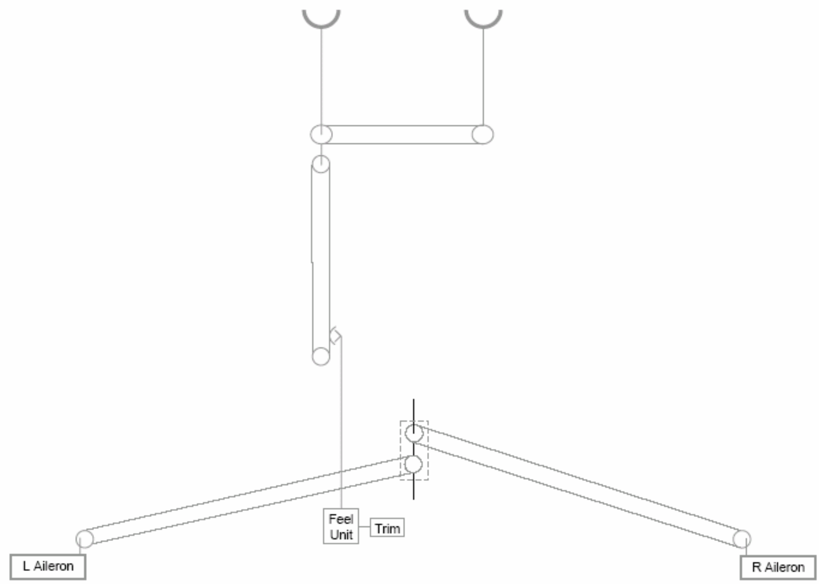
IPC wheel posn xducer PW.pdf (Details about the wheel posn xducer- Part Catalog Maintenance)

Boeing Proprietary information and will not be available for public use

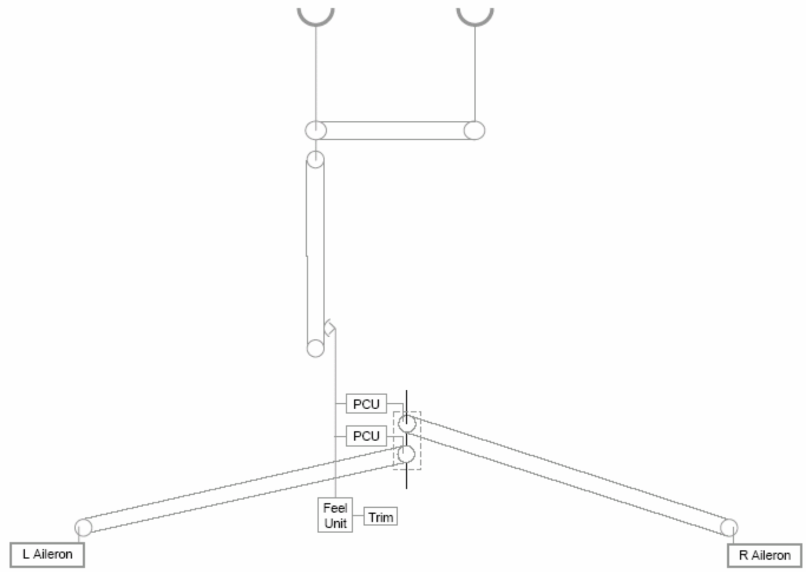
CairoMarch04Slides (March Progress Meeting - Cairo).pdf



Lateral Control System
Function Schematic

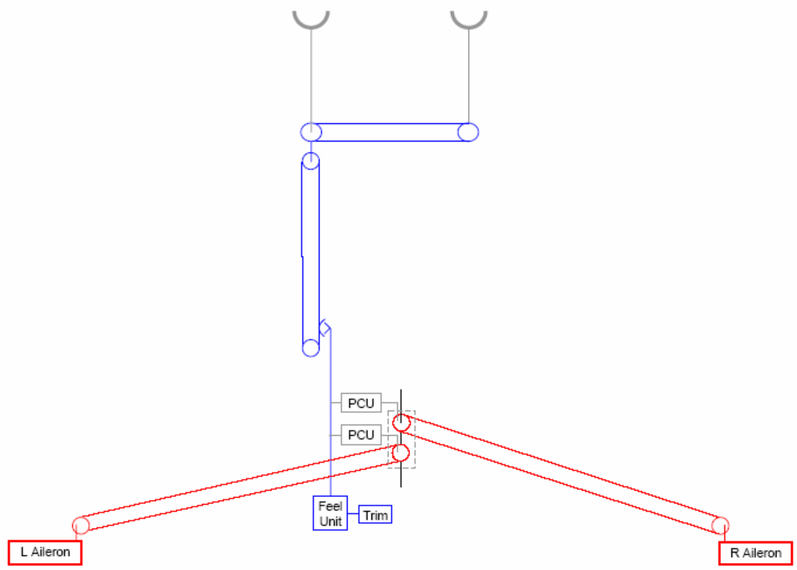


Lateral Control System
Function Schematic

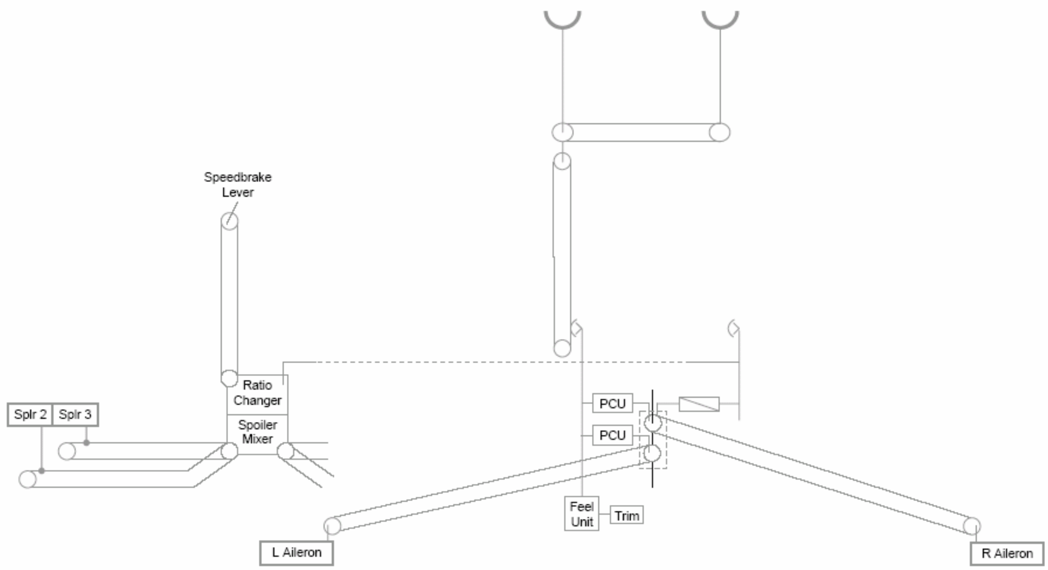


Lateral Control System

Function Schematic

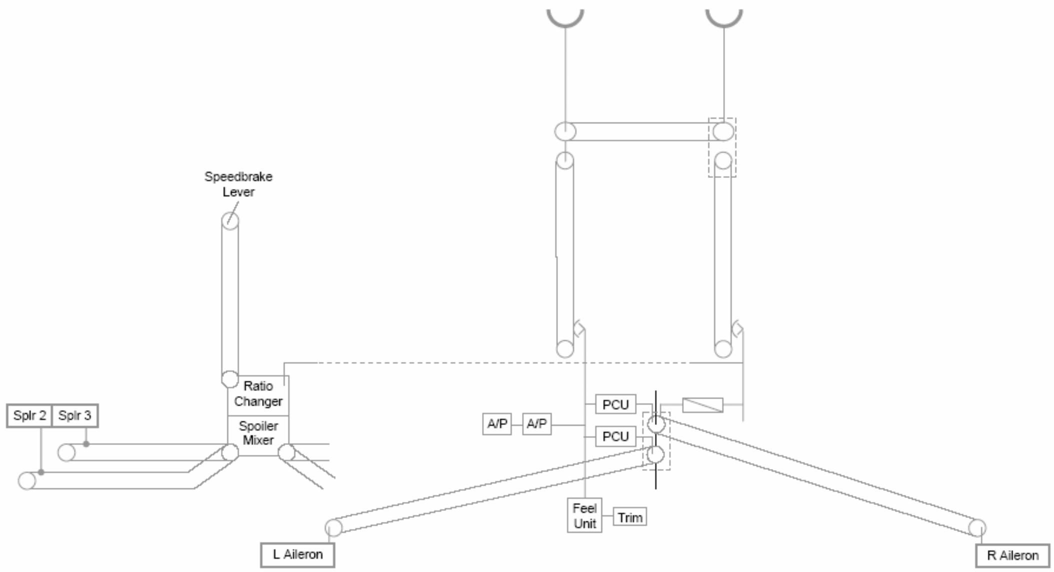


Lateral Control System
Function Schematic

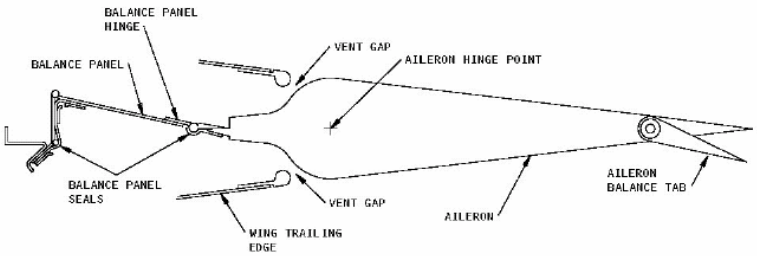


Lateral Control System

Function Schematic



Aileron



Note

Remaining information is Boeing proprietary information and will not be available for public use

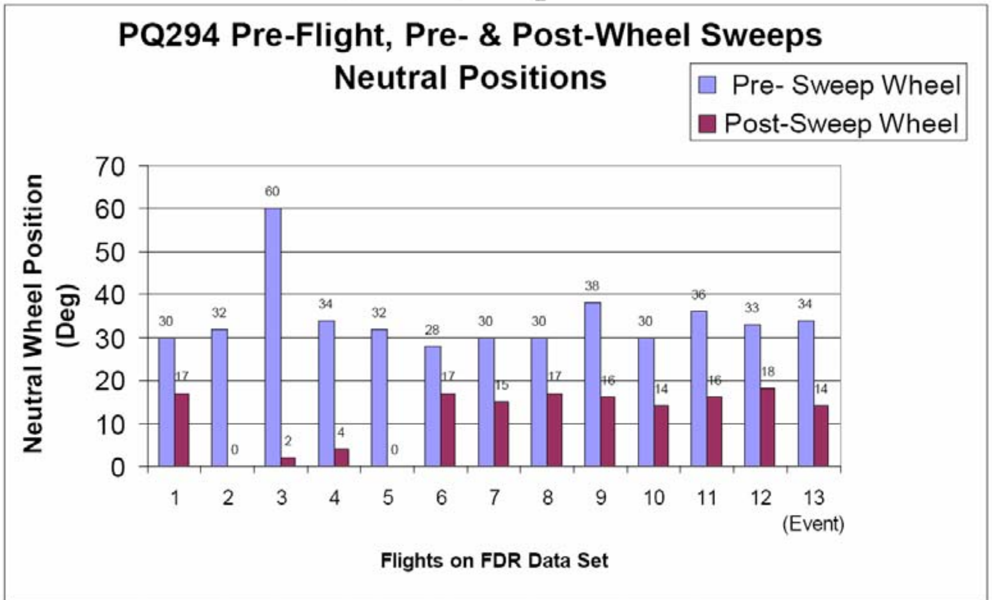
Aileron PCU Control Valve.ppt

Boeing Proprietary information and will not be available for public use

ControlWheelBias.pdf, CairoMarch04Slides (March Progress Meeting - Cairo).pdf

PQ294 FDR Control Wheel Position

Wheel Sweep Data

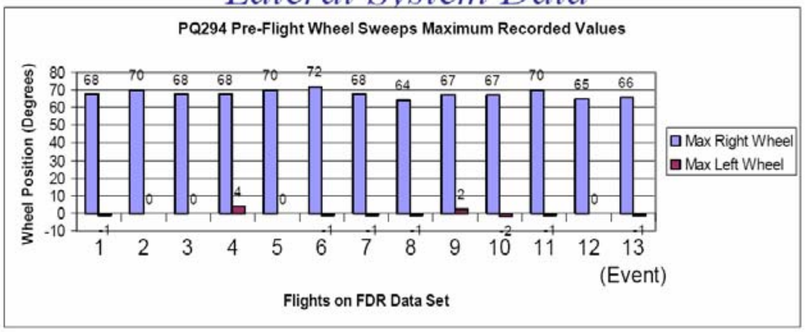


Notes: Wheel Sweeps for flights 2, 3, 4, and 5 where left wheel first, then right wheel.
Wheel Sweeps for flights 1 and 6 - 13 where right wheel first, then left wheel.
Sister ship PQ481 did not have a valid FDR wheel parameter (binary data were all zeros).

Boeing Proprietary

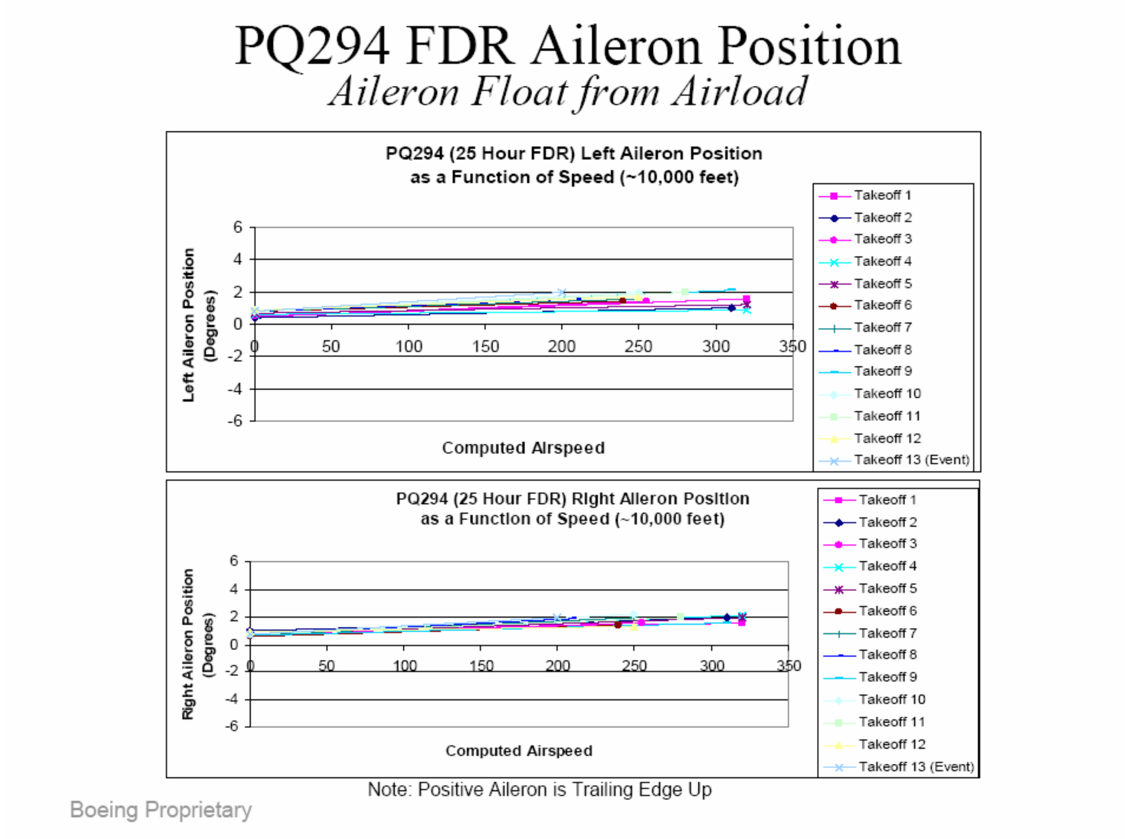
PQ294 FDR Control Wheel Position

Lateral System Data



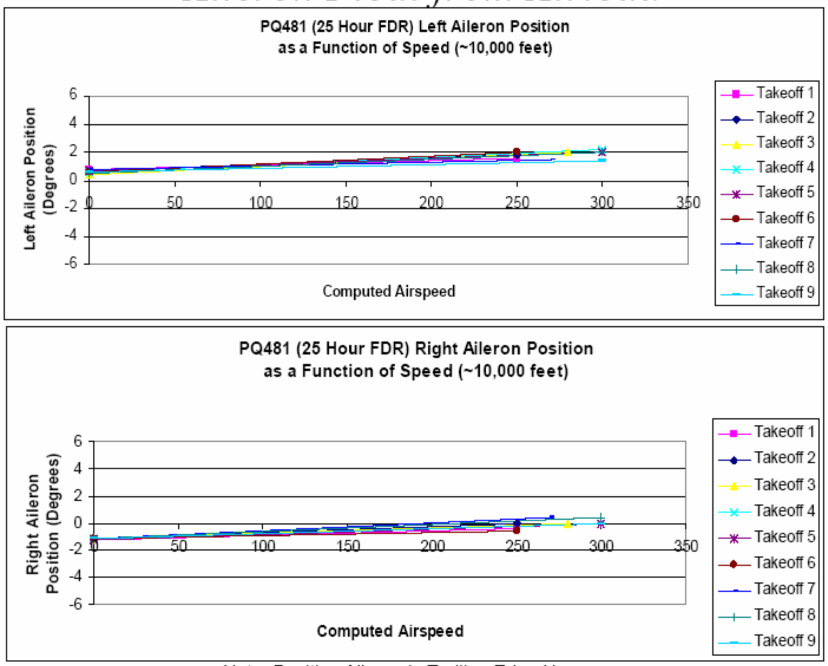
Notes: Maximum wheel deflection is +/- 87.5 degrees, 107.5 degrees with cable stretch
Maximum aileron deflection is +/- 20 degrees

AileronFloat.pdf (PQ294 FDR Aileron Position, Aileron Float from Airload)



PQ481 FDR Aileron Position

Aileron Float from Airload



Note: Positive Aileron is Trailing Edge Up

M-Cab Wheel (Flight Director Results Boeing.xls)

Boeing Proprietary information and will not be available for public use

Force vs Wheel.ppt

Boeing Proprietary information and will not be available for public use

Cor8tmp PCU correction.ppt

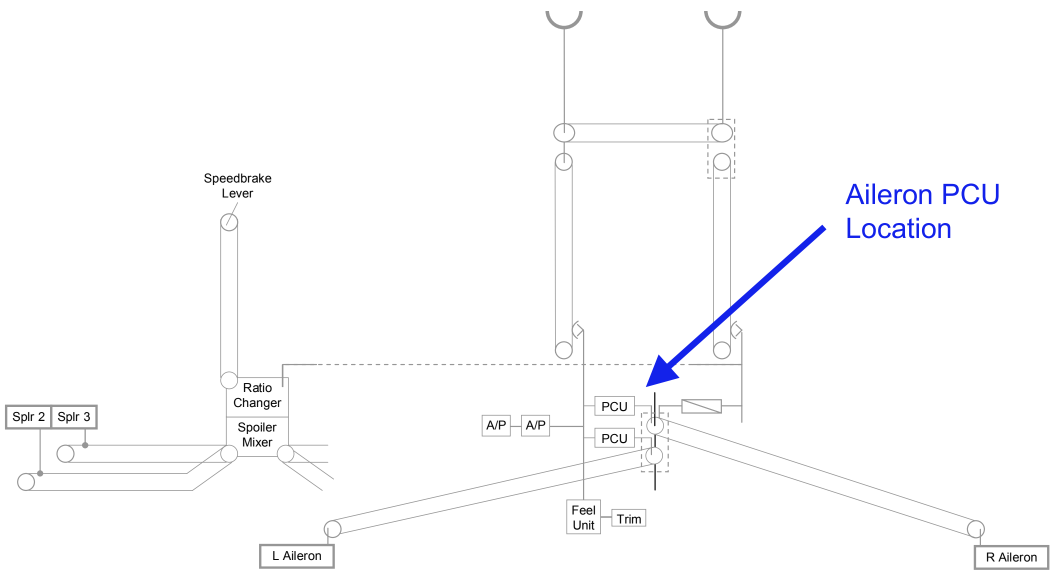
Boeing Proprietary information and will not be available for public use

Aileron PCU
Field Note Summary

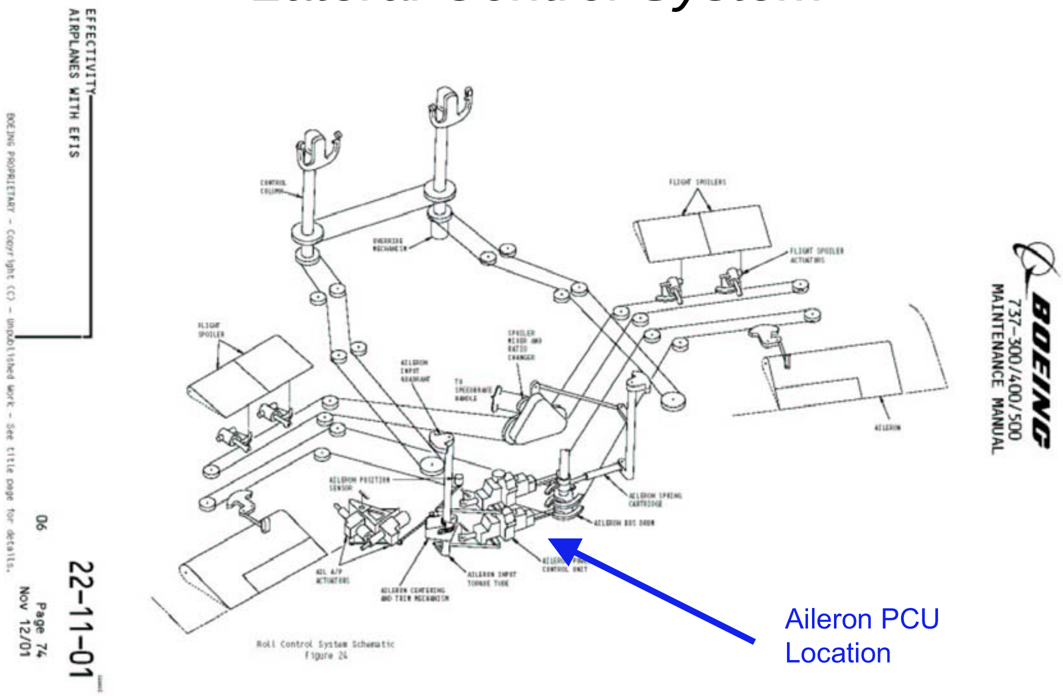
- Recovered 25 Jan 04 (day 23)
- Stored in seawater on board
- Rinsed in freshwater on shore
- Stored at Sharm el-Sheikh airport until shipped to Seattle
- EQA conducted 25-26 Jan 05

Photos taken Jan 04 onboard recovery ship

Lateral Control System
Function Schematic



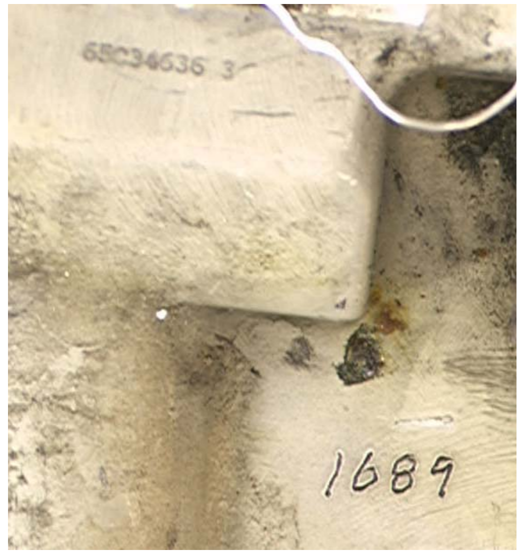
Lateral Control System



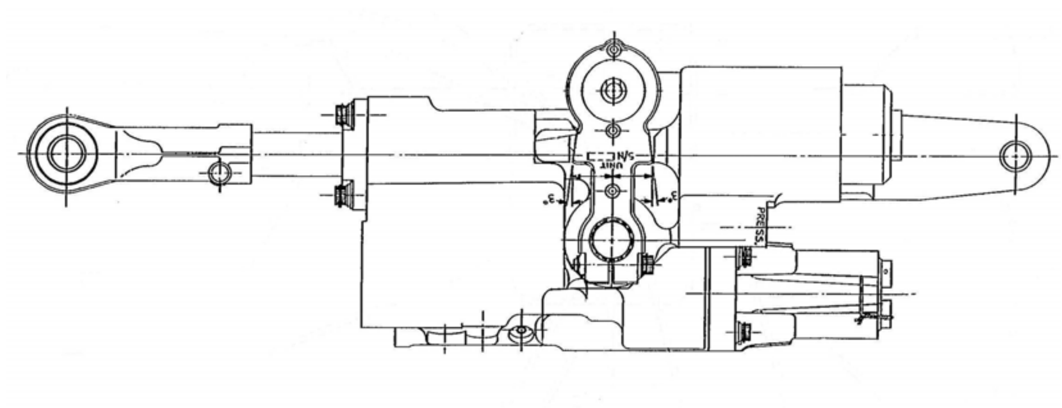
Part Identification

Supplier:	Parker Hannifin
Boeing P/N:	65-44761-21*
S/N:	10748A*
Date Built:	1992*

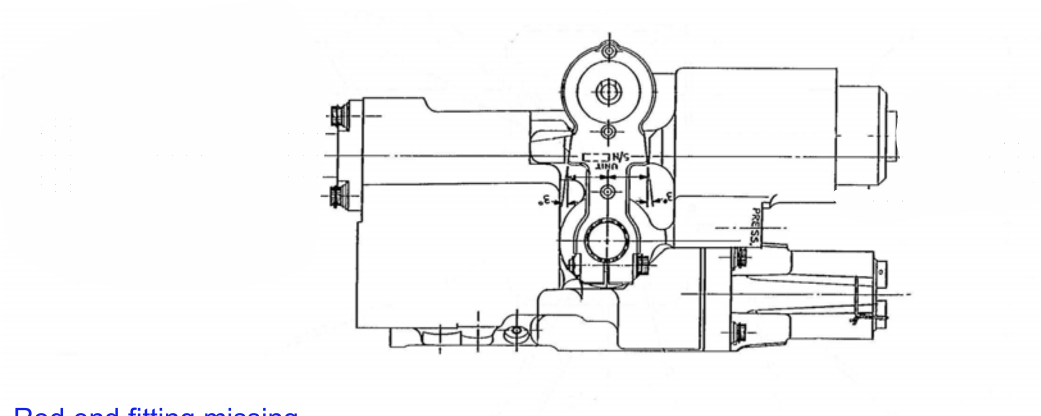
*Data plate missing, information derived form Parker records based on manifold part number, serial number, and servo valve part number and serial number.



65-44761-21 Aileron PCU



65-44761-21 Aileron PCU



Rod end fitting missing
Main ram fractured

Tailstock
missing

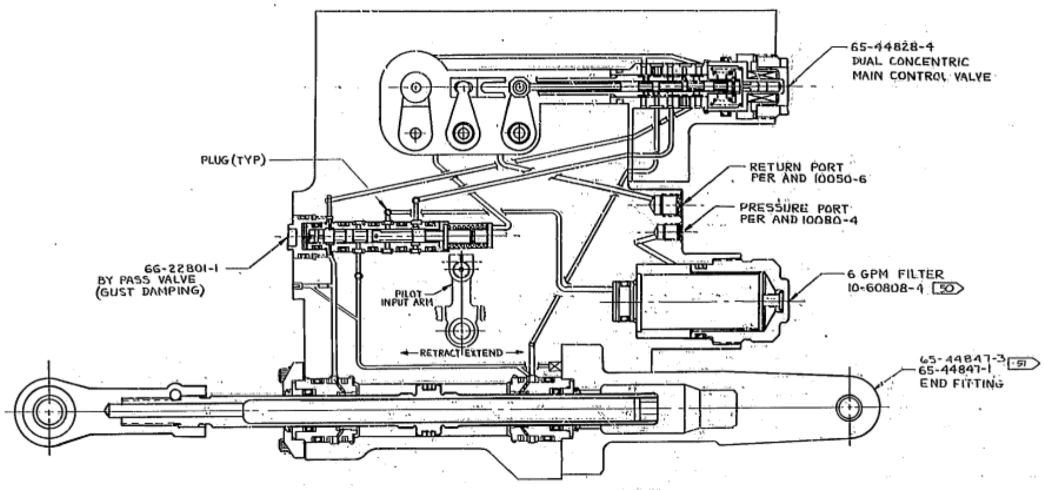
65-44761-21 Aileron PCU

65-44761-21 Aileron PCU

Hydraulic Fittings

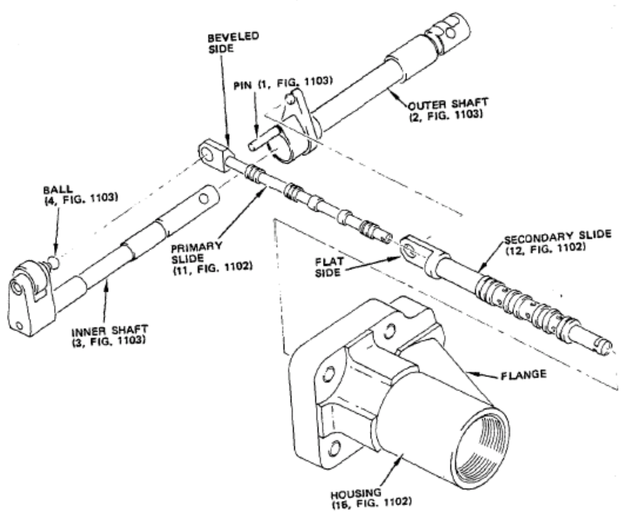
- Hydraulic fittings found broken
- Provides a path for sea water and other contaminants to enter the actuator

Hydraulic Schematic

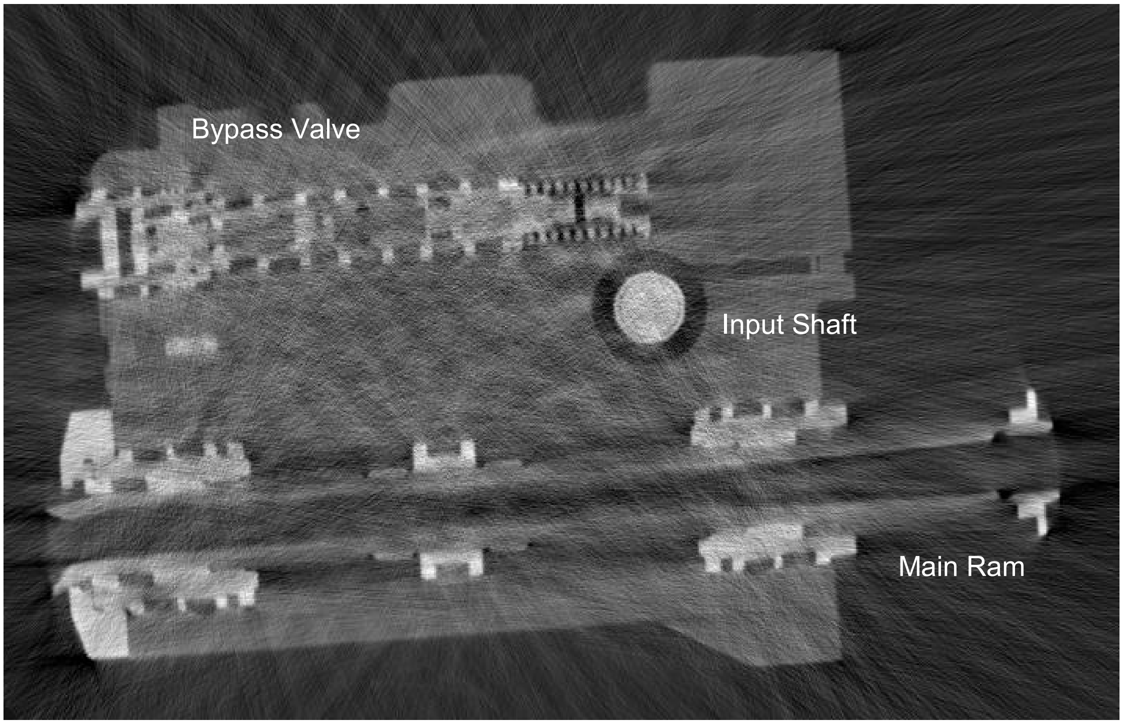


HYDRAULIC SCHEMATIC
(SCALE: NONE)

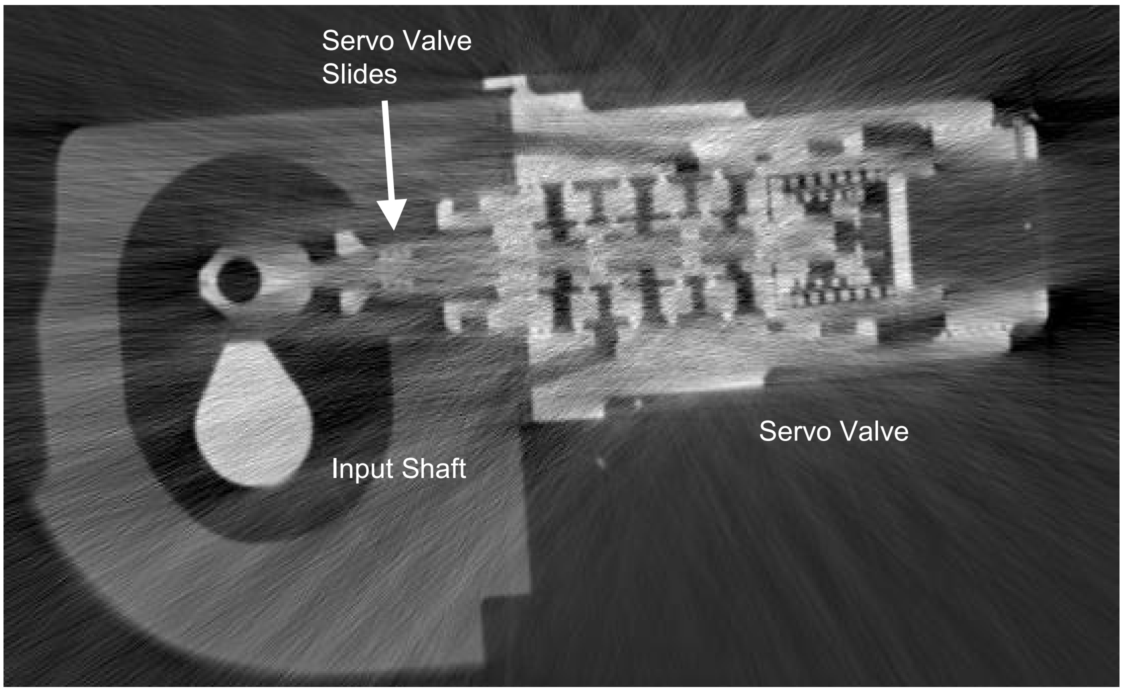
Servo Valve Components



Computed Tomograph Scan



Computed Tomograph Scan

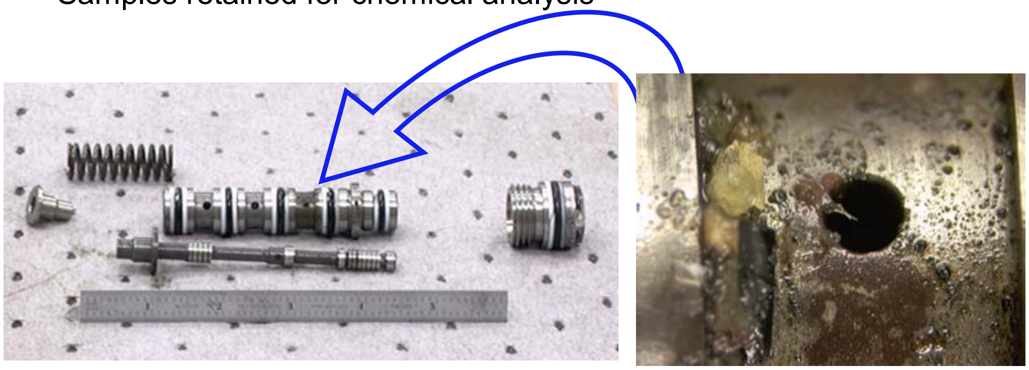


Filter

- Filter cap and filter element removed
- Fluid sample and filter retained for chemical analysis

Bypass Valve

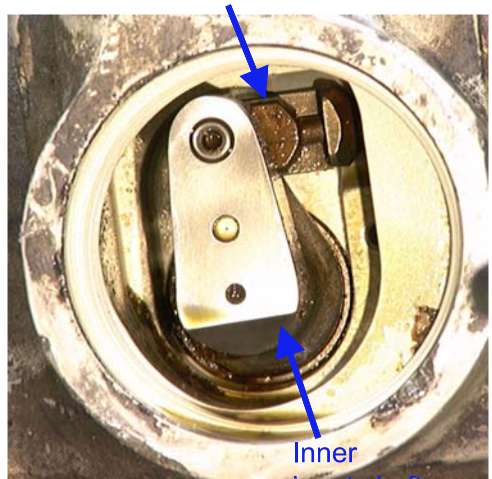
- Some corrosion and contamination on bypass valve sleeve
- Samples retained for chemical analysis



- Metal sliver found on outside of sleeve
- Origin uncertain, retained for chemical analysis

Input Shafts

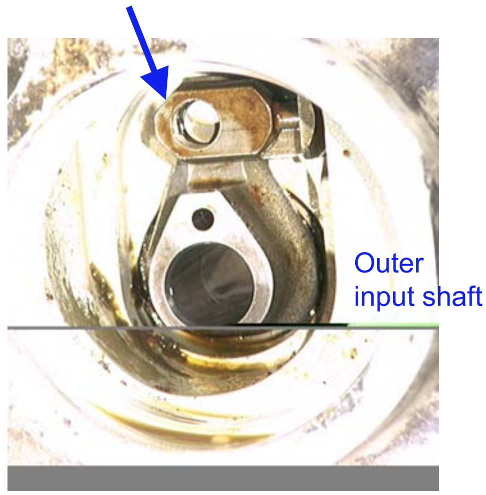
- Linkage cavity cover removed
- Some contamination noted in linkage cavity – samples taken for analysis
- View shows end of inner shaft and shaft and mating ends of servo valve slides



Input Shafts

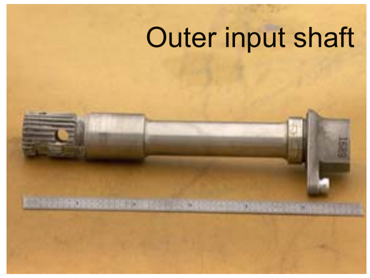
- Inner input shaft pressed out (required removal force much higher than normal)

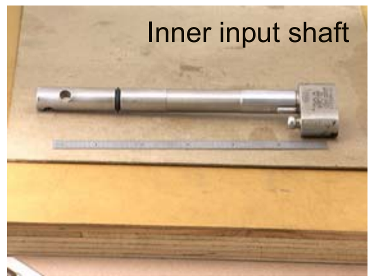
- View shows outer shaft and mating ends of servo valve slides (inner shaft has been removed)



Input Shafts

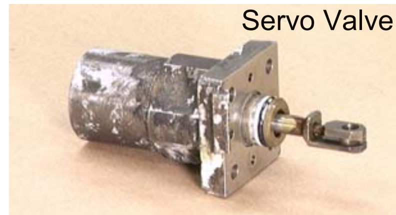
- Both shafts found to be bent
- Some corrosion found on shaft bearings, but none on shafts
- Deformed shafts consistent with high removal forces



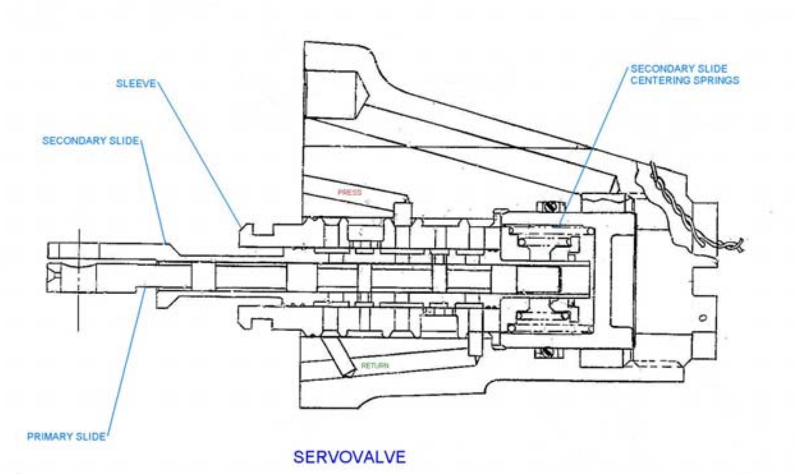


Servo Valve

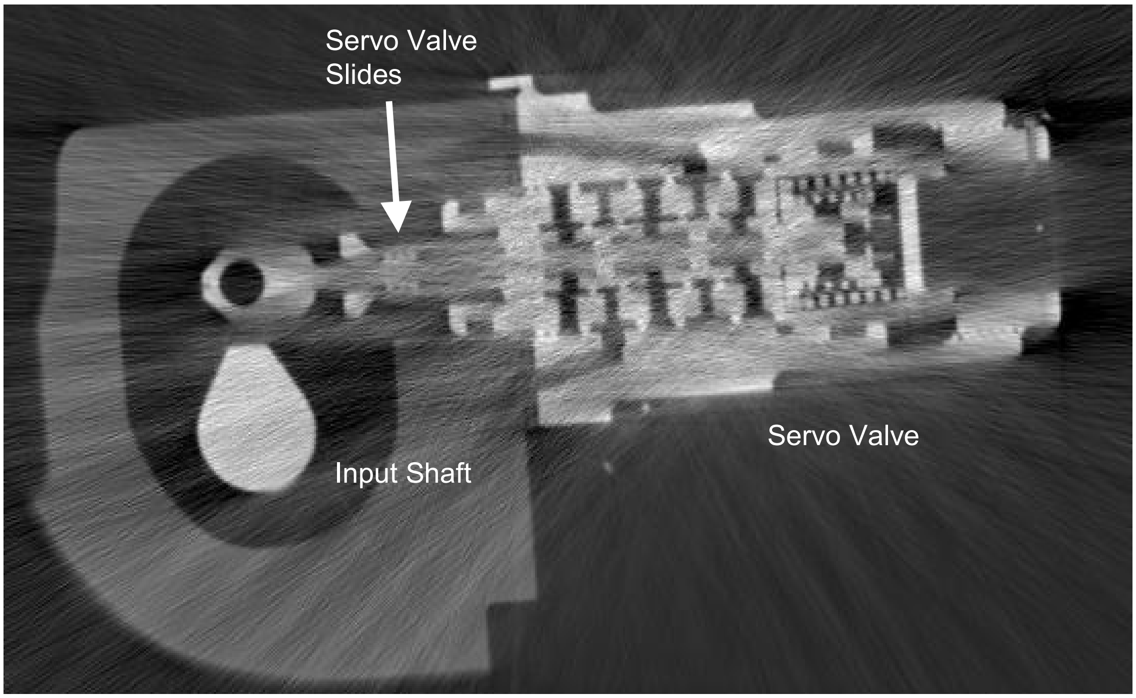
- Outer shaft rotated to allow removal of servo valve
- Axial load of 29 lbs applied to primary sleeve – no movement noted
- After removal, slides remain jammed



Servo Valve Cross Section

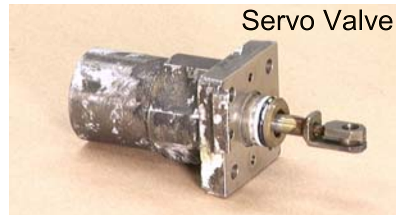


Computed Tomograph Scan



Servo Valve

- Decision made to discontinue disassembly of servo valve
  (driving out slides could cause damage to surfaces)
- If deemed necessary, servo valve can be sectioned by electro-machining discharge (EDM).



▪

Aileron PCU EQA Report (Aileron PCU EQA Report.pdf)

Boeing Proprietary information and will not be available for public use

1.16.1.8. Master Caution:

CairoMarch04Slides (March Progress Meeting - Cairo).pdf

Master Caution Discrete at Time 92465

Flight Controls
- Low Quantity 2
- Low Pressure 2
- Feel Diff Press 2
- Speed Trim Fail 1
- Mach Trim Fail 1
- Yaw Damper 3
- Autoslat Fail 2

Hydraulics
- Low Press – Elec Pump 3
- Overheat – Elec Pump 2
- Low Press – Eng Pump 3

IRS
- Fault 2
- On DC 2
- DC Fail 2

Fuel
- Low Pressure 1
- Filter Bypass. 3

APU
- Low Oil Pressure 2
- Fault 2
- Overspeed 1

Electrical
- Low Oil Pressure 2
- High Oil Temp 2
- Standby Power Off 2
- Transfer Bus Off 3
- Bus Off 3

Overheat Detection
- Engine1 overheat 2
- Engine 2 overheat 2
- APU Detection Inop 1

Anti-Ice
- Window overheat 2
- Pitot heat 2
- Cowl Anti-Ice 3

Doors
- Fwd/Aft Entry 1
- Equipment 1
- Fwd/Aft Cargo 1
- Fwd/Aft Service 1
- Airstairs (not installed on PQ294)

Engine
- Reverser 3
- PMC-Inop 1
- Low Idle 1

Overhead
- Equipment Cooling - Off 2
- Emer Exit Lts-Not Armed 2
- Flight Recorder - Off 3
- Pass Oxy - On 3

Air Cond
- Flt Deck Duct Ovht 2
- Pax Duct Ovht 2
- Dual Bleed 2
- Wing-Body Overheat 2
- Bleed Trip Off 2
- Auto Fail 2
- Off Sched Descent 1
- Pack Trip Off 2

Legend
1 = unknown
2 = unlikely
3 = ruled out

1.16.1.9. Auto Flight Systems

CairoMarch04Slides (March Progress Meeting - Cairo).pdf, 040301 Flash 737 Cairo Mtg (public release version).pdf
Relevant Figures

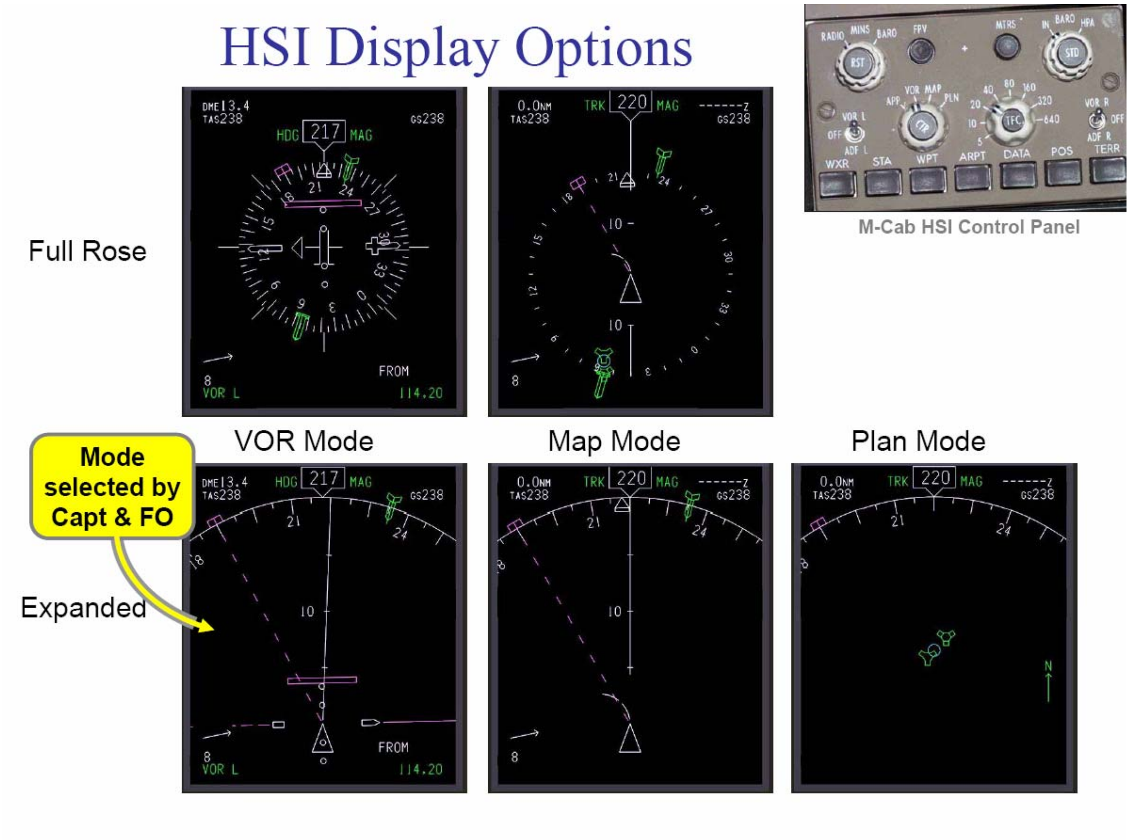
Boeing Proprietary information and will not be available for public use

737-300 (PQ294) Flight Director Control Law: (see also FDControlLaw.pdf file)

Boeing Proprietary information and will not be available for public use

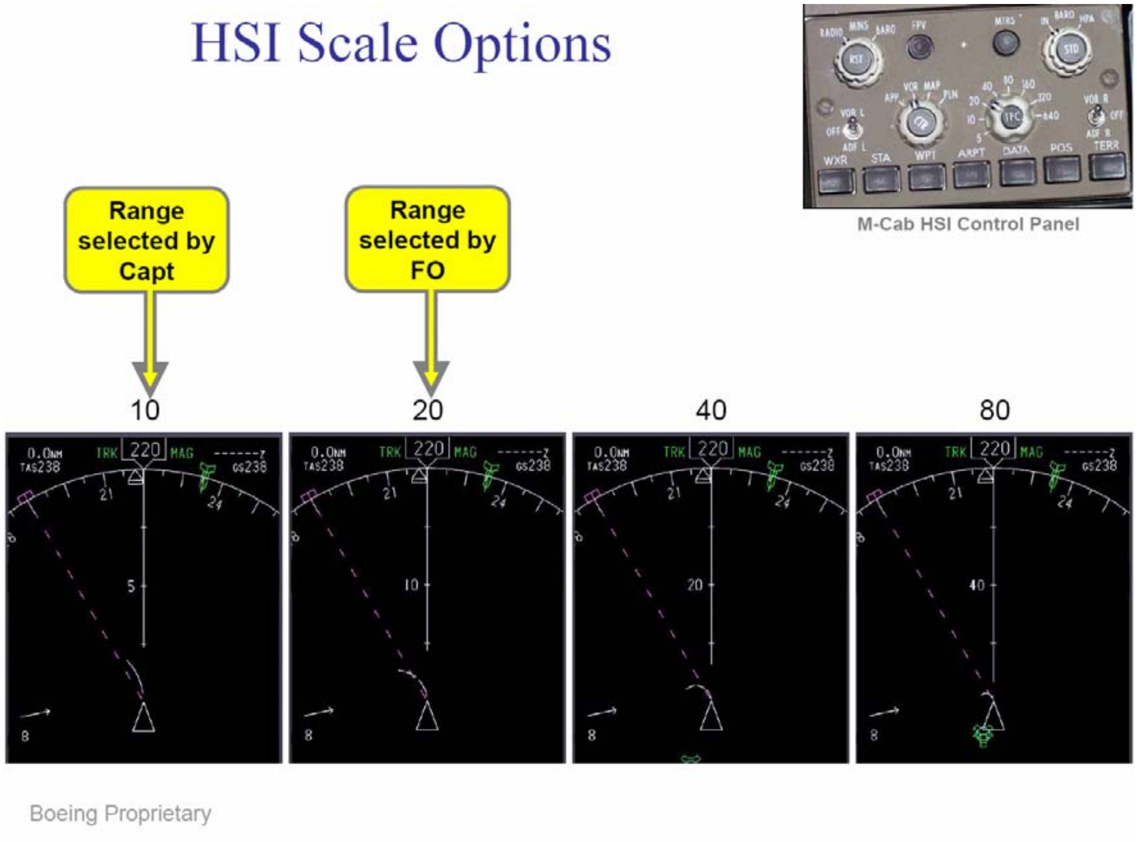
HSI Display

:


HSI Display Options
M-Cab HSI Control Panel
Full Rose
Expanded
VOR Mode
Map Mode
Plan Mode
Mode selected by Capt & FO

Display Settings from FDR

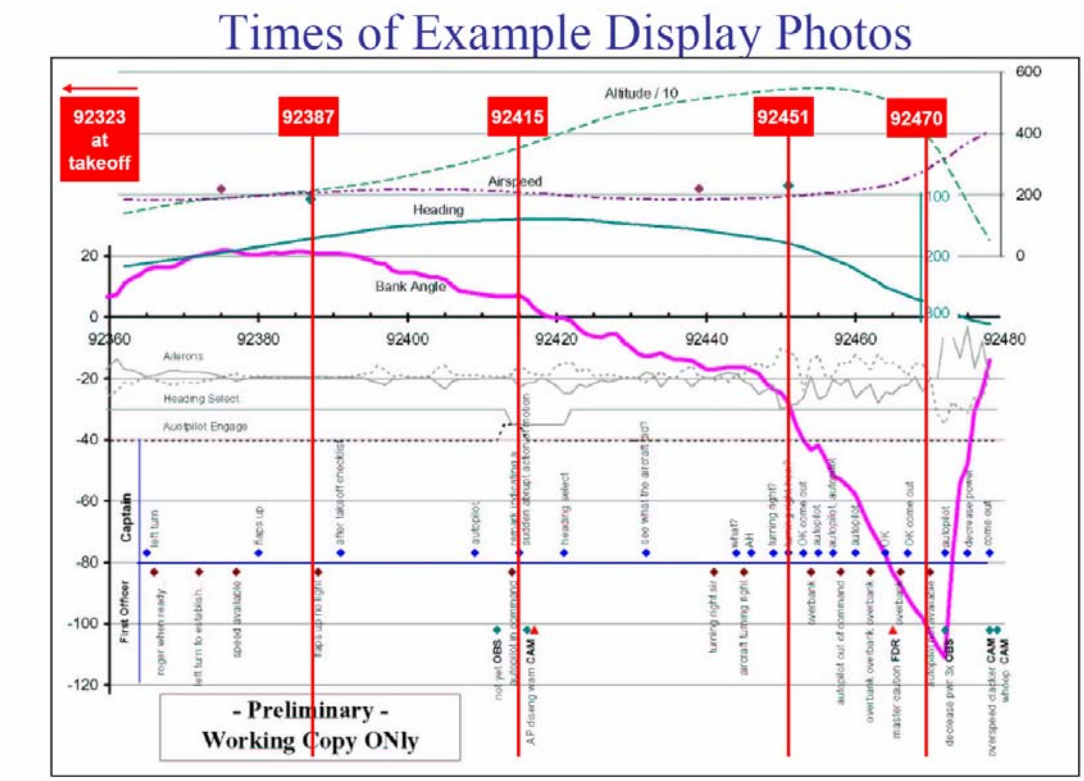
Signal Name	Bit True	Bit False	Capt	FO)
FULL COMPASS ROSE	SELECT	NOT SEL	0	0
AIRPORTS	SELECT	NOT SEL	0	0
RTE DATA	SELECTED	NOT SEL	0	0
WPT	SELECT	NOT SEL	0	0
NAV AIDS	SELECT	NOT SEL	0	0
SPARE	SELECTED	NOT SEL		
NAV MODE SELECTED	SELECT	NOT SEL	0	0
ILS (STD) MODE SEL	ILS (STD)	NOT SEL	0	0
VOR (STD) MODE SEL	VOR (STD)	NOT SEL	0	0
PLAN MODE SEL	PLAN MODE	NOT SEL	0	0
ILS (MOD) MODE SEL	ILS (MOD)	NOT SEL	0	0
VOR (MOD) MODE SEL	VOR (MOD)	NOT SEL	1	1
MAP MODE SELECT	MAP MODE	NOT SEL	0	0
160 MI RANGE SEL	SET	NOT SET	0	0
80 MI RANGE SEL	SET	NOT SET	0	0
40 MI RANGE SEL	SET	NOT SET	0	0
20 MI RANGE SEL	SET	NOT SET	1	0
10 MI RANGE SEL	SET	NOT SET	0	1
WXR DATA	WXR SEL	NOT SEL	0	0 to 1 @ 530-534



Note:

Remaining information is Boeing Proprietary information and will not be available for public use

Times of Example Display Photos:

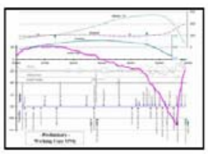


Boeing Proprietary

-

SU-ZCF
@ Time
92323

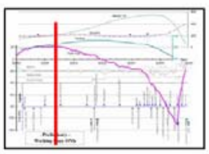
Takeoff



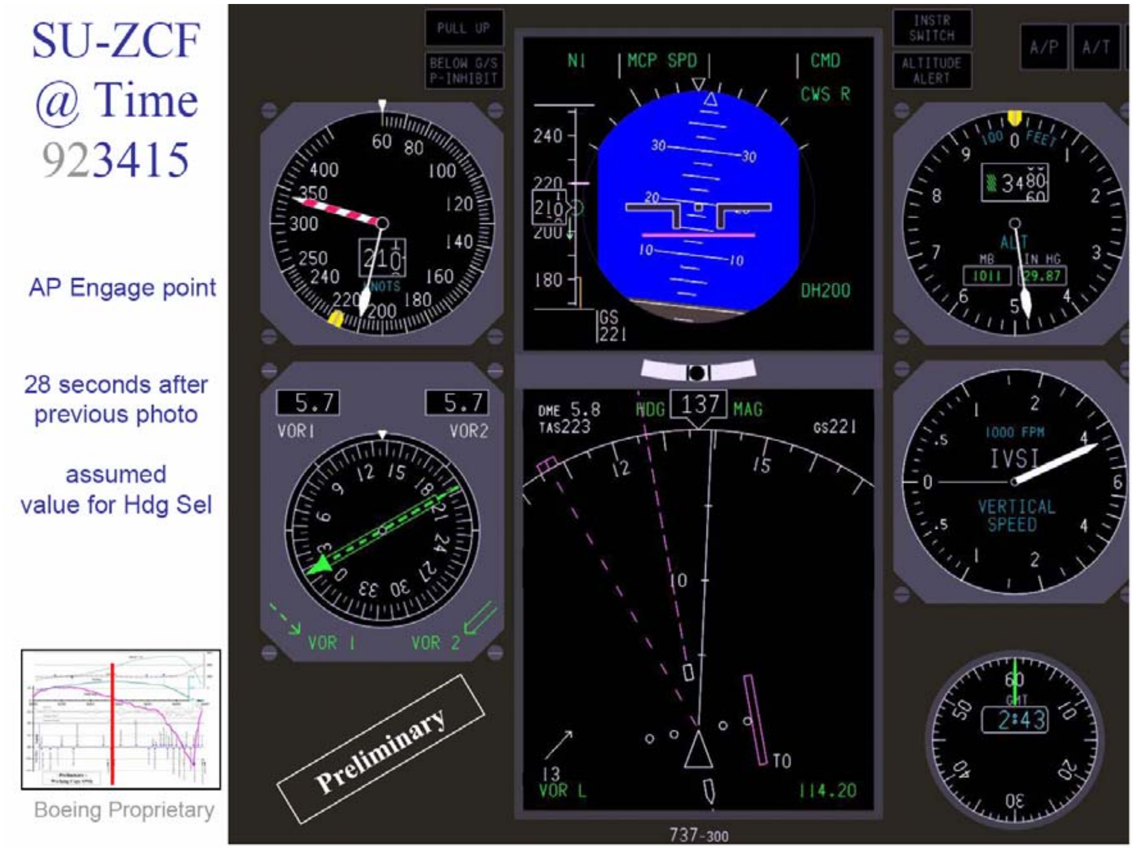
Boeing Proprietary

SU-ZCF
@ Time
92387

1st Hdg Sel point



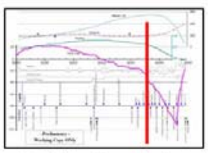
Boeing Proprietary


SU-ZCF
@ Time
923415
AP Engage point
28 seconds after
previous photo
assumed
value for Hdg Sel
Boeing Proprietary
Preliminary
PULL UP
BELOW G/S
P-INHIBIT
N1
MCP SPD
CMD
CWS R
DH200
INSTR
SWITCH
ALTITUDE
ALERT
A/P
A/T
DME 5.8
TAS223
HDG
137
MAG
GS221
VOR L
114.20
TO
VOR1
VOR2
VOR 1
VOR 2
IVSI
VERTICAL
SPEED
1000 FPM
GMT
2:43
737-300

SU-ZCF
@ Time
92451

2nd Hdg Sel point

36 seconds after previous photo

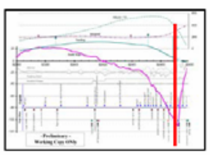


Boeing Proprietary

SU-ZCF
@ Time
92470

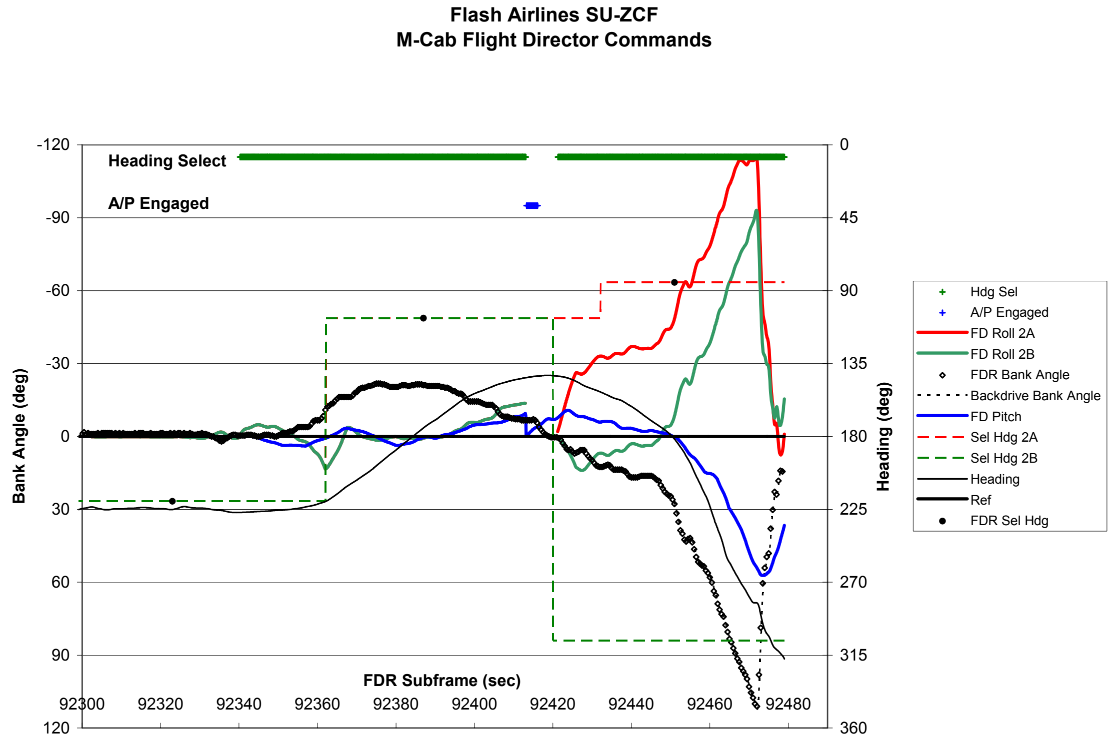
near max
bank angle point

19 seconds after
previous photo



Boeing Proprietary

M-Cab Flight Director Commands (Flight Director Results Boeing.xls)



Display Architecture (Display Architecture.ppt)

Boeing Proprietary information and will not be available for public use

Cairo March 04 Autopilot Flash 737 March Progress Meeting Flash 737 March Progress, 040301 Flash 737 Cairo Mtg (public release version).pdf

Autopilot Engagement Observations

Autopilot Engagement
Observations

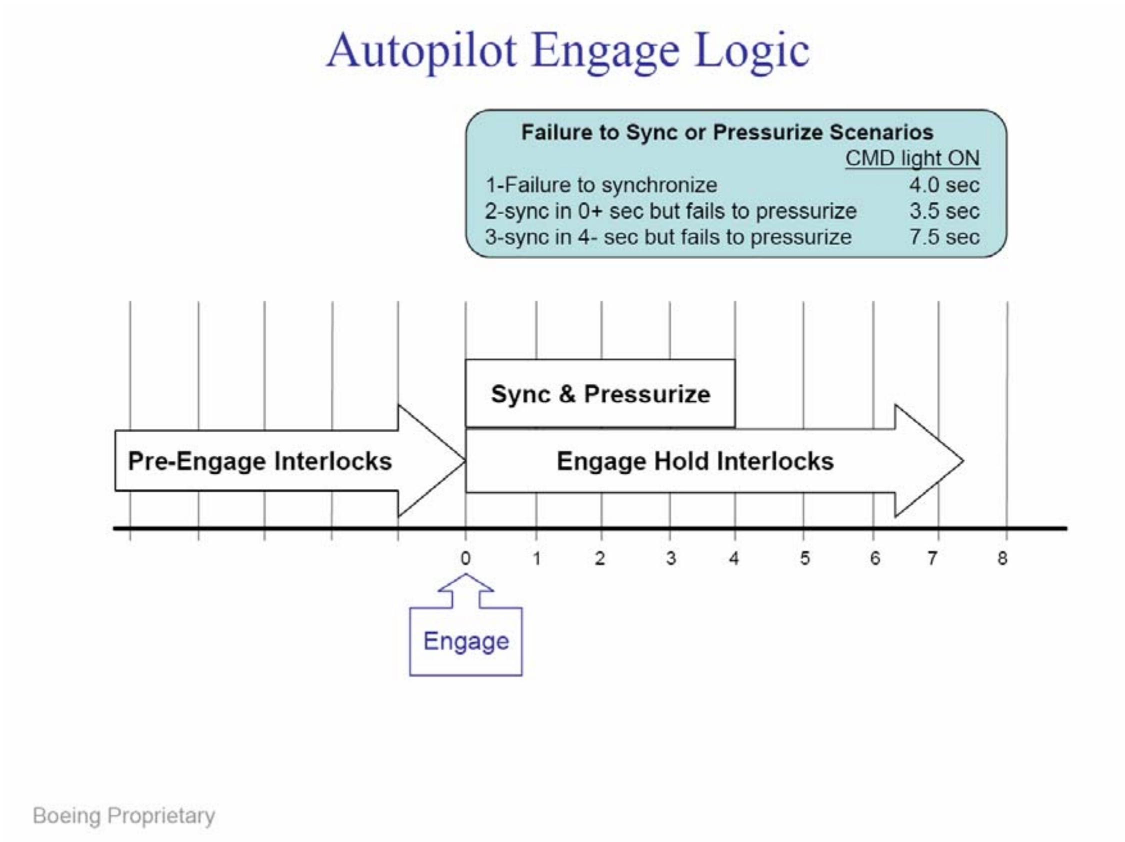
- Engage Hold Interlocks
  - *essentially the same as pre-engage interlocks, see table*
  - *would need to have failed within the 3 seconds since engagement*
- Engage Synchronization
  - *syncs AP servo to aft quadrant*
  - *FCC allows 4.0 seconds to complete*
- Manually Disconnected

Boeing Proprietary

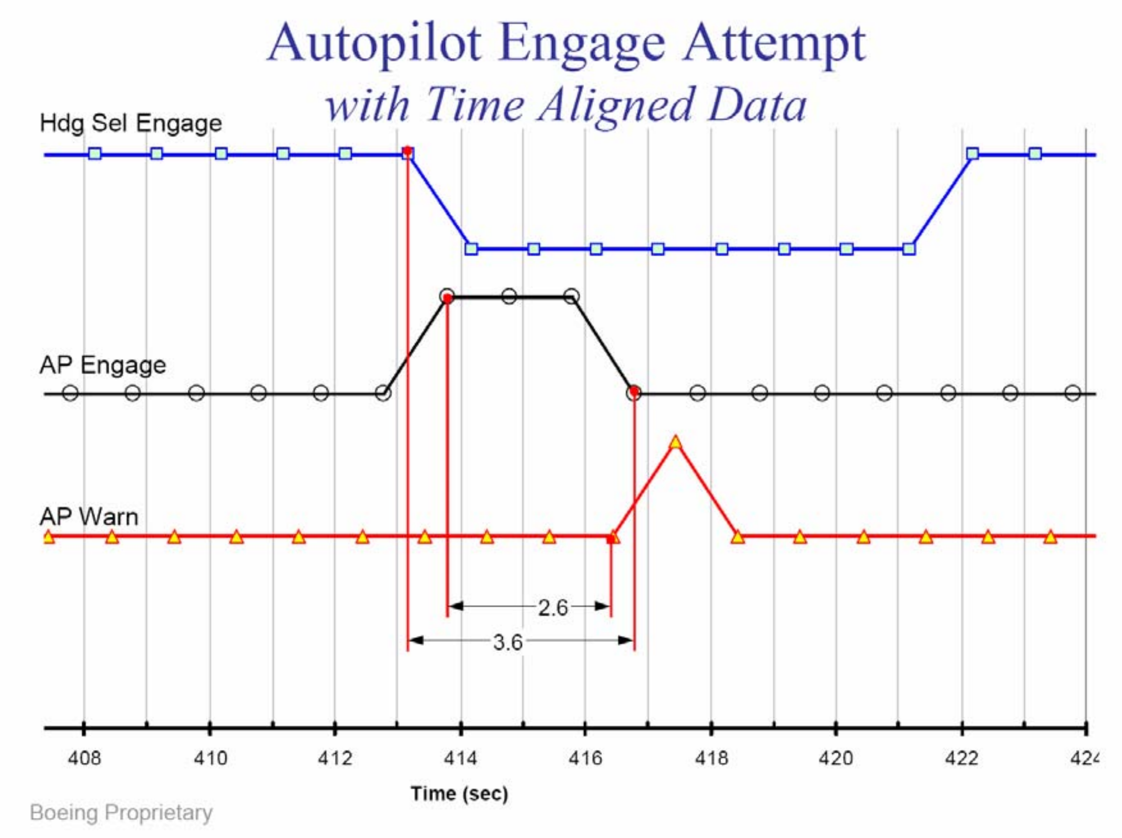
Autopilot Engage Logic

Autopilot Engage & Engage Hold Interlocks

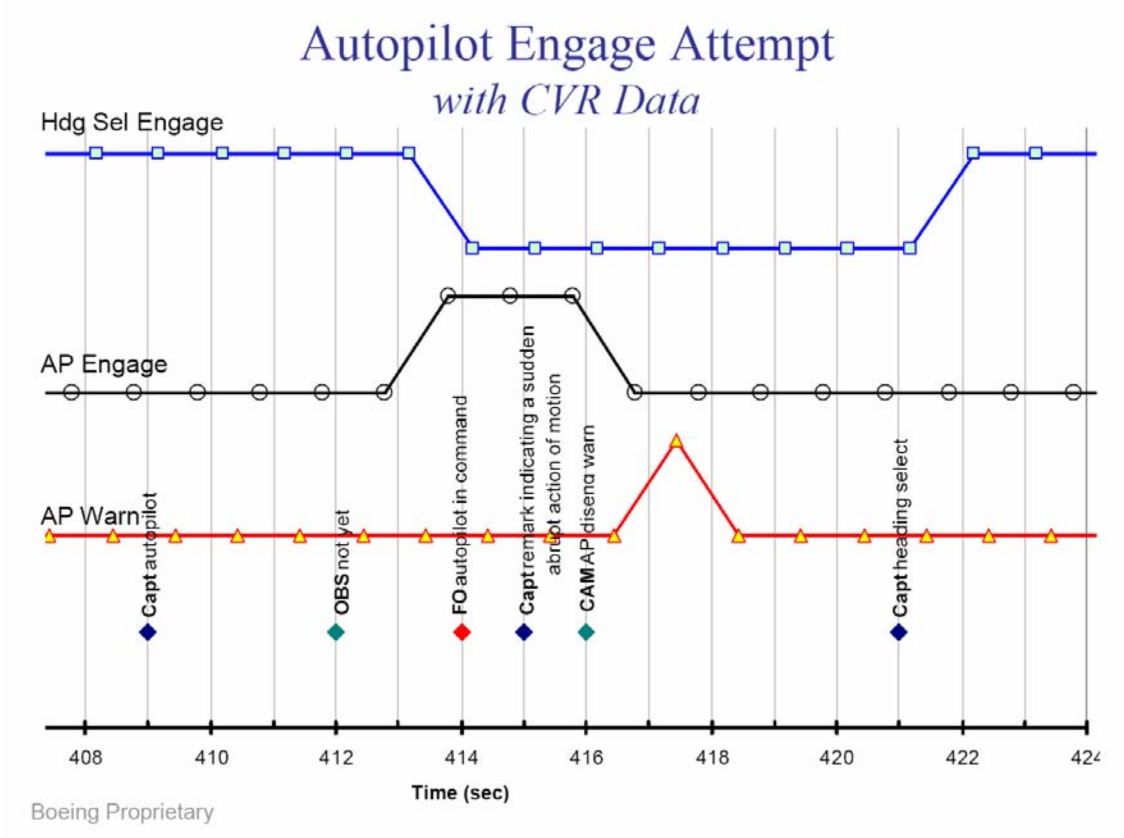
	Pre-Engage	Engage Hold
Condition	Prevent Engage	Cause Disengage
Pitch CWS force greater than 5 lbs	X	
Roll CWS force greater than 2.25 lbs	X	
Elevator Detent Pressure Switch Indicates Pressurized	X	
Aileron Detent Pressure Switch Indicates Pressurized	X	
Auto Stab Trim Cutout Switch in Cutout	X	X
Both Flap Switches and Stab Trim Motor don't agree as Flaps Up or as Flaps Down	X	X
Main Electric Trim Switch Activated	X	X
Aileron Force Limiter position does not agree with Flaps UP or Flaps Down	X	X
CAS Invalid	X	X
Uncorrected Altitude Invalid	X	X
26 VAC 400 Hz Invalid	X	X
MCP to FCC Bus Invalid	X	X
Pitch Angle Invalid	X	X
Pitch Rate Invalid	X	X
Roll Angle Invalid	X	X
Roll Rate Invalid	X	X
Baro Altitude Invalid (Prevents CMD only)	X	X
Elevator Detent Pressure Switch Indicates Non-Pressurized		X
Aileron Detent Pressure Switch Indicates Non-Pressurized		X
(Magnetic Heading OR TAS Invalid) AND (Roll CWS) AND (Bank Angle <8 degrees)	X	X


Autopilot Engage Logic
Failure to Sync or Pressurize Scenarios
CMD light ON
1-Failure to synchronize 4.0 sec
2-sync in 0+ sec but fails to pressurize 3.5 sec
3-sync in 4- sec but fails to pressurize 7.5 sec
Sync & Pressurize
Pre-Engage Interlocks
Engage Hold Interlocks
0 1 2 3 4 5 6 7 8
Engage
Boeing Proprietary

Autopilot Engage Attempt- with Time Aligned Data

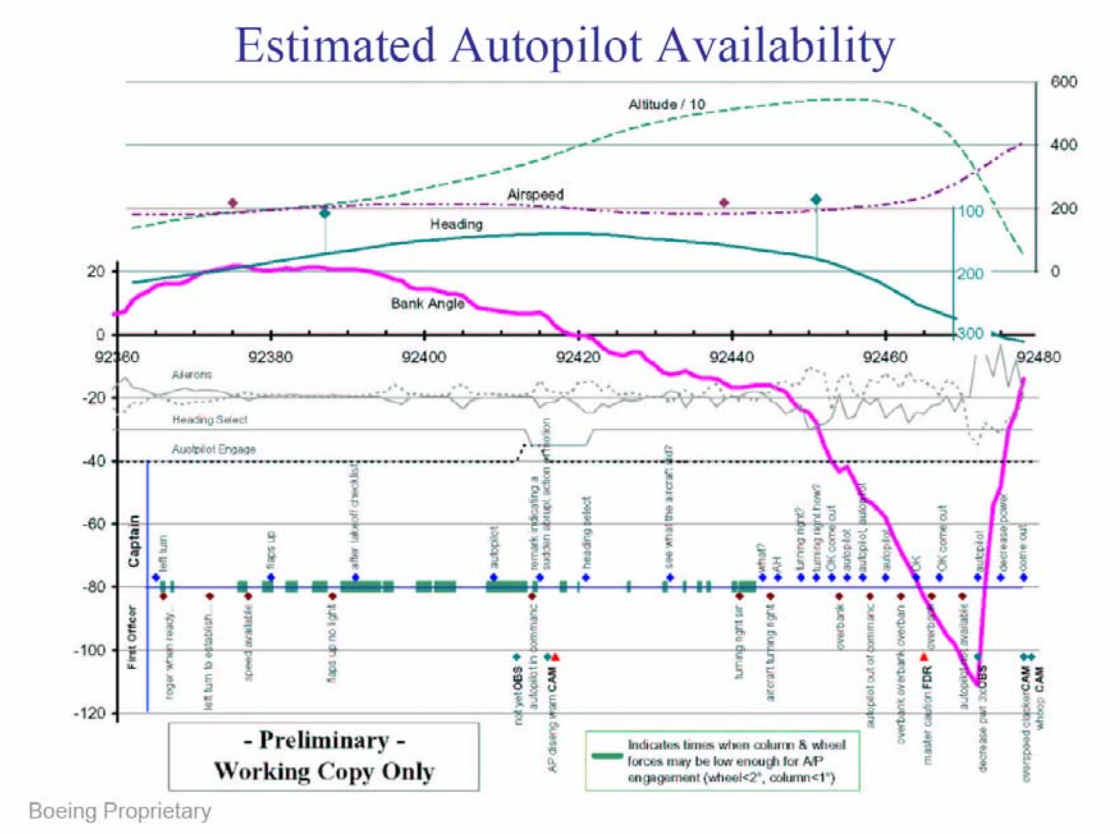


Autopilot Engage Attempt- with CVR Data



Note:
The recording "not yet" at 412 seconds is attributed to the captain and not to the observer.

Estimated Autopilot Availability



Boeing Proprietary

AP Actuator description and Scenario 12 info b.pdf, AP Actuator description and Scenario 12 info 2.ppt

Boeing Proprietary information and will not be available for public use

Scenario 12 ver 2.ppt (Rev - 3 Feb 05)

Boeing Proprietary information and will not be available for public use

Honeywell SP-300 DFCS B737-300.ppt

Honeywell Proprietary information and will not be available for public use

Flash Airlines Presentation SP-300 DFCS Health Monitoring Honeywell.ppt

Honeywell Proprietary information and will not be available for public use

1.16.1.10. Flash Airlines AI236 RAM Simulator Configuration (Flash Airlines AI236 RAM Simulator Configuration.htm, Program_Pins.pdf)

RAM FULL FLIGHT SIMULATOR

Subject: Request Configuration of RAM 737-500/400 Training simulator

Reference: (a) Email from Capt. Shaker Kelada, Egyptian Ministry of Civil Aviation, to xxxxxxxxx dated
26 May 2005.

The simulator was agreed by Egyptian authority (CAA Egyptian) on the 9 Mai 2003 for Flash airlines use. The simulator was used by flash airlines on dry lease, the instructor was flash airlines instructor.

Simulator configuration:

INITIAL CERTIFICATION: FAA AC 120-40 LEVEL D
ACTUAL CERTIFICATION « JAR STD 1A LEVEL D » BY FRENCH AUTHORITY (DGAC) AND MOROCAIN AUTHORITY (DAC). Also agreed by all users authority like Tunisian, Jordanian, Senegalian, JAT Airlines

→ Simulateur Manufacturer: CAE Electronics LTD
→ In service Date : 1993
→ Master Aircraft : B.737-500 Convertible to B.737-400
→ APU : GTCP36-28 (B) Garette
→ Basic Engine Data : CFM 56B2 - CFM 56C1
→ AFCS : Honeywell MCP 4051601-937
→ EFIS : Collins P/N 622-9436-1014
→ Flight Management System : Smith industries P/N: 168925-06-01
→ Host computer : IBM Risc 6000
→ Motion & Control loading : Hydrostatic actuators with digital control electronics and 6 axis

TCAS – CFIT - Windshear warning system – Low visibility (CAT I- II –III) – ATIS – GPWS

VISUAL VITAL VII

→ Visual System Manufacturer : Flight Safety (V S S).
→ Computer : Motorola SMM 1467.
→ Type of Image Generator : Vital VII.
→ Type of Display : Wide (FOV) 150x40 degre.
→ Illumination Level : Day / Bright Day / Dusk / Night.

INSTRUCTOR STATION

→ Computer : 2 Computers Iris 4D25.
→ Display : 2 CRT / Touch Screen
→ Printer : Color hardcopy unit.
→ Training Aids : Wind, Wind shear (16 Profils), Rec & Instant replay, FMC copy, Camera, video tape recorder, lesson plan

EFIS CUSTOMER OPTIONS:

EADI FORMAT	: EUROPEAN - BASIC
FAST SLOW/SPEED TAPE	: SPEED TAPE – FAST SLOW
F/S – G/S	: REVERSAL – NORMAL
SPEED TAPE	: REVERSAL – NORMAL

SPEED TREND VECTOR : DISABLE – ENABLE
SPEED TAPE CAS : CURSOR – ROLLING
MIN OP SPEED : ENABLE – DISABLE
G/S AND TAS DISPLAY : DLH – BASIC
EADI TAS DISPLAY : ENABLE – DISABLE
FD DISP SEL : FILLED INTEGRA C – INTEGRA C – SPLIT AXIS
FILLED AIRPLANE SYMBOL:
RA DISP SEL : ANA - ANA/RR
DIG - DIG /RR
PITCH LIMIT IND : DISABLE – ENABLE
H ALERT SEL : NO ALERT – 1000 FT
1500FT - 2500 FT
ILS DEVIATION: DISABLE – ENABLE
WARNING
DUAL CHANNEL ANN : DISABLE – ENABLE
COMPARATOR : ON – OFF
BLINKING COMPARATOR : DISABLE – ENABLE
EHSI SYMBOLOGY : SPERRY – BASIC
CENTER MAP : FULL ROSE – EXP ROSE
MAP ORIENTATION : HEADING UP – TRACK UP
VOL/ILS ORIENTATION : HEADING UP – TRACK UP
NAV/IRU POS DIFF : F/TIME DISP – FMC DISP
DISABLE
WIND BEARING : DISABLE – ENABLE
RANGE ARCS : DISABLE – ENABLE
WXR TURB COLOR : MAGENTA – RED
ADF POINTERS MAP : DISABLE – ENABLE
ADF INSTL : SINGLE LEFT – SINGLE RGT
DUALE - NONE

ENGINE: **20.000 LB**
22.000 LB
23.500 LB
18.500 LB

GPWS CUSTOMER OPTIONS:

WINDSHEAR ALGORITHM: ENABLE – DISABLE

ALTITUDE CALL OUTS: ENABLE – DISABLE
INCLUDE ‘BANK ANGLE – BANK ANGLE ‘when bank angle exceeds 35, 40 and 45 degrees.

ALTITUDE CALL OUTS SEL ID: ………….

VOICE MENU SEL:

ENVELOPE MODULATION: ENABLE – DISABLE
FMC INPUT SELECTION: ENABLE – DISABLE
AUDIO LEVEL REDUCTION: ENABLE – DISABLE

FCC

The Flight Control Computer System of the B737 Classic is identified as Computer software Component (CSC)
This CSC will simulate the flight Control computer and will consist of the xxxxSL, xxxxSP, xxxxSR, xxxxSC, xxxxST modules called up by the synchrnous dispatcher as entry points SLOGIC, SPITCH,SROLL, SCOMP, SINT and STRIM.

1.16.1.10. Boeing response to raised questions.doc

References

17833 (B-H200-17833-ASI 12 Feb 2004).pdf

CairoMarch04Slides (March Progress Meeting - Cairo).pdf

17848 (B-H200-17848-ASI 04 March 2004).pdf

Cairo March 04 Autopilot Flash 737 March Progress Meeting Flash 737 March Progress

Flash Airlines Autopilot Answer to Questions - 31 Jan 2005.ppt

Answers to question_cairo meeting05.ppt

Action Item Response.ppt (Cairo meeting, 1-30-05 to 2-2-05)

1.16.1.11. Boeing response to raised questions.doc

17833 (B-H200-17833-ASI 12 Feb 2004).pdf

Responses to Airplane System Queries
Flash Airlines 737 SU-ZCF Accident at Sharm el Skeikh – 3 Jan 04

Questions from the MCA on 25 Jan 04

A1) Why did the autopilot disengage?
Answer: *There are three possible reasons why the autopilot disengaged: the engage synchronization (actuator to surface) failed to complete; the engage hold interlocks were not satisfied; or it was manually disconnected. Based on the data recorded on the FDR, we are not able to pinpoint which of these caused the autopilot to disengage. Additional information on the details of the interlocks and their operation are provided in the Airplane Maintenance Manual section 22-11-01.* ①

A2) What is the effect of hydraulic systems failures on the flight controls?
Answer: *The hydraulic system arrangement for the 737-300 flight controls is provided in the attached figure. This figure shows which functions would be lost in the event of either an A or B hydraulic system failure.*

A3) What does the FD command? Roll rate? Bank angle?
Answer: *The Flight Director (FD) provides a bank angle command that is primarily a function of selected heading, airplane heading, airplane roll angle, and airplane roll rate.* ①

A4) Please provide the FMEA for the 737-300 autopilot and flight controls related to the roll axis.
Answer: *The following documents were mailed to the NTSB, MCA and BEA:*
D6-14070 737-300 Lateral Failure Analysis (7MB)
D6-37432 737-300 Autopilot Failure Analysis (20MB)

A5) What does the flight director do when the airplane bank angle exceeds the selected bank angle limit?
Answer: *It will produce a command to fly back to the desired bank angle.* ①

A6) What does the flight director do when the airplane roll rate exceeds the intended roll rate?
Answer: *It will produce a command to fly back to the desired bank angle.* ①

---

① We are preparing additional and more detailed technical information about the operation of the autopilot, flight director, and lateral control systems which will be available for discussion during the next progress meeting in Cairo.

Responses to Airplane System Queries
Flash Airlines 737 SU-ZCF Accident at Sharm el Skeikh – 3 Jan 04

A7) What are the aileron travel rates with various hydraulic system availability?
Answer: *The aileron PCUs are significantly oversized. Because of this, aileron travel rates are not a function of hydraulic system availability - i.e. aileron travel rates are not significantly different whether either or both hydraulic system is pressurized. For reference, the no load rate is approximately 54 degrees per second of aileron.*

A8) How is Selected Heading recorded on the FDR if it is being turned while the knob is being moved)
Answer: *The FCC transmits the selected heading value to the DFDAU at a rate of 20 times per second. The DFDAU then takes the latest value once each 64 seconds and sends it to the DFDR for recording. Thus, if selected heading is dynamically changing when the once-per-64-seconds sample is taken, it will record the selected heading value at the time the sample was taken.*

A9) Is the hydraulic pump capable of outputting 5000 psi of pressure?
Answer: *The following two failures are required in order to reach 5000 psi: /1/ the pump compensator is failed open (full flow), and /2/ the system relief valve failed closed. For the hydraulic system pressure display, in-range is considered to be from -100 to 4,100 psi, so 5000 psi would be out of range. If the system were to actually go to 5000 psi, the affected hydraulic pressure display (on the EIS) would slew to its lower stop; hold for 2 seconds then the pointer would disappear and dashes would appear in the display.*

A10) What caused the Master Caution discrete late in the flight?
Status: *The Master Caution discrete occurs at time 92465 in the FDR data file received by Boeing. There are over 40 inputs that could have caused this discrete to be set. We are still evaluating the possible causes of the setting of this discrete, and expect to have an update for the next progress meeting in Cairo. We did notice that the Master Caution discrete was set several times on previous flights. Airplane records, such as technical log entries, may record the reason for previous Master Caution events. These records may help isolate why the Master Caution was set at time 92465 in the accident flight.*

---

① We are preparing additional and more detailed technical information about the operation of the autopilot, flight director, and lateral control systems which will be available for discussion during the next progress meeting in Cairo.

Responses to Airplane System Queries
Flash Airlines 737 SU-ZCF Accident at Sharm el Skeikh – 3 Jan 04

B1) Correlation between control inputs and flight control surface deflections, with special emphasis on the inconsistency of control wheel and aileron surface deflection as indicated by the FDR.
Answer: *A kinematic consistency check and a simulator proof-of-match is being accomplished on the accident data at Boeing. This work is still in progress; however, we have been able to make a few observations on the bias in control wheel position. There is a bias in control wheel position that shifts over time, and possibly a scaling issue. Both issues are being further analyzed for possible explanations.* ①

B2) Investigate the changes in aileron deflection bias.
Answer: *The changes in aileron position bias are caused by the airload on the aileron reacting against the cable run in the wing between the aileron and aileron PCU. The bias in aileron position is due to aileron hinge moment which varies as a function of airspeed.* ①

B3) Investigate the cause(s) for the autopilot disconnect.
Answer: *See response to question A1.*

B4) Investigate the cause for HDG SEL disengage when the autopilot was engaged.
Answer: *If the FD command is greater than 7 degrees at the time autopilot engagement is attempted, the roll mode will change from HDG SEL to CWS. According to the FDR data, this seems consistent with the probable flight director command which existed when A/P engagement was initiated.* ①

B5) Investigate the possible failure modes of the Flight Director indicator.
Status: *This is being researched. We will have some preliminary data available to discuss during the next progress meeting in Cairo.* ①

---

① We are preparing additional and more detailed technical information about the operation of the autopilot, flight director, and lateral control systems which will be available for discussion during the next progress meeting in Cairo.

Responses to Airplane System Queries
Flash Airlines 737 SU-ZCF Accident at Sharm el Skeikh – 3 Jan 04

B6) Investigate availability of autopilot during the captain's requests for "autopilot, autopilot".
Answer: *The autopilot will not initiate the engage sequence if the A/P engage interlocks are not satisfied (ref AMM 22-11-01 page 54). If the engage interlocks are not satisfied, the attempt to engage (A/P button push) will not be recorded on the FDR. In the case of the accident flight it's possible that forces on the column or wheel prevented the engage logic from being satisfied. Additional information on the details of the interlocks and their operation are provided in the Airplane Maintenance Manual section 22-11-01.* ①

B7) Investigate the effect of flight control surface failures for surfaces like spoiler deflections that are not recorded on the FDR.
Answer: *The effects of various spoiler failures are being examined using kinematic simulations. These results are expected to be available for the next progress meeting in Cairo.*

Observations on EGT and Engine Oil Pressure Parameters

During the work in Cairo, it was noted that the EGT and engine oil pressure parameters did not appear to be working properly for either the left or right engines. All four of these parameters are defined in D6-55333 Appendix B and are found in word 61 of the 737-2 data frame, along with a number of other parameters which occupy the same locations. There are several variants of the 737-2 data frame depending upon whether the airplane is equipped with an electronic engine instrument system (EIS) or an electronic flight instrument system (EFIS). The subject airplane, SU-ZCF, was equipped with both and the resulting data frame variant is informally referred to as the 737-2EE data frame. Appendix B lists all variants of the data frame, including the multiple parameters that can be stored in word 61. The order of data selection, e.g. which parameters are actually to recorded in word 61, is provided in the general notes of appendix B. In this case, the EFIS parameters have priority over the EIS parameters and EGT and engine oil pressure are not recorded. Thus, the attempted conversion of word 61 into EGT and engine oil pressure is not appropriate in the 737-2EE data frame. In the 737-2EE data frame, word 61 is used for a number EFIS mode selection discretes, which appear to be recorded properly on the FDR.

① We are preparing additional and more detailed technical information about the operation of the autopilot, flight director, and lateral control systems which will be available for discussion during the next progress meeting in Cairo.

CairoMarch04Slides (March Progress Meeting - Cairo).pdf, 040301 Flash 737 Cairo Mtg (public release version).pdf

Lateral System-answers to questions

A2) What is the effect of hydraulic systems failures on the flight controls?

Answer: The hydraulic system arrangement for the 737-300 flight controls is provided in the attached figure. This figure shows which functions would be lost in the event of either an A or B hydraulic system failure.

A7) What are the aileron travel rates with various hydraulic system availability?

Answer: The aileron PCUs are significantly oversized. Because of this, aileron travel rates are not a function of hydraulic system availability. i.e. aileron travel rates are not significantly different whether either or both hydraulic system is pressurized. For reference, the no load rate is approximately 54 degrees per second of aileron.

B1) Correlation between control inputs and flight control surface deflections, with special emphasis on the inconsistency of control wheel and aileron surface deflection as indicated by the FDR.

Answer: A kinematic consistency check and a simulator proof of match is being accomplished on the accident data at Boeing. This work is still in progress, however, we have been able to make a few observations on the bias in control wheel position. There is a bias in control wheel position that shifts over time, and possibly a scaling issue. Both issues are being further analyzed for possible explanations. ①

B2) Investigate the changes in aileron deflection bias.

Answer: The changes in aileron position bias are caused by the airload on the aileron reacting against the wing cable run between the aileron and aileron PCU. Therefore, the bias in aileron position is due to aileron hinge moment which varies as a function of airspeed. ①

B7) Investigate the effect of flight control surface failures for surfaces like spoiler deflections that are not recorded on the FDR.

Answer: The effects of various spoiler failures are being examined using the Boeing simulation. These results are expected to be available for the next progress meeting in Cairo.

Autopilot - Answers To Questions

A1) Why did the autopilot disengage?

Answer: There are three possible reasons why the autopilot disengaged: the engage synchronization (actuator to surface) failed to complete; the engage hold interlocks were not satisfied; or it was manually disconnected. Based on the data recorded on the FDR, we are not able to pinpoint which of these caused the autopilot to disengage. Additional information on the details of the interlocks and their operation are provided in the Airplane Maintenance Manual section 22-11-01 . ①

B3) Investigate the cause(s) for the autopilot disconnect.

Answer: See response to question A1.

B6) Investigate availability of autopilot during the captain's requests for "autopilot, autopilot".

Answer: The autopilot will not initiate the engage sequence if the A/P engage interlocks are not satisfied (ref AMM 22-11-01 page 54). If the engage interlocks are not satisfied, the attempt to engage (A/P button push) will not be recorded on the FDR. In the case of the accident flight it's possible that forces on the column or wheel prevented the engage logic from being satisfied. Additional information on the details of the interlocks and their operation are provided in the Airplane Maintenance Manual section 22-11-01. ①

FD-answers to questions

A3) What does the FD command? Roll rate? Bank angle?

Answer: The Flight Director (FD) produces a roll and roll rate command to zero the error between the selected heading and the magnetic heading. ①

A5) What does the flight director do when the airplane bank angle exceeds the selected bank angle limit?

Answer: It will produce a command to fly back to the desired bank angle. ①

A6) What does the flight director do when the airplane roll rate exceeds the intended roll rate?

Answer: It will produce a command to fly back to the desired bank angle. ①

A8) How is Selected Heading recorded on the FDR if it is being turned while the knob is being moved)

Answer: The FCC transmits the Hdg Sel value to the DFDAU at a rate of 20 times per second. The DFDAU then takes the latest value once each 64 seconds and sends it to the DFDR for recording. Thus, if Hdg Sel is dynamically changing when the once-per-64-seconds sample is taken, it will record the Hdg Sel value at the time the sample was taken.

B4) Investigate the cause for Hdg Sel disengage when the autopilot was engaged.

Answer: If the FD command is greater than 7 degrees at the time autopilot engagement is attempted, the Heading Select mode will be reset and the roll mode will default to CWS. According to the FDR data, this seems consistent with the probable flight director command which existed when A/P engagement was initiated. ①

Other-answers to questions

A4) Please provide the FMEA for the 737-300 autopilot and flight controls related to the roll axis.

Answer: The following documents were mailed to the NTSB, MCA and BEA:
D6-14070 737-300 Lateral Failure Analysis (7MB)
D6-37432 737-300 Autopilot Failure Analysis (20MB)

A9) Is the hydraulic pump capable of outputting 5000 psi of pressure?

Answer: The following two failures are required In order to reach 5000 psi: /1/ pump compensator failed open (full flow), and /2/ system relief valve failed closed. For the hydraulic system pressure display, in-range is considered to be from -100 to 4,100 psi, so 5000 psi would be out of range. If the system were to actually go to 5000 psi, the affected hydraulic pressure display (on the EIS) would slew to it's lower stop; hold for 2 seconds then the pointer would disappear and dashes would appear in the display.

A10) What caused the Master Caution discrete late in the flight?

Status: The Master Caution discrete occurs at time 92465 in the FDR data file received by Boeing. There are over 40 inputs that could have caused this discrete to be set. We are still evaluating the possible causes of the setting of this discrete, and expect to have an update for the next progress meeting in Cairo. We did notice that the Master Caution discrete was set several times on previous flights. Airplane records, such as technical log entries, may record the reason for previous Master Caution events. These records may help isolate why the Master Caution was set at time 92465 in the accident flight.

Displays-answers to questions

B5) Investigate the possible failure modes of the Flight Director indicator.

Status: This is being researched. We will have some preliminary data available to discuss during the next progress meeting in Cairo.

Enclosure to B-H200-17848-ASI

Responses to Queries
Flash Airlines 737 SU-ZCF Accident at Sharm el Skeikh – 3 Jan 04

Questions from 1 March 04

1) How is drift angle matched in KINCON with corrected accelerations?
Response: Wheel-well based accelerometer data recorded on the FDR are integrated and converted into a ground speed vectors and altitude. Using IRU information, the ground speed vectors are converted into a drift angle and ground speed. The calculated altitude, drift angle and ground speed are then compared to the recorded altitude and the FMC's recorded drift angle and ground speed. Differences between the two sets of data are minimized by calculating a unique but constant acceleration bias for each axis. The biases are then applied to the recorded accelerometer data. The biases were calculated based on minimizing the error over the entire accident flight.

2) With the simulator match data vs FDR data, at the end of the flight when rolling back towards wings level, time 92470 thru the end of data, why does the FDR data show the oscillatory motion, but the simulator match does not?
Response: The simulator match is an iterative process in which the difference between the simulator behavior and the recorded FDR data is used as a feedback (with a specific gain) to revise the simulator control inputs. In general, a lower gain produces smoother control inputs (lower frequency content) while a higher gain is required to match highly dynamic maneuvers, but can produce significant noise. The gain used in this iteration was chosen to best match the behavior in the time period from 92337 to 92470. Increasing the gain to match the highly dynamic portion of the flight after time 92470 would have introduced significant noise into the earlier portion of the simulation.

3) From FDR time 92470 thru the end of data, are the aileron rates seen on the FDR within the capability of the system (i.e. is it real)?
Response: Yes, the aileron rates seen at the end of the FDR data are within the capability of the system.

4) With respect to the FDR recorded wheel position data, the wheel bias in the air, just after takeoff, is different on the accident flight than the previous flight, Why?
Response: The bias in the recorded control wheel signal appears to change on numerous occasions. As noted in the earlier presentation material, the bias changes during the control wheel sweep prior to every takeoff. In addition, the bias appears to change during every climb out, typically between takeoff and flaps up. Furthermore, the bias also appears to change just prior to landing, either during descent or approach. See attached slides that show the changing wheel bias for the accident flight and the previous flight. Similar behavior is noted in all flights, including the first recorded landing, control sweep and takeoff from Abu Simbel. The behavior of the recorded FDR wheel signal appears consistent with a slipping synchro body.

Responses to Queries
Flash Airlines 737 SU-ZCF Accident at Sharm el Skeikh – 3 Jan 04

5) What equation is Boeing using to convert raw data into EU for Wheel Position?
Response: The conversion steps are as follows:

1. *The raw data is first converted to a signed quantity using two's complement.*
2. *The signed counts (C) are converted to synchro degrees (S) using the formula: S = C * 360 / 1024*
3. *The synchro degrees (S) are converted to degrees of wheel (W) using the formula: W = S * 150.7663958 / 180*

Additional Information: The control wheel sensor on this airplane is a synchro. The synchro signal is interpreted by the FDAU and passed to the flight recorded as counts. Different FDAUs interpret the synchro signal differently. SU-ZCF was equipped with a Sundstrand FDAU which interprets the synchro linearly. Other FDAU's (e.g. Teledyne) use a non-linear interpretation of synchro data. For Sundstrand FDAU's (and any other that interprets synchros linearly), the correct conversion for wheel data is a linear one such as the one shown above in step 2. For a Teledyne FDAU, a non-linear conversion is required. This conversion is built into the RAPS program and is called "dc_TELEDYNE_SYNCHRO". It would not be appropriate to use this function for converting data from a Sundstrand FDAU, such as the SU-ZCF data. In examining the FFD file provided, it appears that this function is being used to convert control wheel data. This conversion will introduce some errors as shown in the attached plots.

The MCA also provide a sheet of paper titled "Analog Signal Description" dated 24 May 1991, with the notation "Project BS7372". The data in this sheet appears to match the D6-55333 data for the 737-2 data frame with 2 exceptions:

D6-55333 defines control wheel as a 10 bit signal. BS7372 lists the signal as a 12 bit signal. The lower two bits of the actual dataframe are used to discrete bits. If both these bits are set, than a wheel position error of ~0.22 degrees will result.

The scaling of the BS7372 differs by a small amount from that of D6-55333. Note: The BS7372 sheet lists separate "Breakpoints" in the data. These "break points" exist to account for the signed nature of the signal (it wraps around from maximum counts back to zero). The function of the "break point" in the BS7372 data is accomplished by the two's complement function listed above and that also exists in the RAPS conversion listed in the FFD file provided.

Responses to Queries
Flash Airlines 737 SU-ZCF Accident at Sharm el Skeikh – 3 Jan 04

6) Please provide a schematic showing the dual concentric control valve in the aileron PCU, and how it attaches to the PCU input rod.
Response: Schematics provided.

7) What bias springs are present on the PCU valve, and which direction are they biased?
Response: Schematics provided.

8) Is there any delay between the time the autopilot is disconnected and when the disconnect warning is issued.
Response: The MCP monitors the CMD and CWS discretes from the FCC and immediately sets the warning (light and aural) when an autopilot disconnect is detected.

9) What method does Boeing use to perform differentiation on flight data? Is there software available for purchase, or what is our algorithm?
Response: Without knowing the specifics of the differentiation in question, we can provide a very general answer. Because of the inherent noise associated with differentiation, Boeing tends to avoid differentiation of recorded signals where possible. In some cases, when differentiation is required, we have first modeled the recorded data with a curve fit known to have continuous derivatives and then performed the differentiation on the fitted curve. In other cases, it is possible to take advantage of the known behavior of specific physical quantities and required relationships between different recorded signals when differentiation is required.

Questions from 2 March 04

1) Relative to the photo at time 92415, does the "CMD" and "CWS R" text appear on the EADI immediately when the cmd button is pushed or does it wait until the FCC has completed sync & pressurize (i.e. connected to system)?
Response: Immediately when CMD is received from the MCP (button push or paddle lift) the FCC retransmits it to the EFIS processor for display on the EADI.

2) Would the roll FD bar really disappear when Hdg Sel was re-set during AP engage. The photo shows the bar gone because Hdg Sel had reset.
Response: Yes, the FD bar will be biased out of view in this situation.

3) How does CWS R mode work?
Response: In CWS R, the autopilot will enter Heading Hold if the bank angle is less than or equal to 8 degrees or Bank Angle Hold if bank angle is greater than 8 degrees (if bank angle is greater than 30 it will return the airplane to 30).

Responses to Queries
Flash Airlines 737 SU-ZCF Accident at Sharm el Skeikh – 3 Jan 04

4) Relative to the photo at time 92470, does the EADI have the feature that forces the blue/brown line to always be present, even in unusual attitudes?
Response: Yes, the forced blue/brown interface is present unless pitch attitude exceeds 85 degrees (up or down), at which point it is removed.

Question /4/

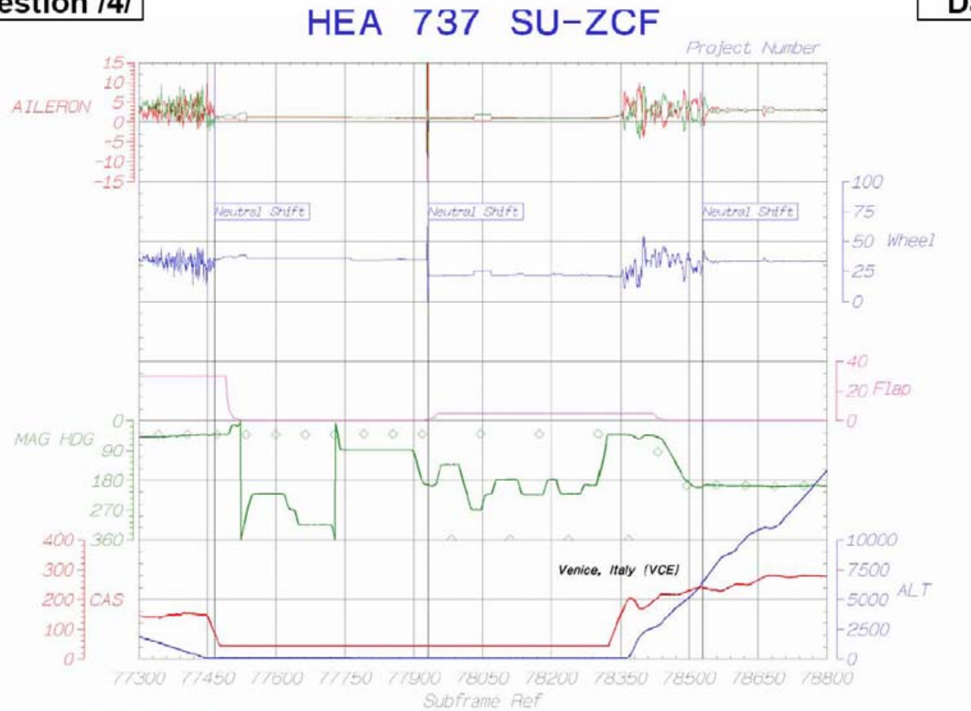
Day 1

Wheel bias shifts during landing at SSH, control sweep on ground at SSH, and takeoff on accident flight from SSH.

Boeing Proprietary

Question /4/

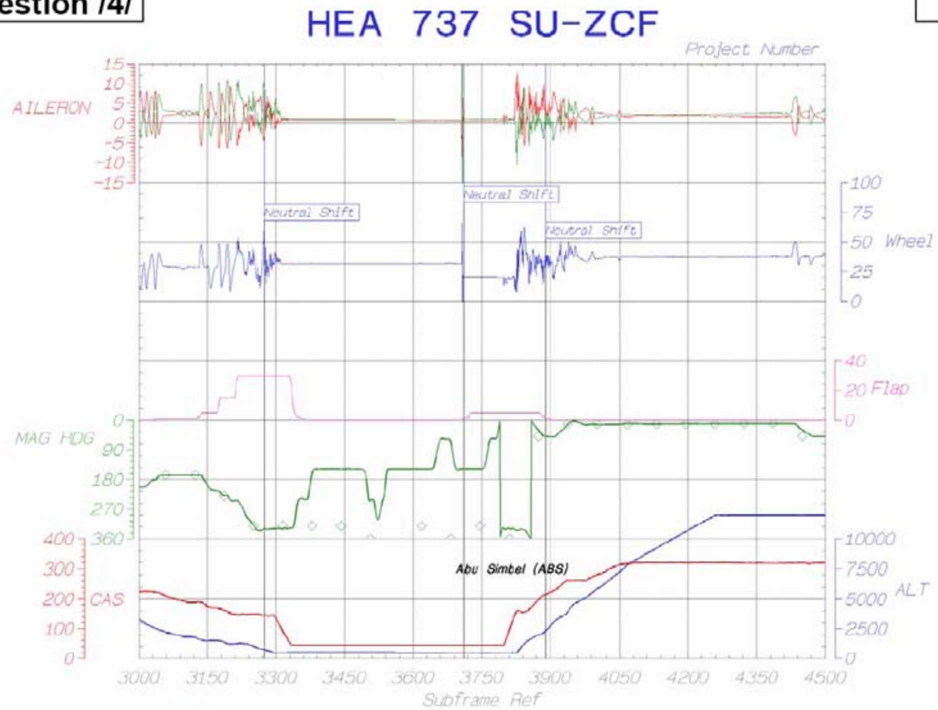
Day 1



Wheel bias shifts during landing at VCE, control sweep on ground at SSH, and takeoff on previous flight from VCE.

Boeing Proprietary

Question /4/ **Day 1**

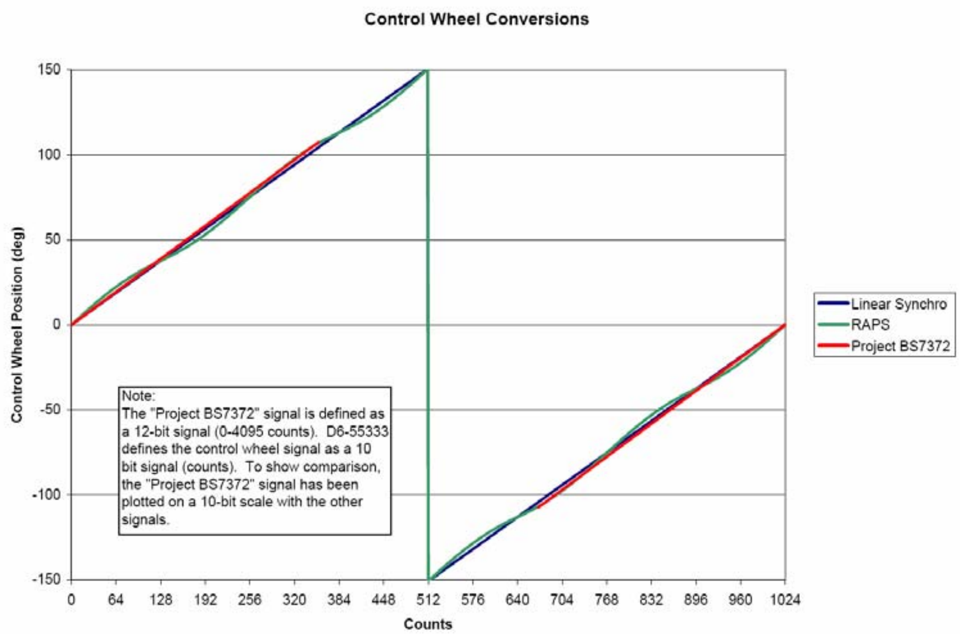


Wheel bias shifts during landing at ABS, control sweep on ground at ABC, and first recorded takeoff from ABS.

Boeing Proprietary

Question /5/

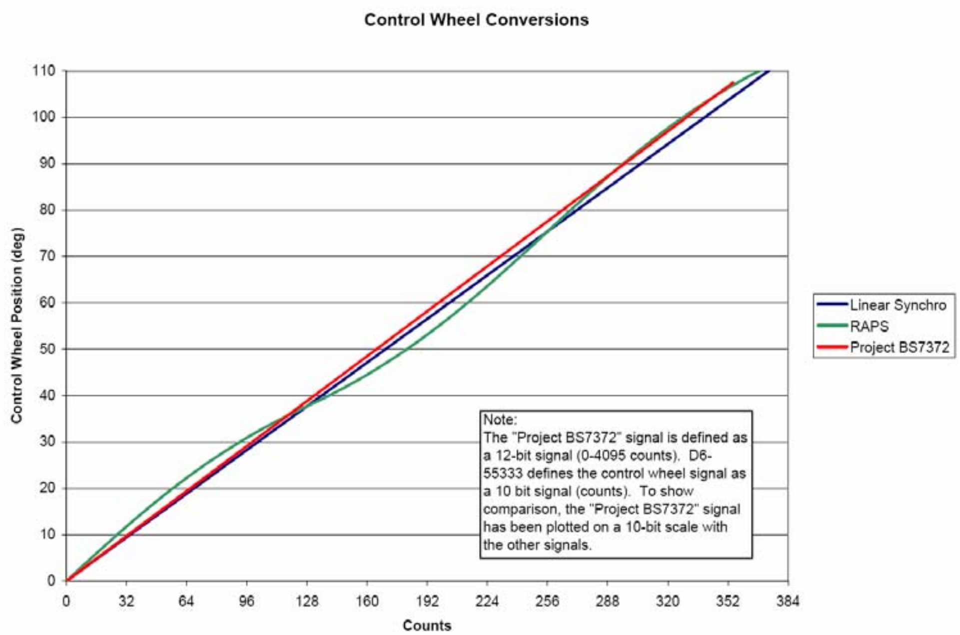
Day 1



Boeing Proprietary

Question /5/

Day 1



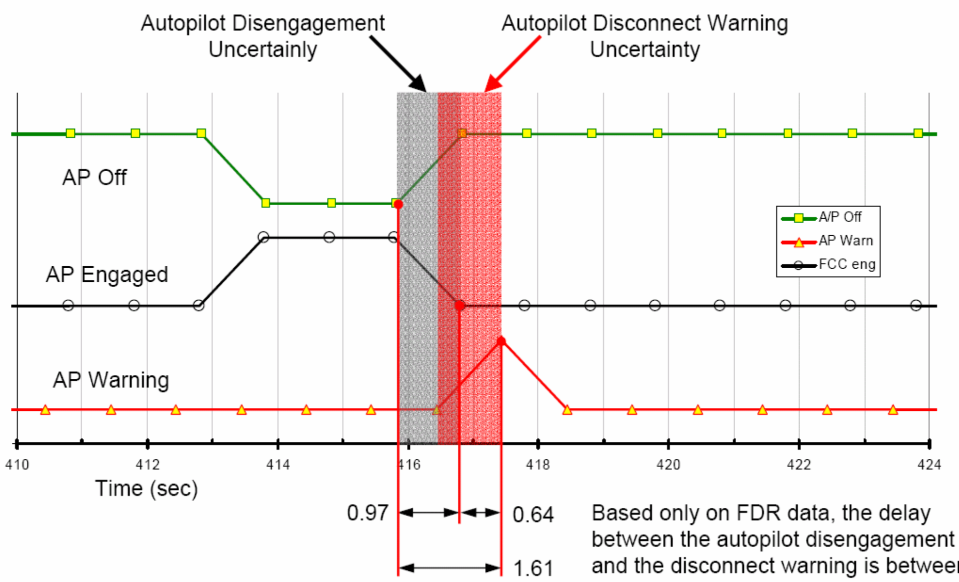
Boeing Proprietary

Question /8/

Day 1

Autopilot Disengagement

with Time Aligned Data



Based only on FDR data, the delay between the autopilot disengagement and the disconnect warning is between 0 and 1.61 seconds.

Autopilot - Answers To Questions

A1) Why did the autopilot disengage?

Answer: There are three possible reasons why the autopilot disengaged: the engage synchronization (actuator to surface) failed to complete; the engage hold interlocks were not satisfied; or it was manually disconnected. Based on the data recorded on the FDR, we are not able to pinpoint which of these caused the autopilot to disengage. Additional information on the details of the interlocks and their operation are provided in the Airplane Maintenance Manual section 22-11-01 . ①

B3) Investigate the cause(s) for the autopilot disconnect.

Answer: See response to question A1.

B6) Investigate availability of autopilot during the captain's requests for "autopilot, autopilot".

Answer: The autopilot will not initiate the engage sequence if the A/P engage interlocks are not satisfied (ref AMM 22-11-01 page 54). If the engage interlocks are not satisfied, the attempt to engage (A/P button push) will not be recorded on the FDR. In the case of the accident flight it's possible that forces on the column or wheel prevented the engage logic from being satisfied. Additional information on the details of the interlocks and their operation are provided in the Airplane Maintenance Manual section 22-11-01. ①

Answers to Questions from 31 Jan 2005 Meeting

- **Q 1 – What can occur during the A/P engage sequence or after that would cause an aileron command change of 2.91 degrees during R CWS?**

1. **Input from wheel/force sensors**
   - **Pilot command**
   - **Force sensor failure (CWS command rate to be evaluated against change)**
2. **Heading Hold submode entered**
   - **Requires Roll Angle < 6 deg**
   - **FDR data = -6.7 deg at autopilot engage in left IRU, right IRU used and data not known**
   - **FDR aileron rates are above the A/P CWS command rates for Heading Hold**
3. **Misrigging or Failure of Quadrant Position Sensor or Actuator LVDT**
   - **Actuator LVDT position information continuously monitored for failures**
   - **Results in successful A/P synchronization when sensors match but surface and actuator to do match mechanically**
   - **A/P operation did not reflect this in previous flights**

Answers to Questions from 31 Jan 2005 Meeting

- **Q2 – Provide better description of engage "jolt" for scenario 13, Hypothetical Scenarios # 2**

  - **If this fault exists when the autopilot is trying to engage, the engagement may occur with minor wheel movement as the A/P piston would be coupled to the ailerons before the position synchronization is complete**

Note: In-flight engage operation may differ from on ground engage due to aerodynamic loading on control surfaces versus only gravitation forces on surfaces on ground

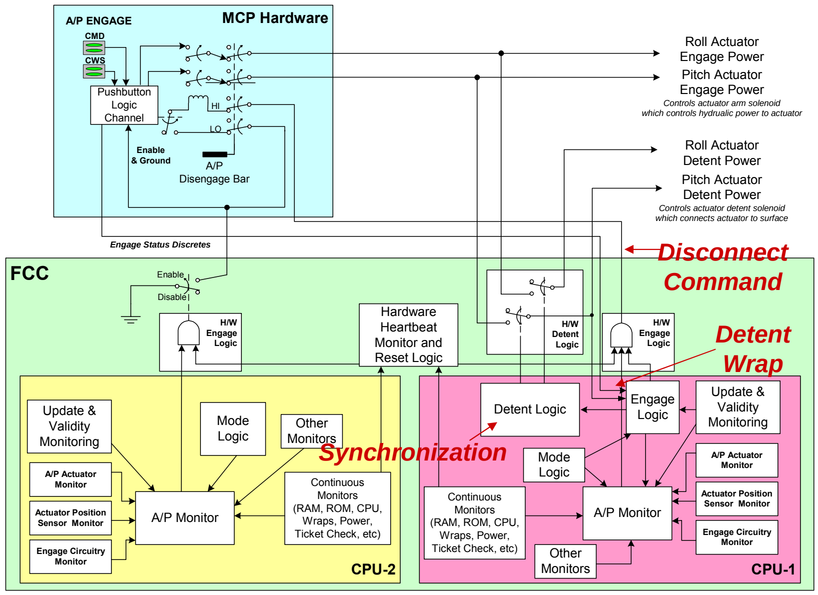
Answers to Questions from 31 Jan 2005 Meeting

- **Q3 – Provide minimum time for disconnect given immediate A/P synchronization with no detent pressure**
  - **FCC receives Local Command from MCP Engage Logic when the A/P CMD button is pressed**
    - **Running Time: Start**
  - **Detent Command logic detects synchronization and sets Aileron Detent Command output (100 ms delay)**
    - **Running Time : +100 ms**
  - **Engage Logic receives Aileron Detent Pressure Command Wrap (50 ms delay)**
    - **Running Time : +150 ms**
  - **Engage Logic does not receive valid Aileron Detent Pressure Switch data and removes power from MCP engage hardware, 3.5 ms delay)**
    - **Running Time : +3.65 seconds**
  - **MCP Engage Logic disconnect (minimum 45 ms, maximum 80 ms)**
    - **Running Time : +3.695 seconds**

Minimum Time to A/P Disconnect with No Detent Pressure: 3.695 seconds

Honeywell

Answers to Questions from 31 Jan 2005 Meeting



Honeywell

Answers to Questions from 31 Jan 2005 Meeting

- **Q4 – Provide relative probability for A/P disconnect given signal invalid in scenario 10 b.**

Item	*Interlock or Condition*	*Prevents Engage*	*Causes Disengage*	*Probability*	*Comment*
1	A/P Stab Trim Cutout Switch Normal	Yes	Yes	Unlikely	Pilot action or switch failure while A/P in CMD
2	Main Electric Trim Switches (not pressed)	Yes	Yes	Unlikely	Pilot must attempt manual trimming while A/P in CMD
3	A/P Stab Trim Motor Speed Interlock (10 sec)	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD
4	Aileron Force Limiter Authority Limit Interlock (10 sec)	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD
5	*Aileron Force Limiter Clutch - disengage*	*Yes*	*No*	*FDR Data rules out*	*This interlock is only used prior to A/P engage*
6	*Aileron Force Limiter Clutch - engage in 0.5 sec*	*Yes*	*No*	*FDR Data rules out*	*FDR recorded disconnect timing too long for this disconnect case*
7	A/P Disengage Switch	Yes	Yes	Possible	Pilot could have initiated disconnect
8	*A/P Aileron Hydraulic Pressure Switch - stuck in pressurized state*	*Yes*	*No*	*FDR Data rules out*	*This would have prevented initial engagement and, after engage, not be detectable until after disengage*
9	A/P Aileron Hydraulic Pressure Switch - pressure within 3.695 seconds after actuator detent solenoid engaged	No	Yes	FDR Data rules out	Minimum timing greater than FDR data by ~ 0.1 seconds
10	A/P Elevator Hydraulic Pressure Switch - stuck in pressurized state	No	Yes	FDR Data rules out	This would have prevented initial engagement and, after engage, not be detectable until after disengage

Legend:
- (blue) Possible cause
- (yellow) Unlikely cause
- (red) FDR Mismatch
- *Italic Text* Flight Condition Mismatch

Answers to Questions from 31 Jan 2005 Meeting

Item	Interlock or Condition	Prevents Engage	Causes Disengage	Probability	Comment
11	A/P Elevator Hydraulic Pressure Switch - pressure within 3.5 seconds after elevator actuator detent solenoid engaged	No	Yes	FDR Data rules out	Minimum timing greater than FDR data by ~ 0.1 seconds
12	115 VAC	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD
13	28 VDC Engage Interlock Power	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD
14	*Not (Foreign FCC In CMD And APP PB And Radio Altitude < 800 ft)*	*No*	*Yes*	*FDR Data rules out*	*This prevents engage only in approach mode*
15	FCC DC And FCC Power Supply	Yes	Yes	FDR Data rules out	FCC continued to provide data to FDR throughout the flight
16	1800 Hz Power Supply	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD
17	*Power Up Test Fails*	*Yes*	*No*	*FDR Data rules out*	*FCC continued to provide data to FDR throughout the flight*
18	Continuous Monitor(s) Fail	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD
19	A/P Only Continuous Monitor Valid	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD
20	*Less Than 3 lb Force On Control Wheel*	*Yes*	*No*	*FDR Data rules out*	*This only prevents engagement, will cause mode reversion to CWS with sufficient wheel force after A/P engage.*

Possible cause
Unlikely cause
FDR Mismatch
Italic Text Flight Condition Mismatch

Honeywell

Answers to Questions from 31 Jan 2005 Meeting

Item	Interlock or Condition	Prevents Engage	Causes Disengage	Probability	Comment
21	*Less Than 5 lb Force On Control Column*	*Yes*	*No*	*FDR Data rules out*	*This only prevents engagement, will cause mode reversion to CWS with sufficient column force after A/P engage*
22	Selected IRU Roll Angle Valid (norm - off side)	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD
23	Selected IRU Roll Rate Valid (norm - off side)	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD
24	Selected IRU Pitch Angle Valid (norm - on side)	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD and FDR recorded valid Left IRU data
25	Selected IRU Pitch Rate Valid (norm - on side)	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD and FDR recorded valid Left IRU data
26	*A/P to CMD and R/A <400 Ft with LOC and GS engaged*	*No*	*Yes*	*FDR Data rules out*	*Only causes disconnect in approach mode*
27	*F/D in TO or GA, R/A Alt <400 feet and A/P to CMD*	*No*	*Yes*	*FDR Data rules out*	*Only causes disconnect when TOGA mode selected*
28	ADC CAS Not Valid (except in dual channel operation)	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD and FDR recorded valid Left DADC data
29	IRU Transfer	No	Yes	Unlikely	IRS transfer must occur in 2 seconds while A/P in CMD
30	A/P Engage Switch Swap	No	Yes	FDR Data rules out	FDR data indicates FCC B was not in CMD or CWS during the flight

Possible cause

Unlikely cause

FDR Mismatch

Italic Text Flight Condition Mismatch

Honeywell

Answers to Questions from 31 Jan 2005 Meeting

Item	Interlock or Condition	Prevents Engage	Causes Disengage	Probability	Comment
31	ADC Corrected Baro Altitude Valid	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD and FDR recorded valid Left DADC data
32	ADC Uncorrected Baro Altitude Valid	Yes	Yes	Unlikely	Failure must occur during 2 seconds while A/P in CMD and FDR recorded valid Left DADC data
33	Local Power Bus Transfer	No	Yes	FDR Data rules out	No bus transfers in FDR data
34	Failure Of Aileron Axis To Synchronize	No	Yes	Unlikely	Disengage after 4 seconds of CMD
35	Failure Of Elevator Axis To Synchronize	No	Yes	Unlikely	Disengage after 4 seconds of CMD
36	(RCWS) and (Heading Hold (bank angle < 6 deg)) and (TAS Or Heading Invalid)	No	Yes	Unlikely	Only applicable to Heading Hold mode, Left IRS data showed 6.7 degrees Roll Angle from engage through disconnect

Possible cause
Unlikely cause
FDR Mismatch

Italic Text Flight Condition Mismatch

Answers to Questions from 31 Jan 2005 Meeting

- **Q5 – What are the causes for reversion of Heading Select mode to Roll CWS (Control Wheel Steering) when the A/P is engaged?**

1. Pressing the Heading Select pushbutton on MCP (when Heading Select mode active)

2. Applying greater than 10 lbs of wheel force after A/P is Engaged
   - A/P needs to be engaged in this case or the wheel force will prevent engagement

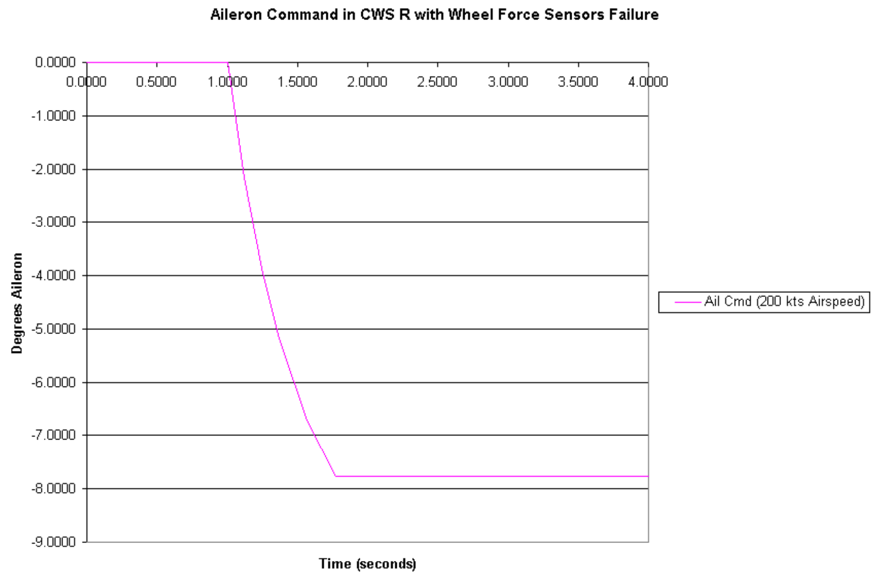
3. Losing True Airspeed (TAS) or Magnetic Heading validity
   - Validity can be lost prior to A/P engage attempt without affecting mode
   - Causes Roll F/D bias out-of-view (BOV) when A/P is not engaged
   - True Airspeed invalid will also cause Level Change to change to CWS P when A/P is engaged and Pitch F/D BOV when F/D On

4. F/D Bar Command greater than 7 degrees of bank error (Performance Assessment Monitor (PAM) invalid)
   - Based on FDR data, F/D bank error > 7 degrees was present for more than 9 seconds prior to A/P engagement

Answers to Questions from 2 Feb 2005 Meeting

- **What is the maximum rate of the Roll CWS command given a failure of the Wheel Force Transducer? (Scenario 9)**
  - **15.5 lbs maximum input into the Roll CWS control law based on hardware input scaling limit**
  - **Command is multiplied by scaling factors and lagged prior to output for a maximum steady state output of 7.64 degrees of aileron (limited by wheel limit) about 0.77 seconds after fault occurs**
  - **More than 3 lbs force sensor input prevents engagement, so failure in time sequence dependent with the 2.6 to 3.6 second CWS R engage period.**

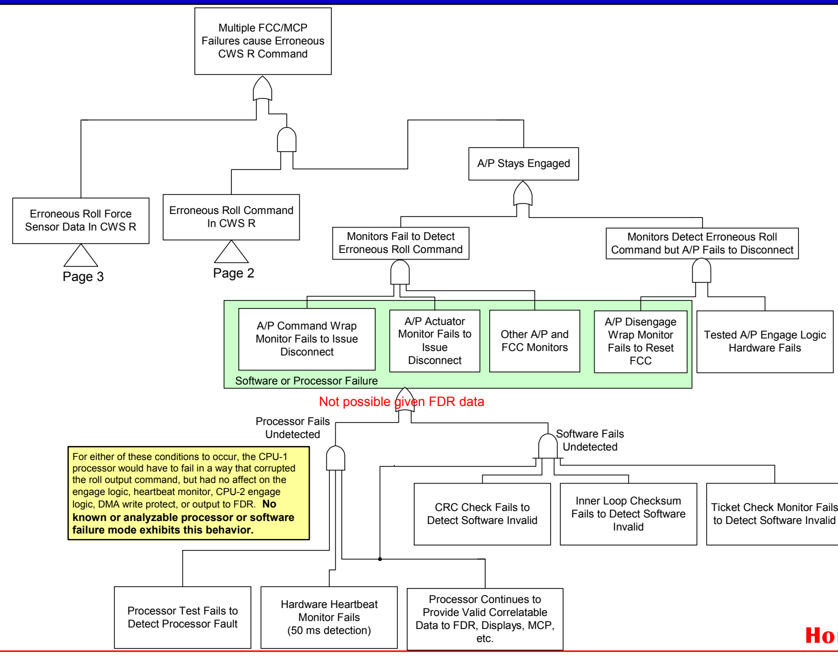
Answers to Questions from 2 Feb 2005 Meeting



Answers to Questions from 2 Feb 2005 Meeting

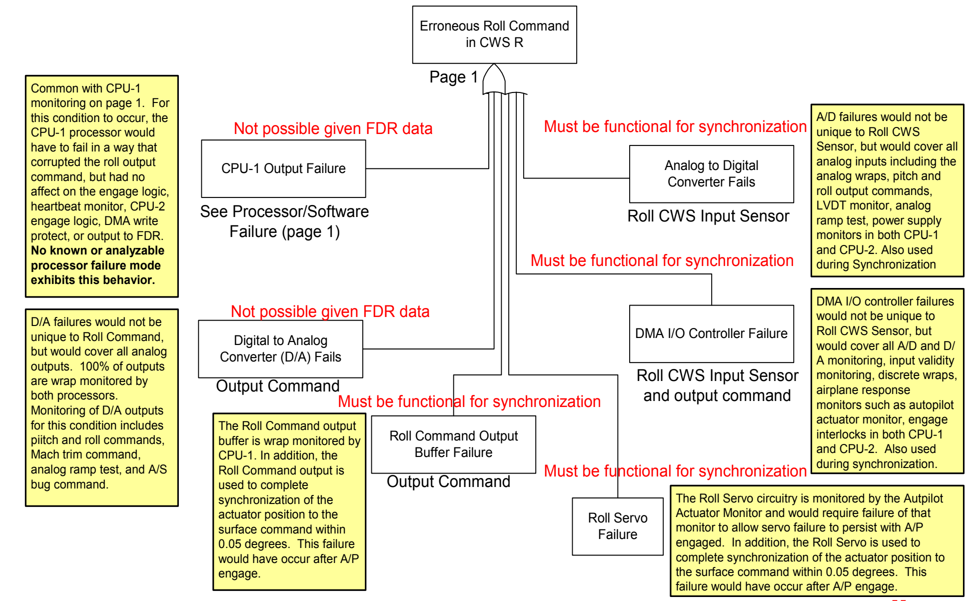
- **What failures of the Flight Control Computer would cause the A/P to command a 3.64 degree aileron change in Roll CWS? (Scenario 9)**

Answers to Questions from 2 Feb 2005 Meeting

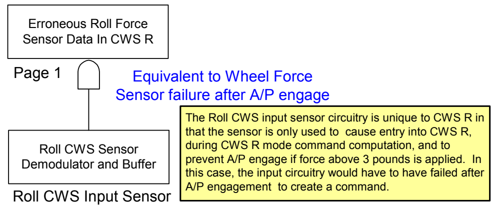


Honeywell

Answers to Questions from 2 Feb 2005 Meeting



Answers to Questions from 2 Feb 2005 Meeting



Note :This failure does not inhibit manual disconnect nor does it result in failure to disconnect with erroneous FDR disengaged indication. When this failure occurs, pilot can override erroneous command with normal autopilot override forces.

Answers to Questions from 2 Feb 2005 Meeting

- **Provide minimum time for disconnect given immediate A/P synchronization with no detent pressure (Scenario 10)**
  - FCC receives Local Command from MCP Engage Logic when the A/P CMD button is pressed
    - Running Time: Start
  - Detent Command logic detects synchronization and sets Aileron Detent Command output (100 ms delay, based on 0.005% real time clock oscillator/timer)
    - Running Time : +100 ms ± 0.005 ms
  - Engage Logic receives Aileron Detent Pressure Command Wrap (50 ms delay, based on 0.005% real time clock oscillator/timer)
    - Running Time : +150 ms ± 0.0075 ms
  - Engage Logic does not receive valid Aileron Detent Pressure Switch data and removes power from MCP engage hardware, 3.5 ms delay, based on 50 ms task driven by 0.005% real time clock oscillator timer)
    - Running Time : +3.65 seconds ± 0.0001825 seconds
  - MCP Engage Logic disconnect (minimum 45 ms, maximum 80 ms, no additional tolerance)
    - Running Time : +3.695 seconds ± 0.0001825 seconds

Note: No input time penalty assumed through DMA I/O controller. Assumes all I/O exactly aligned in time with input/output timing.

Minimum Time to A/P Disconnect with No Detent Pressure: 3.6948175 seconds

Honeywell

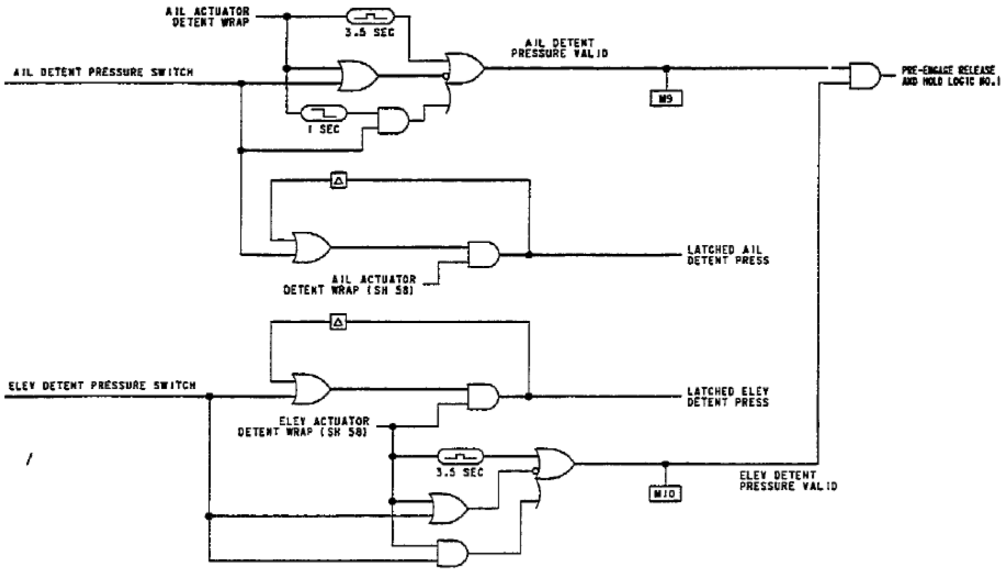
Answers to Autopilot Questions from 2 Feb 2005

- What is the maximum time for the autopilot to disconnect given the detent solenoid is stuck open prior to A/P engagement? (Scenario 10)
  - The time to the hydraulic pressurization and subsequent detent pressure switch reaction is a maximum of 50 ms
  - DMA I/O cycle maximum time delay of 536 μsec for detent pressure input
  - The detent logic of the engage interlocks is executed at 20 Hz (50 ms) so a maximum of one frame delay due to just missing the input data.
  - There is no software delay in reaction to detent pressure input by engage interlocks prior to detent command output.
  - DMA I/O cycle maximum time delay of 536 μsec for disconnect command
  - The MCP engage circuitry react in 45 to 80 ms of the processor issuing a disconnect.

Note: This logic is depicted in the SP-300 DFCS Training Manual Volume 4 Sheet 54

Worst case time the FCC to disconnect for this case is 181.072 ms.

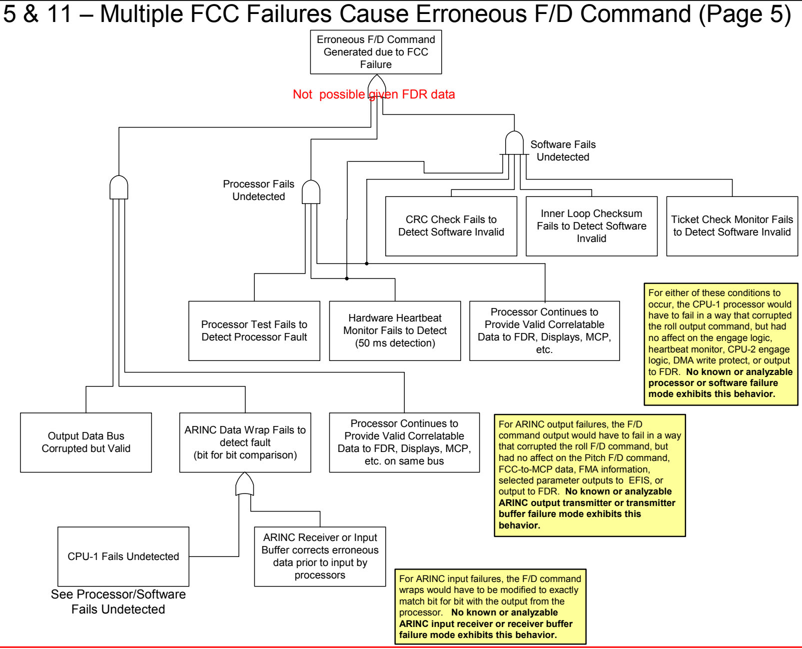
Answers to Autopilot Questions from 2 Feb 2005



Honeywell

Answers to Autopilot Questions from 2 Feb 2005

Scenario 5 & 11 – Multiple FCC Failures Cause Erroneous F/D Command (Page 5)



Honeywell

Answers to Autopilot Questions from 2 Feb 2005

- **Scenario 13 – Multiple FCC failures cause erroneous A/P engage and erroneous command output**
  - **FCCs *CANNOT* engage A/P on their own regardless of failure mode.**
    - **MCP engage hardware is in control of autopilot engage. FCCs can only disable or enable MCP engage hardware.**
    - **From page 9 of Scenario 13, since the FCC self-engages, the multiple FCC fault case, the IRU fault case, and the bank limit fault case (page 10) cannot be a function of FCC failure.**

Answers to question_cairo meeting05.ppt

Boeing/ Honeywell proprietary information and will not be available for public use

Action Item Response.ppt (Cairo meeting, 1-30-05 to 2-2-05), Boeing Action Items of 30 January (public release).ppt

Question 1
Does the aileron PCU bypass valve interconnect the extend and retract side of the main ram when no hydraulic pressure is available?
What is the correct hydraulic schematic for the PCU?

Question 2
Q) Reference Scenario 9 - What will happen to lateral trim capability after the 12 degrees of lost motion is taken up?
A) Lateral trim capability will be limited to +/- 12 degrees of wheel. The force required to break out the transfer mechanism (50 Lb) is in excess of the feel and centering force (~20 Lb peak).

Question 3
What is the airplane level effect of lateral control scenario #9 (spoiler control drum jammed at neutral)?
Boeing to run desktop simulation

Question 4
Provide proposed corrections to scenario #10 write up
See rewrite.

Question 5
Q) Reference Scenario 9-10 – What is breakout force of the aileron spring cartridge?
A) Breakout force of the aileron spring cartridge (reflected at the control wheel) is approximately 16 Lb.

Question 6
Q) Reference Scenario 16 – What is the effect of a failure in the PCA input rod (A or B)?
A) There is no functional effect of a single failure in the PCA input rod. The entire input rod and fasteners are dual load path. The effect of a multiple failure depends on the position of the primary slide at the time of the failure. Worst case effect is a rate jam of the affected PCU, causing a force fight with the other PCU and stalling of both PCUs. Control of spoilers is available from the FO side if the transfer mechanism is broken out. Lateral trim will not be available. Depressurizing the affected PCU will restore normal control.

Question 7
Q) Reference Scenario 17 – What is the effect of a jam between the primary and secondary slide in the aileron PCA?
1. If the primary slide and secondary slide jam together near neutral, the effect is a minor reduction in rate capability.
2. If the jam occurs away from neutral, the feedback motion of the PCU will cause the primary and secondary slides to counter each other (crossflow condition). At a full crossflow condition, the PCU will lose rate capability and be backdriven by the unaffected PCU.
Question 8
Q) Reference Scenario 18 – What is the effect of a jam between the secondary slide and the sleeve in the aileron PCA?
1. If the secondary slide jams near neutral, the effect is a minor reduction in rate capability.

2. If the jam occurs away from neutral, the feedback motion of the PCU will cause the primary and secondary slides to counter each other (crossflow condition). At a full crossflow condition, the PCU will lose rate capability and be backdriven by the unaffected PCU.

Question 9, 10
Q) Reference Scenarios 20, 21 – What is the effect of a piston to cylinder jam in the aileron PCA?
The effect is same as a jam elsewhere in the captain's side aileron control path. The FO must break out the transfer mechanism and aileron spring rod to move the spoilers. Aileron control is limited to deflections within the valve stops.

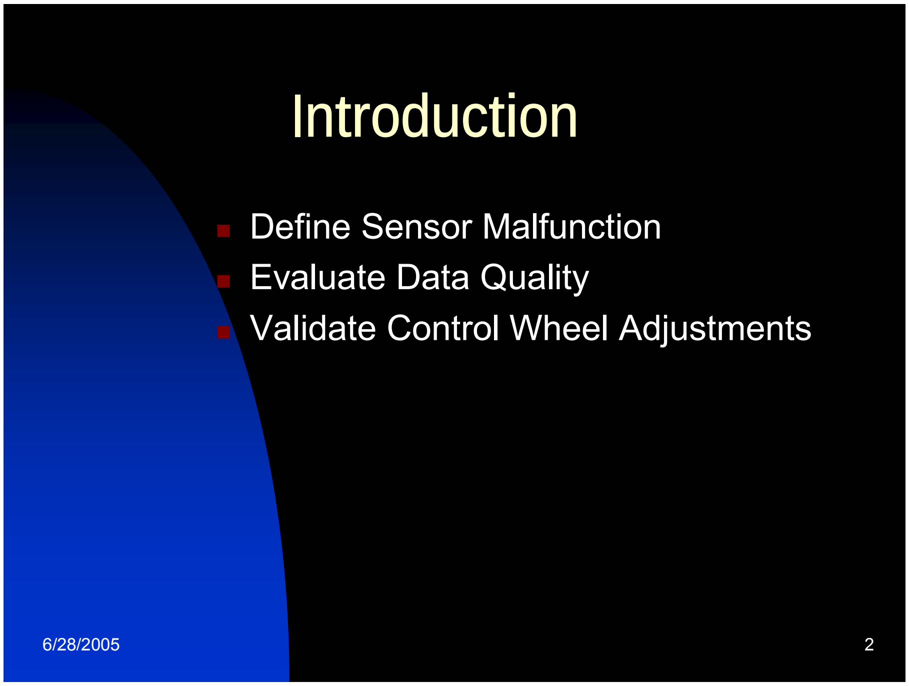
Question 11
Provide proposed corrections to scenario #34 write up
See rewrite.

Question 12
Provide proposed corrections to scenario #36 write up
See rewrite.

Question 13
Provide proposed corrections to scenario #47 write up
See rewrite

1.16.2. Tests and researches conducted by NTSB:

C.wheel NTSB.ppt


Introduction
Define Sensor Malfunction
Evaluate Data Quality
Validate Control Wheel Adjustments
6/28/2005
2

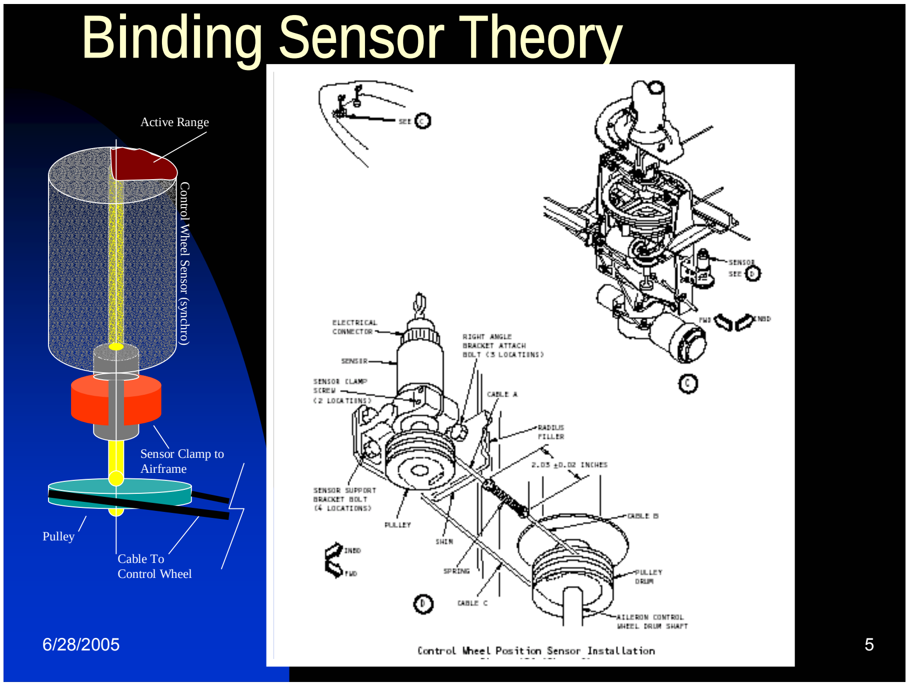
Discussion Points

- Fact - Control Wheel Sensor Maximum Minimum Values Recorded on 25-Hours of FDR data (-2.237deg to 81.5 deg)
- Theory - Control Wheel Sensor Moved Freely Within Active Range (–2.237 and 81.5 degrees.), But due to Internal Binding of Rotating Components will not Exceed this Range.
- Theory - Control Wheel Inputs Outside of Active Range Cause Sensor to Rotate in Mounting Bracket and Reposition Control Wheel Sensor/Cockpit Control Wheel Offset.
- Theory - Rapid Control Wheel Inputs Will Also Cause Sensor to Shift in Mounting Bracket.
- Theory - Control Wheel Sensor Values Can Be Used to Evaluate Crew Inputs When Sensor Offset can be Derived From Known Control Wheel Position (i.e. Before and After Preflight Control Checks, 0 - Aileron Deflection.)

6/28/2005 3

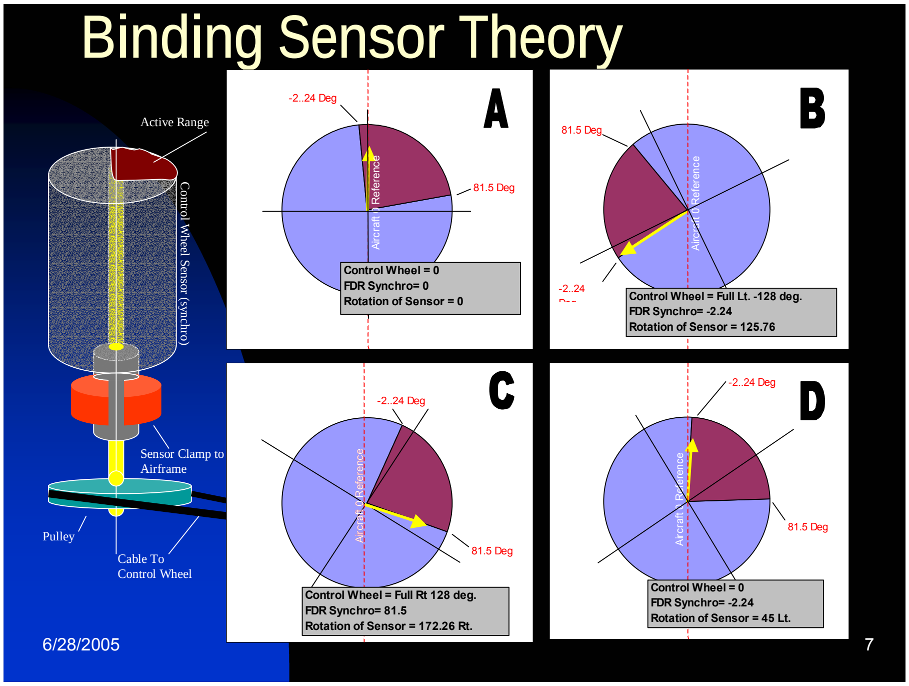
Discussion Points (cont.)

- Control Wheel Position Sensor is a synchro with a range of 0 to 360 degrees or +- 180 degrees.
- Full Range of Control Wheel as expressed in sensor units (synchro angles) is +- 128 degrees.
- Full Range of Control Wheel Travel as measured in cockpit is +- 107 degrees.
- The following discussion will reference sensor units only (ie, synchro angles +- 128 degrees)
- Theory – Control Wheel Position (Cockpit) values recorded during accident flight can be corrected to actual by applying the following offsets:
  - From Frame 92250 to 92361.92 subtract 17.5444 deg.
  - From Frame 92362.42 to 92445 subtract 28.9 deg.
  - From Frame 92446 to end of data 28.9 deg sensor offset may not apply due to rapid control wheel inputs.

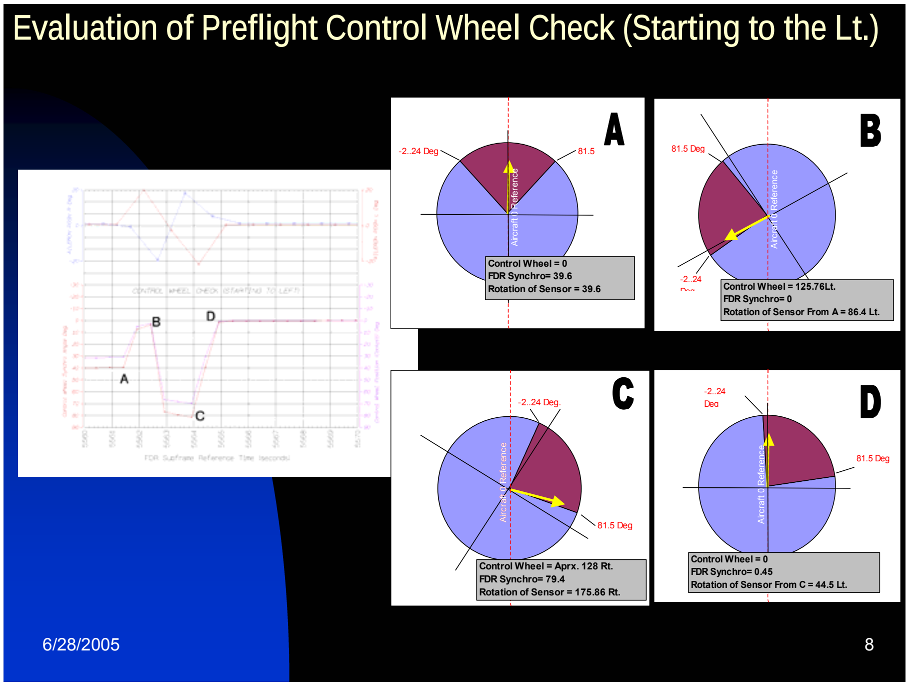

Binding Sensor Theory
Active Range
Control Wheel Sensor (synchro)
Sensor Clamp to Airframe
Pulley
Cable To Control Wheel
SEE C
SENSOR SEE D
FWD
INBD
C
ELECTRICAL CONNECTOR
SENSOR
SENSOR CLAMP SCREW (2 LOCATIONS)
RIGHT ANGLE BRACKET ATTACH BOLT (3 LOCATIONS)
CABLE A
RADIUS FILLER
2.03 ±0.02 INCHES
SENSOR SUPPORT BRACKET BOLT (4 LOCATIONS)
PULLEY
SHIM
CABLE B
INBD
FWD
SPRING
PULLEY DRUM
D
CABLE C
AILERON CONTROL WHEEL DRUM SHAFT
Control Wheel Position Sensor Installation
6/28/2005
5

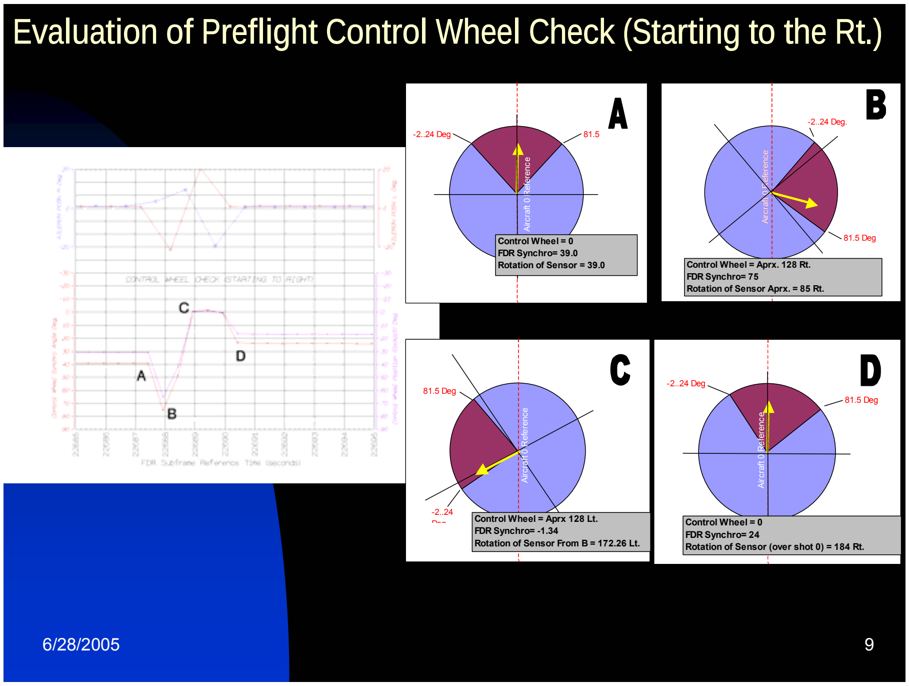
Control Wheel Position Sensor Values for Neutral Aileron Before & After Preflight Control Checks

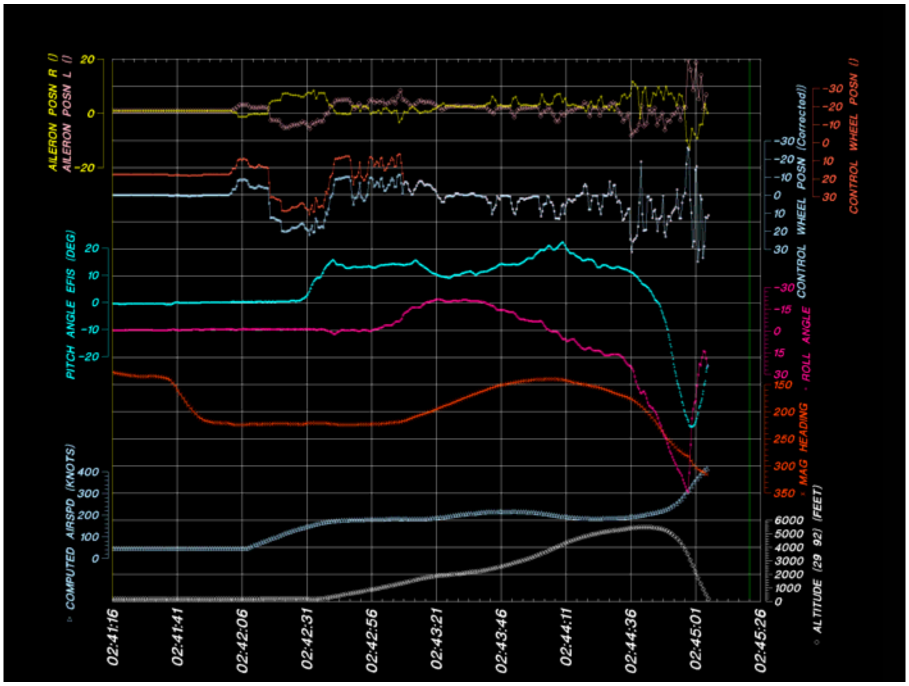
	Time in Seconds (FDR Sub Frame)	Control Wheel Position		Control Check Direction
		Before Check	After Check	
1	3713	29.4466	16.7846	Rt. To LT.
2	5568	31.2134	0	Lt. To Rt.
3	7801	58.8932	2.35573	Lt. To Rt.
4	9789	33.8636	3.23913	Lt. To Rt.
5	12124	31.8023	0.294466	Lt. To Rt.
6	14134	28.5632	16.4901	Rt. To LT.
7	17431	29.1521	14.7233	Rt. To LT.
8	22682	30.6245	16.7846	Rt. To LT.
9	30419	37.6915	15.012	Rt. To LT.
10	46964	30.6245	14.1344	Rt. To LT.
11	62156	35.6304	15.6067	Rt. To LT.
12	77924	32.9802	17.668	Rt. To LT.
13	92030	33.5691	14.4288	Rt. To LT.

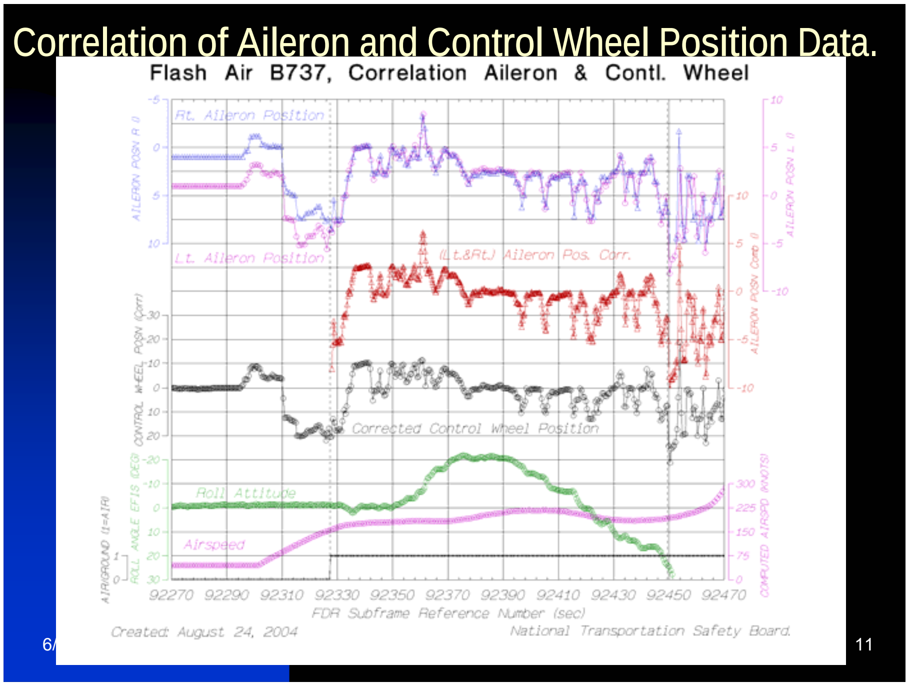


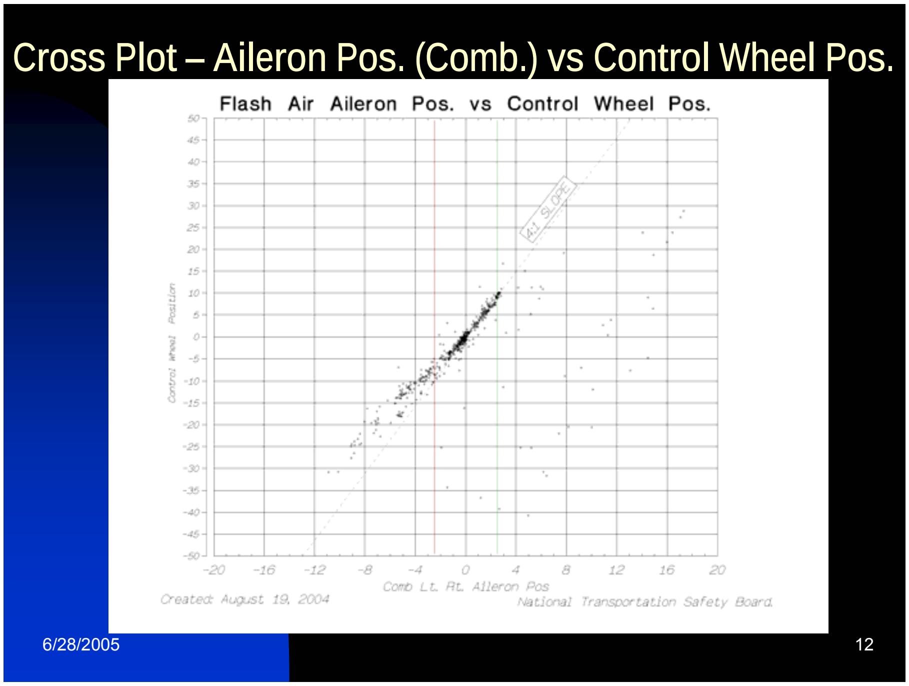
Binding Sensor Theory
Active Range
Control Wheel Sensor (synchro)
Sensor Clamp to Airframe
Pulley
Cable To Control Wheel
A
-2..24 Deg
81.5 Deg
Aircraft 0 Reference
Control Wheel = 0
FDR Synchro= 0
Rotation of Sensor = 0
B
81.5 Deg
-2..24
Control Wheel = Full Lt. -128 deg.
FDR Synchro= -2.24
Rotation of Sensor = 125.76
C
-2..24 Deg
81.5 Deg
Control Wheel = Full Rt 128 deg.
FDR Synchro= 81.5
Rotation of Sensor = 172.26 Rt.
D
-2..24 Deg
81.5 Deg
Control Wheel = 0
FDR Synchro= -2.24
Rotation of Sensor = 45 Lt.
6/28/2005
7


Evaluation of Preflight Control Wheel Check (Starting to the Lt.)
A
-2..24 Deg
81.5
Aircraft 0 Reference
Control Wheel = 0
FDR Synchro= 39.6
Rotation of Sensor = 39.6
B
81.5 Deg
-2..24
Aircraft 0 Reference
Control Wheel = 125.76Lt.
FDR Synchro= 0
Rotation of Sensor From A = 86.4 Lt.
C
-2..24 Deg.
81.5 Deg
Aircraft 0 Reference
Control Wheel = Aprx. 128 Rt.
FDR Synchro= 79.4
Rotation of Sensor = 175.86 Rt.
D
-2..24
Deg
81.5 Deg
Aircraft 0 Reference
Control Wheel = 0
FDR Synchro= 0.45
Rotation of Sensor From C = 44.5 Lt.
6/28/2005
8

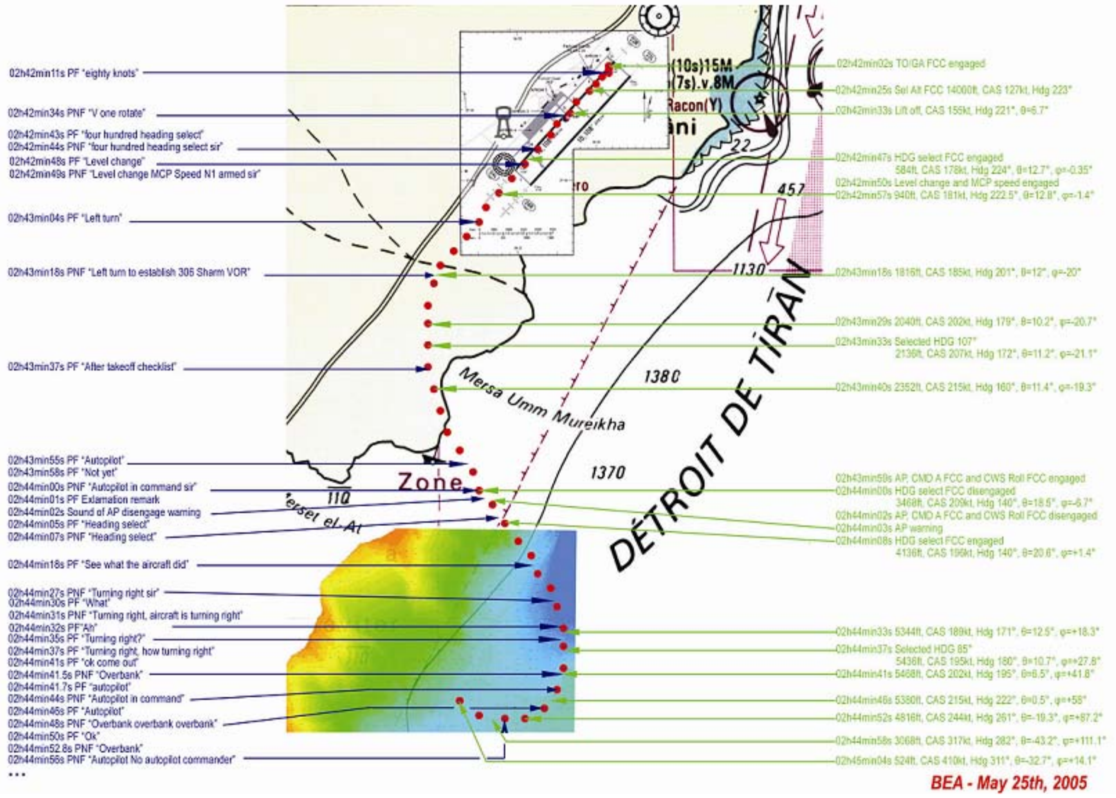

Evaluation of Preflight Control Wheel Check (Starting to the Rt.)
A
-2..24 Deg
81.5
Aircraft 0 Reference
Control Wheel = 0
FDR Synchro= 39.0
Rotation of Sensor = 39.0
B
-2..24 Deg.
81.5 Deg
Aircraft 0 Reference
Control Wheel = Aprx. 128 Rt.
FDR Synchro= 75
Rotation of Sensor Aprx. = 85 Rt.
C
81.5 Deg
-2..24
Aircraft 0 Reference
Control Wheel = Aprx 128 Lt.
FDR Synchro= -1.34
Rotation of Sensor From B = 172.26 Lt.
D
-2..24 Deg
81.5 Deg
Aircraft 0 Reference
Control Wheel = 0
FDR Synchro= 24
Rotation of Sensor (over shot 0) = 184 Rt.
A
B
C
D
6/28/2005
9


AILERON POSN R ()
AILERON POSN L ()
PITCH ANGLE EFIS (DEG)
COMPUTED AIRSPD (KNOTS)
CONTROL WHEEL POSN (Corrected)
CONTROL WHEEL POSN ()
ROLL ANGLE
MAG HEADING
ALTITUDE (29 92) (FEET)
02:41:16
02:41:41
02:42:06
02:42:31
02:42:56
02:43:21
02:43:46
02:44:11
02:44:36
02:45:01
02:45:26


Correlation of Aileron and Control Wheel Position Data.
Flash Air B737, Correlation Aileron & Contl. Wheel
Rt. Aileron Position
Lt. Aileron Position
(Lt.&Rt.) Aileron Pos. Corr.
Corrected Control Wheel Position
Roll Attitude
Airspeed
92270 92290 92310 92330 92350 92370 92390 92410 92430 92450 92470
FDR Subframe Reference Number (sec)
Created: August 24, 2004
National Transportation Safety Board.
11


Cross Plot – Aileron Pos. (Comb.) vs Control Wheel Pos.
Flash Air Aileron Pos. vs Control Wheel Pos.
Control Wheel Position
Comb Lt. Rt. Aileron Pos
Created: August 19, 2004
National Transportation Safety Board
6/28/2005
12

1.16.3. Tests and researches conducted by BEA
(Trajecto_may05.jpg)



1.16.4. Tests and researches introduced by MCA:

Spatial Disorientation[20]

[20] Reference: "U.S. Army Field Manual, FM 3-04.301, Aeromedical Training for Flight Personnel".

Spatial Disorientation

Contents

- Graveyard Spin
- Coriolis Illusion

- SOMATOGRAVIC ILLUSIONS
    - Oculogravic Illusion
    - Elevator Illusion
    - Oculoagravic Illusion

PROPRIOCEPTIVE ILLUSIONS

PREVENTION OF SPATIAL DISORIENTATION

TREATMENT OF SPATIAL DISORIENTATION

Spatial Disorientation

Spatial disorientation contributes more to causing aircraft accidents than any other physiological problem in flight. Regardless of their flight-time experience, all aircrew members are subject to disorientation. The human body is structured to perceive changes in movement on land in relation to the surface of the earth. In an aircraft, the human sensory systems—the visual, vestibular, and proprioceptive systems—may give the brain erroneous orientation information. This information can cause sensory illusions, which may lead to spatial disorientation.

COMMON TERMS OF SPATIAL DISORIENTATION

SPATIAL DISORIENTION

9-1. Spatial disorientation is an individual's inability to determine his or her position, attitude, and motion relative to the surface of the earth or significant objects; for example, trees, poles, or buildings during hover. When it occurs, pilots are unable to see, believe, interpret, or prove the information derived from their flight instruments. Instead, they rely on the false information that their senses provide.

SENSORY ILLUSION

9-2. A sensory illusion is a false perception of reality caused by the conflict of orientation information from one or more mechanisms of equilibrium. Sensory illusions are a major cause of spatial disorientation.

VERTIGO

9-3. Vertigo is a spinning sensation usually caused by a peripheral vestibular abnormality in the middle ear. Aircrew members often misuse the term vertigo, applying it generically to all forms of spatial disorientation or dizziness.

TYPES OF SPATIAL DISORIENTATION

TYPE I (UNRECOGNIZED)

9-4. A disoriented aviator does not perceive any indication of spatial disorientation. In other words, he does not think anything is wrong. What he sees—or thinks he sees—is corroborated by his other senses. Type I disorientation is the most dangerous type of disorientation. The pilot—unaware of a problem—fails to recognize or correct the disorientation, usually resulting in a fatal aircraft mishap:

- The pilot may see the instruments functioning properly. There is no suspicion of an instrument malfunction.
- There may be no indication of aircraft-control malfunction. The aircraft is performing normally.
- An example of this type of SD would be the height-/depth-perception illusion when the pilot descends into the ground or some obstacle above the ground because of a lack of situational awareness.

TYPE II (RECOGNIZED)

9-5. In Type II spatial disorientation, the pilot perceives a problem (resulting from spatial disorientation). The pilot, however, may fail to recognize it as spatial disorientation:

- The pilot may feel that a control is malfunctioning.

- The pilot may perceive an instrument failure as in the graveyard spiral, a classic example of Type II disorientation. The pilot does not correct the aircraft roll, as indicated by the attitude indicator, because his vestibular indications of straight-and-level flight are so strong.

TYPE III (INCAPACITATING)

9-6. In Type III spatial disorientation, the pilot experiences such an overwhelming sensation of movement that he or she cannot orient himself or herself by using visual cues or the aircraft instruments. Type III spatial disorientation is not fatal if the copilot can gain control of the aircraft.

EQUILIBRIUM MAINTENANCE

9-7. Three sensory systems—the visual, vestibular, and proprioceptive systems—are especially important in maintaining equilibrium and balance. Figure 9-1 shows these systems. Normally, the combined functioning of these senses maintains equilibrium and prevents spatial disorientation. During flight, the visual system is the most reliable. In the absence of the visual system, the vestibular and proprioceptive systems are unreliable in flight.

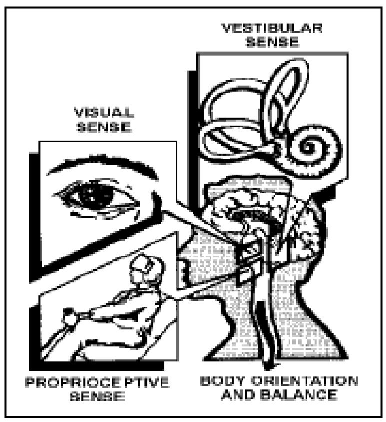


Figure 9-1. The Three Equilibrium Systems

VISUAL SYSTEM

9-8. Of the three sensory systems, the visual system is the most important in maintaining equilibrium and orientation. To some extent, the eyes can help determine the speed and direction of flight by comparing the position of the aircraft relative to some fixed point of reference. Eighty percent of our orientation information comes from the visual system. (Chapter 8 contains information about the eye).

9-9. On flights under IMC, crew members lose fixed points of reference outside of the aircraft. Under IMC, the pilot must rely on visual sensory input from the instruments for spatial orientation. The decision to rely on the visual sense—and to believe the instruments rather than the input of the other senses—demands disciplined training.

9-10. The eyes allow the pilot to scan sensitive flight instruments that give accurate spatial-orientation information. These instruments indicate unusual aircraft attitudes resulting from turbulence, distraction, inattention, mechanical failure, or spatial disorientation.

VESTIBULAR SYSTEM

9-11. The inner ear contains the vestibular system, which contains the motion- and gravity-detecting sense organs. This system is located in the temporal bone on each side of the head. Each vestibular apparatus consists of two distinct structures: the semicircular canals and the vestibule proper, which contain the otolith organs. Figure 9-2 depicts the vestibular system. Both the semicircular canals and the otolith organs sense changes in aircraft attitude. The semicircular canals of the inner ear sense changes in angular acceleration and deceleration.

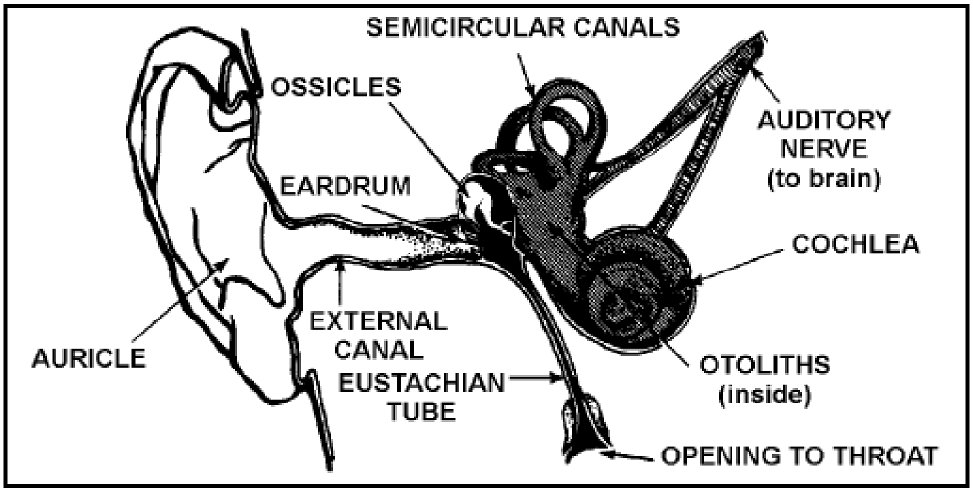


Figure 9-2. The Vestibular System

Otolith Organs

9-12. The otolith organs are small sacs located in the vestibule. Sensory hairs project from each macula into the otolithic membrane, an overlaying gelatinous membrane that contains chalklike crystals, called otoliths. The otolith organs, shown in Figure 9-3, respond to gravity and linear accelerations/decelerations. Changes in the position of the head, relative to the gravitational force, cause the otolithic membrane to shift position on the macula. The sensory hairs bend, signaling a change in the head position.

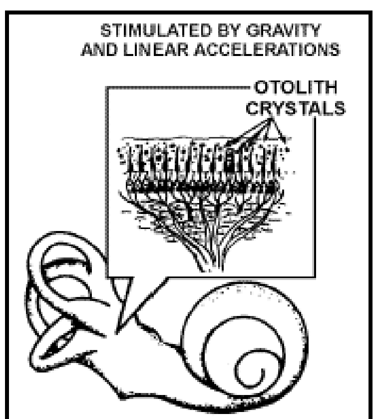


Figure 9-3. The Otolith Organs

9-13. When the head is upright, a "resting" frequency of nerve impulses is generated by the hair cells. Figure 9-4 shows the position of the hair cells when the head is upright.

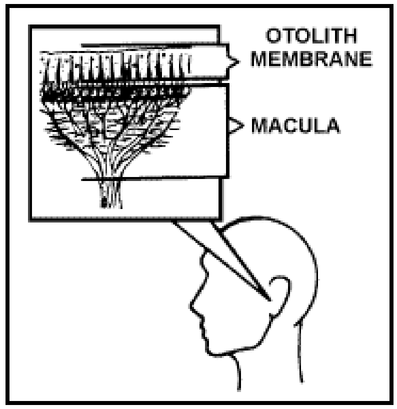


Figure 9-4. Position of the Hair Cells When the Head Is Upright

9-14. When the head is tilted, the "resting" frequency is altered. The brain is informed of the new position. The positions of the hair cells when the head is tilted forward and backward are shown in Figure 9-5.

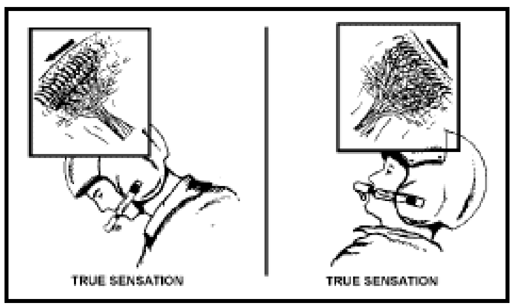


Figure 9-5. Position of the Hair Cells When the Head Is Tilted Forward and Backward

9-15. Linear accelerations/decelerations also stimulate the otolith organs. The body cannot physically distinguish between the inertial forces resulting from linear accelerations and the force of gravity. A forward acceleration results in backward displacement of the otolithic membranes. When an adequate visual reference is not available, aircrew members may experience an illusion of backward tilt. Figure 9-6 shows this false sensation of backward tilt.

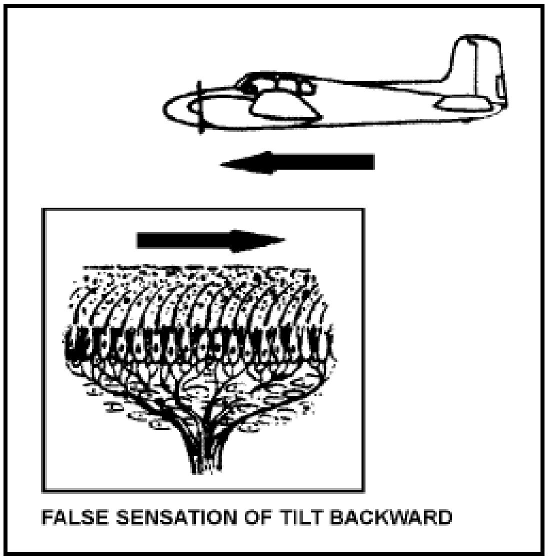


Figure 9-6. False Sensation During Backward Tilt

SEMICIRCULAR CANALS

9-16. The semicircular canals of the inner ear sense changes in angular acceleration. The canals will react to any changes in roll, pitch, or yaw attitude. Figure 9-7 shows where these changes are registered in the semicircular canals.

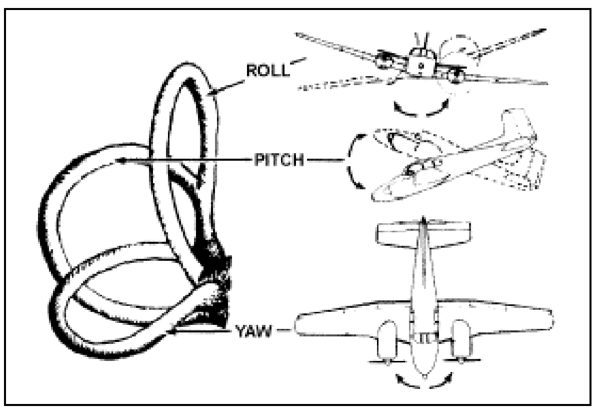


Figure 9-7. Reaction of the Semicircular Canals to Changes in Angular Acceleration

9-17. The semicircular canals are situated in three planes, perpendicular to each other. They are filled with a fluid called endolymph. The inertial torque resulting from angular acceleration in the plane of the canal puts this fluid into motion. The motion of the fluid bends the cupula, a gelatinous structure located in the ampulla of the canal. This, in turn, moves the hairs of the hair cells situated beneath the cupula. This movement stimulates the vestibular nerve. These nerve impulses are then transmitted to the brain, where they are interpreted as rotation of the head. Figure 9-8 shows a cutaway section of the semicircular canal.

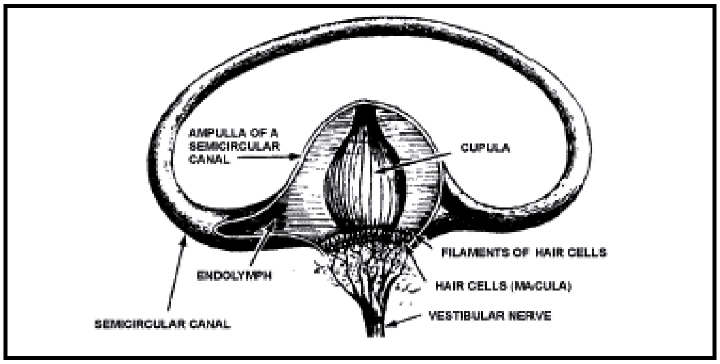


Figure 9-8. Cutaway View of the Semicircular Canals

9-18. When no acceleration takes place, the hair cells are upright. The body senses that no turn has occurred. The position of the hair cells and the actual sensation correspond, as shown in Figure 9-9.

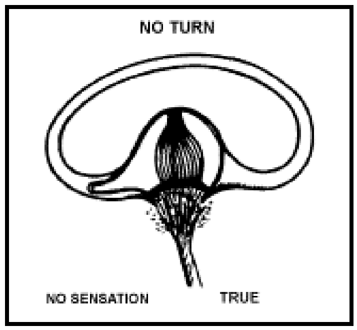


Figure 9-9. Position of Hair Cells During No Acceleration

9-19. When a semicircular canal is put into motion during clockwise acceleration, the fluid within the semicircular canal lags behind the accelerated canal walls. This lag creates a relative counterclockwise movement of the fluid within the canal. The canal wall and the cupula move in the opposite direction from the motion of the fluid. The brain interprets the movement of the hairs to be a turn in the same direction as the canal wall. The body correctly senses that a clockwise turn is being made. Figure 9-10 shows the position of the hair cells and the resulting true sensation during a clockwise turn.

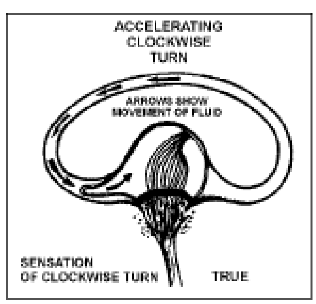


Figure 9-10. Sensation During a Clockwise Turn

9-20. If the clockwise turn then continues at a constant rate for several seconds or longer, the motion of the fluid in the canals catches up with the canal walls. The hairs are no longer bent, and the brain receives the false impression that turning has stopped. The position of the hair cells and the resulting false sensation during a prolonged, constant clockwise turn is shown in Figure 9-11. A prolonged constant turn in either direction will result in the false sensation of no turn.

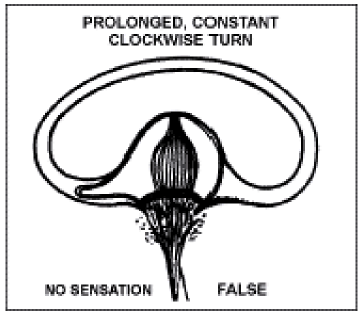


Figure 9-11. Sensation During a Prolonged Clockwise Turn

9-21. When the clockwise rotation of the aircraft slows or stops, the fluid in the canal moves briefly in a clockwise direction. This sends a signal to the brain that is falsely interpreted as body movement in the opposite direction. In an attempt to correct the falsely perceived counterclockwise turn, the pilot may turn the aircraft in the original clockwise direction. Figure 9-12 shows the position of the hair cells—and the resulting false sensation when a clockwise turn is suddenly slowed or stopped.

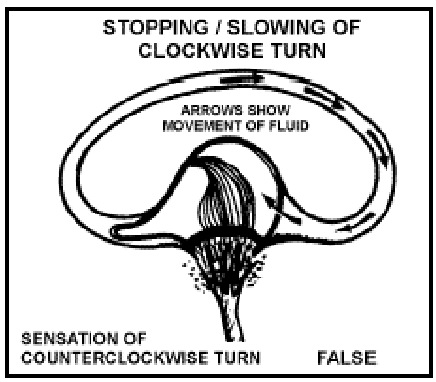


Figure 9-12. Sensation During Slowing or Stopping of a Clockwise Turn

PROPRIOCEPTIVE SYSTEM

9-22. This system reacts to the sensation resulting from pressures on joints, muscles, and skin and from slight changes in the position of internal organs. It is closely associated with the vestibular system and, to a lesser degree, the visual system. Forces act upon the seated pilot in flight. With training and experience, the pilot can easily distinguish the most distinct movements of the aircraft by the pressures of the aircraft seat against the body. The recognition of these movements has led to the term "seat-of-the-pants" flying.

VISUAL ILLUSIONS

9-23. Illusions give false impressions or misconceptions of actual conditions; therefore, aircrew members must understand the type of illusions that can occur and the resulting disorientation. Although the visual system is the most reliable of the senses, some illusions can result from misinterpreting what is seen; what is perceived is not always accurate. Even with the references outside the cockpit and the display of instruments inside, aircrew members must be on guard to interpret information correctly.

RELATIVE-MOTION ILLUSION

9-24. Relative motion is the falsely perceived self-motion in relation to the motion of another object. The most common example is when an individual in a car is stopped at a traffic light and another car pulls alongside. The individual that was stopped at the light perceives the forward motion of the second car as his own motion rearward. This results in the individual applying more pressure to the brakes unnecessarily. This illusion can be encountered during flight in situations such as formation flight, hover taxi, or hovering over water or tall grass.

CONFUSION WITH GROUND LIGHTS

9-25. Confusion with ground lights occurs when an aviator mistakes ground lights for stars. This illusion prompts the aviator to place the aircraft in an unusual attitude to keep the misperceived ground lights above them. Isolated ground lights can appear as stars and this could lead to the illusion that the aircraft is in a nose high or one wing low attitude (Part A of Figure 9-13). When no stars are visible because of overcast conditions, unlighted areas of terrain can blend with the dark overcast to create the illusion that the unlighted terrain is part of the sky (Part B of Figure 9-13). This illusion can be avoided by referencing the flight instruments and establishing a true horizon and attitude.

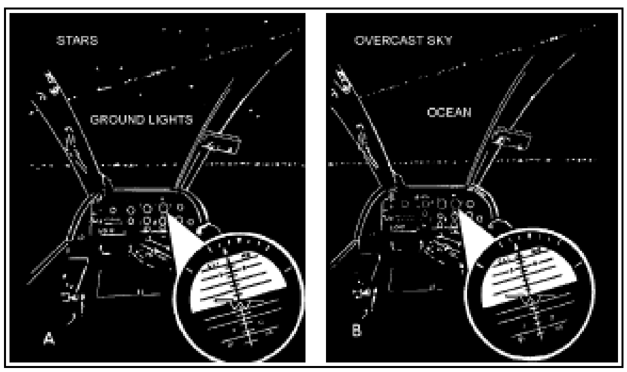


Figure 9-13. Confusion of Ground Lights and Stars at Night

FALSE HORIZON ILLUSION

The false horizon illusion (Figure 9-14) occurs when the aviator confuses cloud formations with the horizon or the ground. This illusion occurs when an aviator subconsciously chooses the only reference point available for orientation. A sloping cloud deck may be difficult to perceive as anything but horizontal if it extends for any great distance in the pilot's peripheral vision. An aviator may perceive the cloudbank below to be horizontal although it may not be horizontal to the ground; thus, the pilot may fly the aircraft in a banked attitude. This condition is often insidious and goes undetected until the aviator recognizes it and makes the transition to the instruments and corrects it. This illusion can also occur if an aviator looks outside after having given prolonged attention to a task inside the cockpit. The confusion may result in the aviator placing the aircraft parallel to the cloudbank.

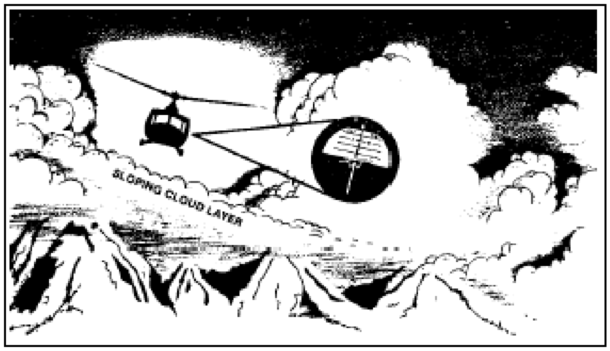


Figure 9-14. False Horizon Illusion

HEIGHT-DEPTH PERCEPTION ILLUSION

2-27. The height-depth perception illusion is due to a lack of sufficient visual cues and causes an aircrew member to lose depth perception. Flying over an area devoid of visual references—such as desert, snow, or water—will deprive the aircrew member of his perception of height. The aviator, misjudging the aircraft's true altitude, may fly the aircraft dangerously low in reference to the ground or other obstacles above the ground. Flight in an area where visibility is restricted by fog, smoke, or haze can produce the same illusion.

CRATER ILLUSION

9-28. The crater illusion occurs when aircrew members land at night, under NVG conditions, and the IR searchlight is directed too far under the nose of the aircraft. This will cause the illusion of landing with up-sloping terrain in all directions. This misperceived up-sloping terrain will give the aviator the perception of landing into a crater. This illusionary depression lulls the pilot into continuing to lower the collective. This can result in the aircraft prematurely impacting the ground, causing damage to both aircraft and crew. If observing another aircraft during hover taxi, the aviator may perceive that the crater actually appears to move with the aircraft being observed.

STRUCTURAL ILLUSIONS

9-29. Structural illusions are caused by the effects of heat waves, rain, snow, sleet, or other visual obscurants. A straight line may appear curved when it is viewed through the heat waves of the desert. A single wing-tip light may appear as a double light or in a different location when it is viewed during a rain shower. The curvature of the aircraft windscreen can also cause structural illusions, as illustrated in Figure 9-15. This illusion is due to the refraction of light rays as they pass through the windscreen. When encountering environments that contain these visual obscurants, the aviator must remain aware that these obscurants may present a false perception.

Figure 9-15. Structural Illusion

SIZE-DISTANCE ILLUSION

9-30. The size-distance illusion (Figure 9-16) is the false perception of distance from an object or the ground, created when a crew member misinterprets an unfamiliar object's size to be the same as an object that he is accustomed to viewing. This illusion can occur if the visual cues, such as a runway or trees, are of a different size than expected. An aviator making an approach to a larger, wider runway may perceive that the aircraft is too low. Conversely, an aviator—making an approach to a smaller, narrower runway—may perceive that the aircraft is too high. A pilot making an approach 25 feet above the trees in the State of Washington, where the average tree is 100 feet tall, may fly the aircraft dangerously low if trying to make the same approach at Fort Rucker, Alabama, where the average tree height is 30 feet. This illusion may also occur when an individual is viewing the position lights of another aircraft at night. If the aircraft being observed suddenly flies into smoke or haze, the aircraft will appear to be farther away than before.

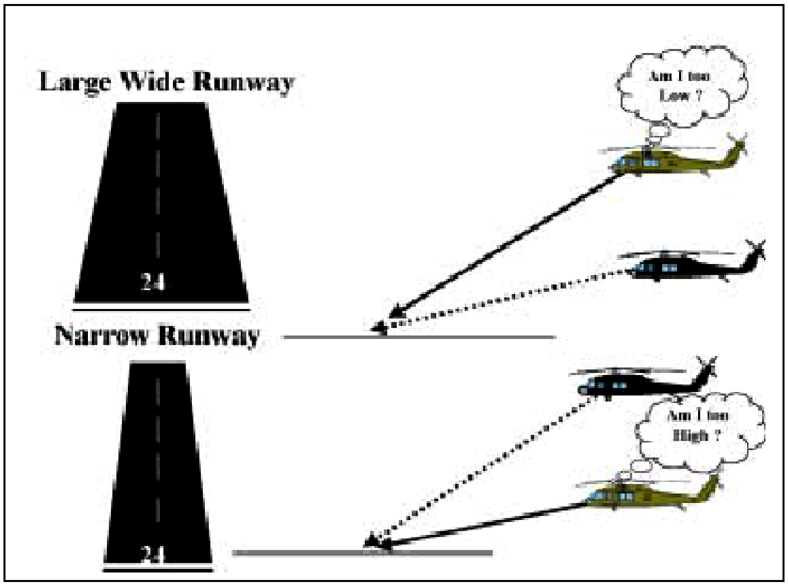


Figure 9-16. Size-Distance Illusion

FASCINATION (FIXATION) IN FLYING

9-31. Fascination, or fixation, flying can be separated into two categories: task saturation and target fixation. Task saturation may occur during the accomplishment of simple tasks within the cockpit. Crew members may become so engrossed with a problem or task within the cockpit that they fail to properly scan outside the aircraft. Target fixation, commonly referred to as target hypnosis, occurs when an aircrew member ignores orientation cues and focuses his attention on his object or goal; for example, an attack pilot on a gunnery range becomes so intent on hitting the target that he forgets to fly the aircraft, resulting in the aircraft striking the ground, the target, or the shrapnel created by hitting the target.

REVERSIBLE PERSPECTIVE ILLUSION

9-32. At night, an aircraft may appear to be moving away when it is actually approaching. If the pilot of each aircraft has the same assumption, and the rate of closure is significant, by the time each pilot realizes the misassumption, it may be too late to avoid a mishap. This illusion is termed reversible perspective and is often experienced when an aircrew member observes an aircraft flying a parallel course. In this situation, aircrew coordination is paramount. To determine the direction of flight, the aircrew member should observe the other aircraft's position lights. Remember the following: red on right returning; that is, if you see an aircraft with the red position light on the right and the green position light on the left, the observed aircraft is traveling in the opposite direction of your flight path.

ALTERED PLANES OF REFERENCE

9-33. In altered planes of reference(Figure 9-17), the pilot has an inaccurate sense of altitude, attitude, or flight-path position in relation to an object so great in size that the object becomes the new plane of reference rather than the correct plane of reference, the horizon. A pilot approaching a line of mountains may feel the need to climb although the altitude of the aircraft is adequate. This is because the horizon, which helps the pilot maintain orientation, is subconsciously moved to the top of the ridgeline. Without an adequate horizon, the brain attempts to fix a new horizon. Conversely, an aircraft entering a valley that contains a slowly increasing up-slope condition may become trapped because the slope may quickly increase and exceed the ability of the aircraft to climb above the hill, causing the aircraft to crash into the surrounding hills.

Figure 9-17. Altered Planes of Reference

AUTOKINESIS

9-34. Autokinesis primarily occurs at night when ambient visual cues are minimal and a small, dim light is seen against a dark background. After about 6 to 12 seconds of visually fixating on the light, one perceives movement at up to 20 degrees in any particular direction or in several directions in succession, although there is no actual displacement of the object. This illusion may allow an aviator to mistake the object fixated as another aircraft. In addition, a pilot flying at night may perceive a relatively stable lead aircraft to be moving erratically, when in fact, it is not. The unnecessary and undesirable control inputs that the pilot makes to compensate for the illusory movement of the aircraft represent increased work and wasted motion, at best, and an operational hazard at worst.

FLICKER VERTIGO

9-35. Flicker vertigo (Figure 9-18) is technically not an illusion; however, as most people are aware from personal experience, viewing a flickering light can be both distracting and annoying. Flicker vertigo may be created by helicopter rotor blades or airplane propellers interrupting direct sunlight at a rate of 4 to 20 cycles per second. Flashing anticollision strobe lights, especially while the aircraft is in the clouds, can also produce this effect. One should also be aware that photic stimuli at certain frequencies could produce seizures in those rare individuals who are susceptible to flicker-induced epilepsy.

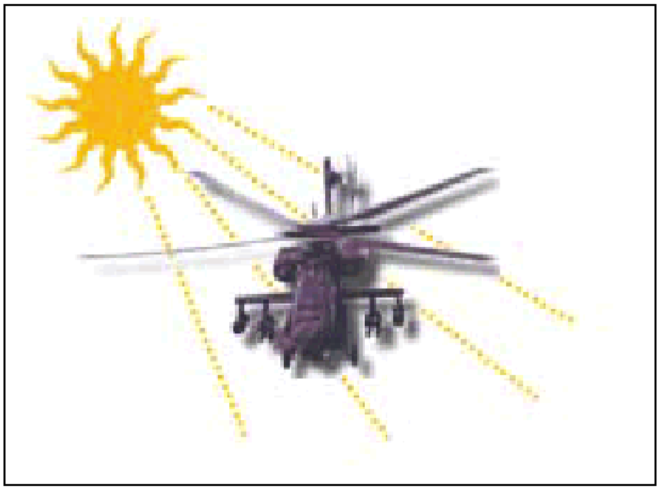


Figure 9-18. Flicker Vertigo

VESTIBULAR ILLUSIONS

9-36. The vestibular system provides accurate information as long as an individual is on the ground. Once the individual is airborne, however, the system may function incorrectly and cause illusions. These illusions pose the greatest problem with spatial disorientation. Aircrew members must understand vestibular illusions and the conditions under which they occur. They must be able to distinguish between the inputs of the vestibular system that are accurate and those that cause illusion.

SOMATOGYRAL ILLUSIONS

9-37. Somatogyral illusions are caused when angular accelerations and decelerations stimulate the semicircular canals. Those that may be encountered in flight are the leans, graveyard spin, and Coriolis illusions.

Leans

9-38. The most common form of spatial disorientation is the leans. This illusion occurs when the pilot fails to perceive angular motion. During continuous straight-and-level flight, the pilot will correctly perceive that he is straight and level (part A, Figure 9-19). However, a pilot rolling into or out of a bank may experience perceptions that disagree with the reading on the attitude indicator. In a slow roll, for instance, the pilot may fail to perceive that the aircraft is no longer vertical. He may feel that his aircraft is still flying straight and level although the attitude indicator shows that the aircraft is in a bank (part B, Figure 9-19). Once the pilot detects the slow roll, he makes a quick recovery. He rolls out of the bank and resumes straight-and-level flight. The pilot may now perceive that the aircraft is banking in the opposite direction. However, the attitude indicator shows the aircraft flying straight and level (part C, Figure 9-19). The pilot may then feel the need to turn the aircraft so that it aligns with the falsely perceived vertical position. Instead, the pilot should maintain straight-and-level flight as shown by the attitude indicator. To counter the falsely perceived vertical position, the pilot will lean his body in the original direction of the subthreshold roll until the false sensation leaves (part D, Figure 9-19).

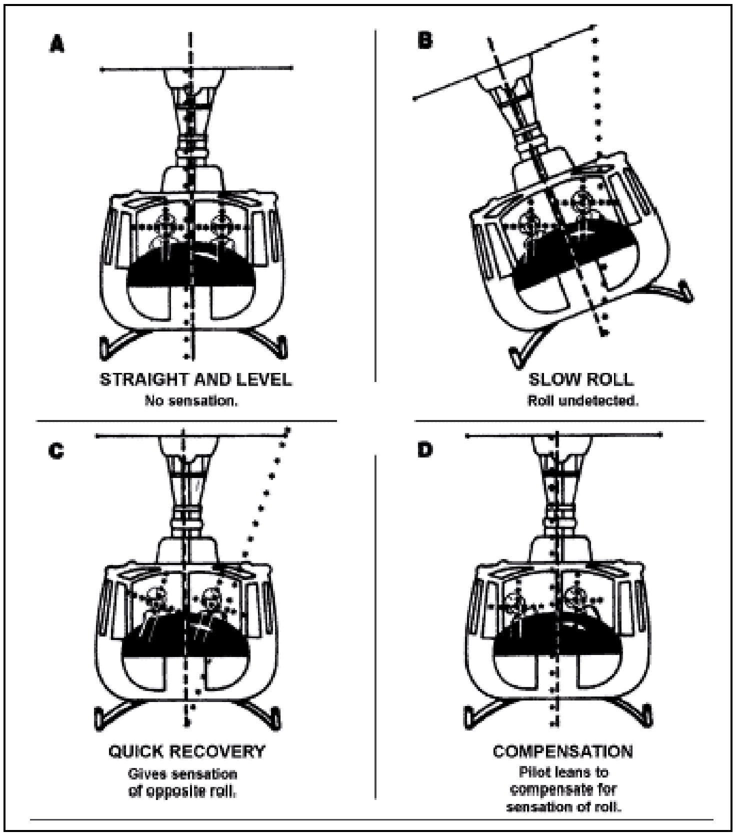


Figure 9-19. Leans

Graveyard Spin

9-39. This illusion, shown in Figure 9-20, usually occurs in fixed-wing aircraft. For example, a pilot enters a spin and remains in it for several seconds. The pilot's semicircular canals reach equilibrium; no motion is perceived. Upon recovering from the spin, the pilot undergoes deceleration, which is sensed by the semicircular canals. The pilot has a strong sensation of being in a spin in the opposite direction even if the flight instruments contradict that perception. If deprived of external visual references, the pilot may disregard the instrumentation and make control corrections against the falsely perceived spin. The aircraft will then reenter a spin in the original direction.

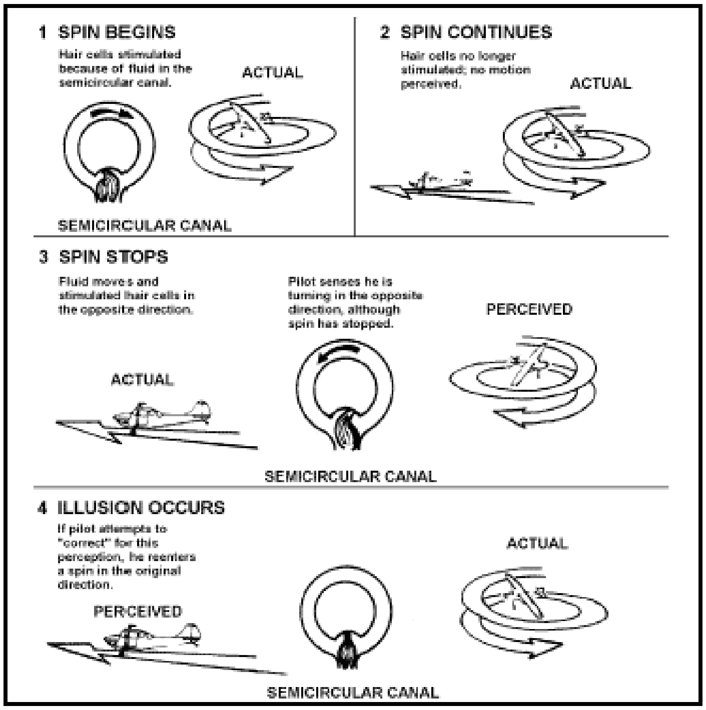


Figure 9-20. Graveyard Spin

9-40. To compound the action of the semicircular canals under these conditions, a pilot, noting a loss of altitude as the spin develops, may apply back pressure on the controls and add power in an attempt to gain altitude. This maneuver tightens the spin and may cause the pilot to lose control of the aircraft.

Coriolis Illusion

9-41. Regardless of the type of aircraft flown, the Coriolis illusion is the most dangerous of all vestibular illusions. It causes overwhelming disorientation.

9-42. This illusion occurs whenever a prolonged turn is initiated and the pilot makes a head motion in a different geometrical plane. When a pilot enters a turn and then remains in the turn, the semicircular canal corresponding to the yaw axis is equalized. The endolymph fluid no longer deviates, or bends, the cupula. Figure 9-21 shows the movement of the fluid in a semicircular canal when a pilot enters a turn.

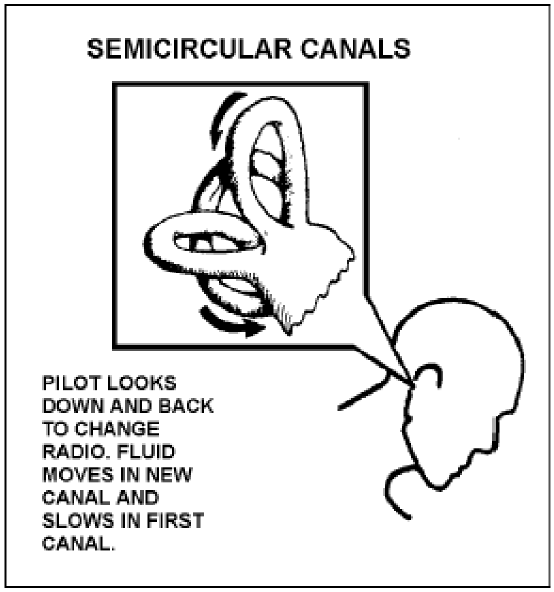


Figure 9-21. Movement of Fluid in the Semicircular Canals During a Turn

9-43. If the pilot initiates a head movement in a geometrical plane other than that of the turn, the yaw axis semicircular canal is moved from the plane of rotation to a new plane of nonrotation. The fluid then slows in that canal, resulting in a sensation of a turn in the direction opposite that of the original turn.

9-44. Simultaneously, the two other canals are brought within a plane of rotation. The fluid stimulates the two other cupulas. The combined effect of the coupler deflection in all three canals creates the new perception of motion in three different planes of rotation: yaw, pitch, and roll. The pilot experiences an overwhelming head-over-heels tumbling sensation.

SOMATOGRAVIC ILLUSIONS

9-45. Somatogravic illusions are caused by changes in linear accelerations and decelerations or gravity that stimulate the otolith organs. The three types of somatogravic illusions that can be encountered in flight are oculogravic, elevator, and oculoagravic.

Oculogravic Illusion

9-46. This type of illusion occurs when an aircraft accelerates and decelerates. Inertia from linear accelerations and decelerations cause the otolith organ to sense a nose-high or nose-low attitude. In a linear acceleration, the gelatinous layer, which contains the otolith organ, is shifted aft. The aviator falsely perceives that the aircraft is in a nose-high attitude. A pilot correcting for this illusion without cross-checking the instruments would most likely dive the aircraft. This illusion does not occur if adequate outside references are available. If making an instrument approach in inclement weather or in darkness, the pilot would be considerably more susceptible to the oculogravic illusion. An intuitive reaction to the sensed nose-high attitude could have catastrophic results

Elevator Illusion

9-47. This illusion occurs during upward acceleration. Because of the inertia encountered, the pilot’s eyes will track downward as his body tries, through inputs supplied by the inner ear, to maintain visual fixation on the environment or instrument panel. With the eyes downward, the pilot will sense that the nose of the aircraft is rising. This illusion is common for aviators flying aircraft that encounter updrafts.

Oculoagravic Illusion

9-48. This illusion is the opposite of the elevator illusion and results from the downward movement of the aircraft. Because of the inertia encountered, the pilot's eyes will track upward. The pilot's senses then usually indicate that the aircraft is in a nose-low attitude. This illusion is commonly encountered as a helicopter enters autorotation. The pilot's usual intuitive response is to add aft cyclic, which decreases airspeed below the desired level.

PROPRIOCEPTIVE ILLUSIONS

9-49. Proprioceptive illusions rarely occur alone. They are closely associated with the vestibular system and, to a lesser degree, with the visual system. The proprioceptive information input to the brain may also lead to a false perception of true vertical. During turns, banks, climbs, and descending maneuvers, proprioceptive information is fed into the central nervous system. A properly executed turn vectors gravity and centrifugal force through the vertical axis of the aircraft. Without visual reference, the body only senses being pressed firmly into the seat. Because this sensation is normally associated with climbs, the pilot may falsely interpret it as such. Recovering from turns lightens pressure on the seat and creates an illusion of descending. This false perception of descent may cause the pilot to pull back on the stick, which would reduce airspeed. Figure 9-22 shows proprioceptive illusions.

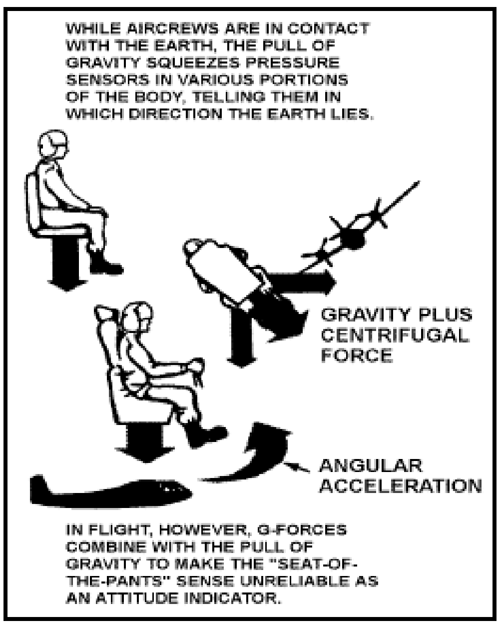


Figure 9-22. Proprioceptive Illusions

PREVENTION OF SPATIAL DISORIENTATION

9-50. Spatial disorientation cannot be totally eliminated. However, aircrew members need to remember that misleading sensations from sensory systems are predictable. These sensations can happen to anyone because they are due to the normal functions and limitations of the senses. Training, instrument proficiency, good health, and aircraft design minimize spatial disorientation. Spatial disorientation becomes dangerous when pilots become incapable of making their instruments read right. All pilots, regardless of experience level, can experience spatial disorientation. For that reason, they should be aware of the potential hazards, understand their significance, and learn to overcome them. To prevent disorientation, aviators should—

- Never fly without visual reference points (either the actual horizon or the artificial horizon provided by the instruments).
- Trust the instruments.
- Avoid fatigue, smoking, hypoglycemia, hypoxia, and anxiety, which all heighten illusions.
- Never try to fly VMC and IMC at the same time.

TREATMENT OF SPATIAL DISORIENTATION

9-51. Spatial disorientation can easily occur in the aviation environment. If disorientation occurs, aviators should—

- Refer to the instruments and develop a good cross-check.
- Delay intuitive actions long enough to check both visual references and instruments.
- Transfer control to the other pilot if two pilots are in the aircraft. Rarely will both experience disorientation at the same time.

Note:
The following references were available for the specialized investigation group to assist in the studies.

- Surviving Spatial Disorientation
- Spatial Disorientation, From Wikipedia, the free encyclopedia.
- Spatial Disorientation -Why you shouldn’t fly by the seat of your pants
- Spatial Disorientation Deaths of Visual Flight Rules Pilots: J. F. Kennedy, Jr., et. al.
- Spatial Disorientation Stories, From AVWEB Question Of The Week

1.16.5 Systems examination:

1.16.5.1 *Cause(s) for the autopilot disconnect*
(Refer to 1.16.1. (Tests and Researches), Cairo March 04 Autopilot Flash 737 March Progress Meeting Flash 737 March Progress, Autopilot Engagement)

1.16.5.2 *Cause(s) for "Heading Select" disengage when the autopilot is engaged* (applied also to the accident aircraft)
(Refer to 1.16.1. (Tests and Researches), Boeing response to the raised questions, enclosure to B-H200-17833-ASI Question B4)

1.16.5.3 *Availability of autopilot during the captain's requests "autopilot, autopilot"* (accident aircraft)
(Refer to 1.16.1. (Tests and Researches), Cairo March 04 Autopilot Flash 737 March Progress Meeting Flash 737 March Progress, Estimated Autopilot Availability, Boeing response to the raised questions, enclosure to B-H200-17833-ASI Question B6)

1.16.5.4 MMEL issues associated with operating the airplane with FD TO/GA mode inoperative (won't stay engaged)
Relevant information to be added upon Human Factors Group discretion

1.16.5.5 *Interlock logic for A/P with the definition of the likelyhood (ruled out, not likely, unknown) to the various interlocks regarding the role they may have played in the autopilot disengagement*
(Refer to 1.16.1. (Tests and Researches), Honeywell SP-300 DFCS B737-300.ppt file, and Flash Airlines Presentation SP-300 DFCS Health Monitoring Honeywell.ppt file)

1.16.5.6 *The effects of the TOGA bit dropping out and way it affects the command bars.*
(Refer to 1.16.1. (Tests and Researches), Boeing AMM 22-03-00, 22-04-00)

1.16.5.7 *Examination of the selected course compared to the selected heading (probability for having "dropouts").*

1.16.6 CVR examination:

1.16.6.1 *Examination of the CVR recording for indications of A/P and heading select switch noises*
(Could not be identified)

1.16.6.2 Examination of CVR at 2.58.15 (when the MSR crew says that they heard a message from Flash on 121.5).
121.5 recording has been checked, no such message was recorded

1.16.7 FDR examination:

1.16.7.1 *Spatial disorientation study of the accident flight based on the recorded FDR data*

TBC (CBS group)

1.16.8 *PCU inspection and teardown (EQA report):*

(Refer to 1.16.1.7. Aileron system)

1.17. Organizational and Management Information

1.17.1. Flash Airlines

1.17.1.1. Flash Airlines Air Operator Certificate (AOC)

Flash Airlines was approved as air operator (charter air carrier) under ECAR 121 by the ECAA, and operating under approval no 018.

Flash Airlines has its main office in Cairo, Egypt at 166b El Hegaz St. Heliopolis. Beginning in 2000, Flash Airlines leased the first B737-300 from the International Lease Financial Corporation (ILFC). In June 2001 another B737-300 from ILFC was added to Flash Airlines fleet, which made the company fleet two aircraft the same type. The Operations Specifications was issued to the company in Feb 2000 and the last revision was on October 29th 2003.

ARAB REPUBLIC OF EGYPT
MINISTRY OF CIVIL AVIATION

AIR OPERATOR CERTIFICATE

This certifies that

FLASH AIRLINES

Has met the requirements of the MINISTRY OF CIVIL AVIATION and related operating regulations and rules prescribed thereunder for the issuance of this certificate and is hereby authorized to conduct Air-Carrier operation in accordance with said operating regulations and rules prescribed thereunder and the terms, conditions and limitations contained in the attached Operation Specifications.

*This certificate is not transferable and, unless sooner surrendered, suspended or revoked, shall continue in effect until **February 23, 2004** or terminated.*

Pilot / Saleh Moussa
SALEH . A . MOUSSA
Head of Operations & Air Transport Sector
20 - 2 - 2003

CERTIFICATE NO. : 18
CERTIFICATE ISSUE DATE : **February 24, 2000**

1.17.1.2. History

Flash Airlines is also approved under ECAR 145 as a repair station. The approval number is CAI/FLASH?AS/1/2001. The certificate is valid until July 30th, 2004 and was issued on July 31, 2001. The certificate is limited to line maintenance up to the 8A check for the B737-300. Flash Airlines maintenance base is Cairo international Airport.

Flash Airline Organization Chart:

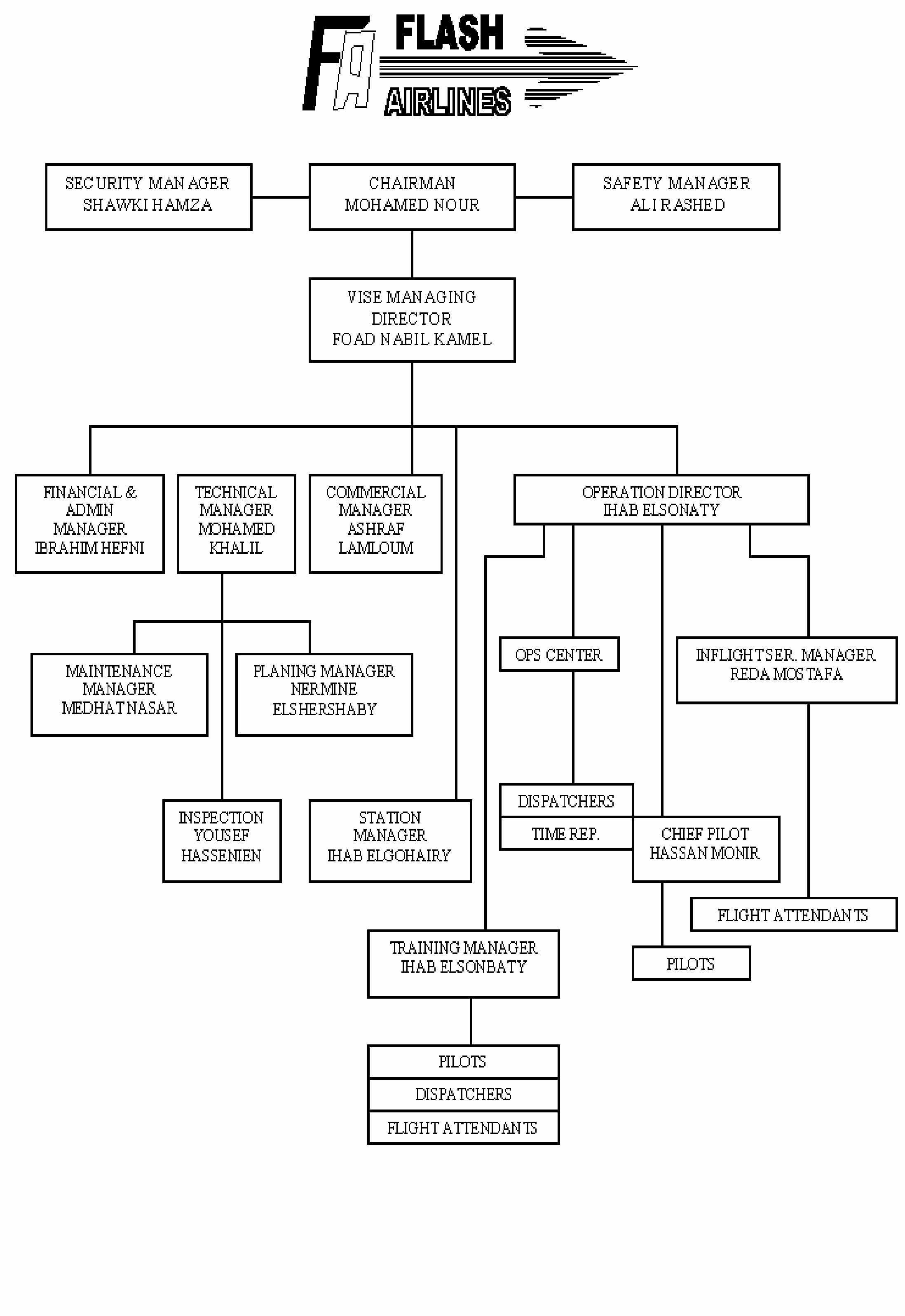


Figure 1.17.1-1 Flash Airlines Organization Chart

Flash Airlines coordinates the maintenance program through its ECAR Part 145 certificate. The Company General Maintenance Manual (GMM) provides guidance related to the Aircraft Maintenance program as the Maintenance Procedures, Maintenance staff Training… etc.

Personnel working on Flash Airlines Fleet at the various maintenance facilities must be familiar with the policies and procedures spelled out in the company GMM. The Quality Control Manager puts the newly hired employees through a twelve-hour Indoctrination Course. The Indoctrination course includes Flash Airlines policy/ procedures, and training practices. It is accomplished before maintenance engineer begins to work at the Flash Airlines facility. The training is documented on a maintenance training attendance record, recorded on the employee's training file.

1.17.1.3. Personnels Training and Authorization

1.17.1.3.1. Maintenance Engineers

According to ECAR 65 the requirements for granting authorization for ground engineer are as follow:

1- Graduation from Faculty of Engineering or an approved training institute.
2- Passing the approved Basic training Course at approved Training Center or institute.
3- On Job Training for 18 months.
4- Passing written, practical and oral exams by the authority for License without Type Rating (LWTR).
5- Passing an approved training course for a specific type airframe and engine.
6- On Job Training (OJT) on the type airframe and engine for 9 months.
7- Attendance of training course for the company exposition procedure manual.
8- Passing oral and practical examination in front of the Company Examination Board (approved by the authority)
9- Getting the company approval.

Flash Airlines maintains its training program in compliance with Egyptian Civil Aviation Regulation requirements. The Maintenance Director and the Quality Control Manager have joint responsibility for assuring all required training is performed and recorded.

Indoctrination training proceeds an employee's start date. The employee is given a 4-hour introduction course that trains one on Flash Airlines maintenance policies and procedures. The training will be documented on a maintenance training attendance record and maintained in the employee's training file.

The aircraft systems training for the A & C Engineers is accomplished through formal systems training and On-the-Job Training (OJT) Worksheets.

Engineer Mustafa Erfan carried out the last pre- flight release.

1.17.1.3.2. Cockpit Crews

Refer to Exhibit F Operation Group Factual Report, Attachment 1

1.17.2. Review of oversight by ECAA on 2003

1.17.2.1 Safety oversight carried out on Flash Airline during the period from 2 Jan, 2003 to 16 Jan 2003 before AOC renewal
The oversight findings and the relevant actions taken by the airline are shown in the table below

A- Operation Findings

	Findings	Actions Taken
1	There is no Training Program	Training Program is submitted and approved
2	There is no Internal Evaluation Program (IEP)	IEP is submitted and approved
3	There is no Line check Training for Captains	Line Check Training is performed
4	No ECAR Training Course was performed recently	Training course has started and it will take some time to cover all the operation personnel
5	There is no approved Training Class	Training Class is Approved.
6	There are no DRM &CRM Training course performed for cockpit crews ,dispatchers and cabin crews	The Airline has introduced a training plan starting on Sep 2003 to be done in PAS Airline
7	No of cockpit crews are not fulfilling the minimum requirement of ECAA	The cockpit crews are sufficient for required operation and the airline will recruit more cockpit crews to fulfill the future operation requirements
8	By reviewing the A/C log book sheets found that ,some sheets not filled out and other some have missed data	The airline issued circular for all cockpit crews and maintenance staff to strictly comply with log book sheets filling out instructions
9	By reviewing the airline TM,GOM and Dispatch Manual some findings were discovered	All findings are covered
10	The submitted station manual not fulfilling ECAA requirements	The Station Manual was updated to fulfill the ECAA requirements
11	The Safety Manual which was submitted by the airline does not meet ECAA requirements	New manual revision is in progress
12	Cabin Crew does not use safety and emergency check lists	A circular was issued for the cabin crew to strictly comply with the written instruction for using the check lists
13	There is no security program for Aircraft	The program is submitted and approved
14	Load sheet calculations for some flights not accurate	Load sheet calculations training course is planned to be done for all flight dispatchers

B-Airworthiness Findings

	Findings	Actions Taken
1	There is shortage of some maintenance equipment and tools	The unavailable equipment and tools will be loaned from EgyptAir when required
2	Personnel files are not updated	Files are updated
3	GMM is not Updated	GMM is updated
4	There is no AMM in the library	AMM is Available now in the library
5	MPD, AFM, CMEL, and FOM are not Updated	All manuals are updated
6	There is no Training Program for Recurrent Course	The recurrent training program was submitted and approved
7	Authorization Board does not include electric engineer	The electric engineer authorization will be issued by ECAA
8	The airline has not submitted SOC 121	SOC 121 was submitted and Accepted
9	Some parts are not calibrated	The parts required to be calibrated were sent to EgyptAir for calibration
10	Safety wire of fire bottles do not meet the standards	Safety wire corrected to meet the standards
11	Spare parts in the store are not sufficient	The required spare parts will be loaned from EgyptAir when required
12	A/C tires storage is not according to the storage requirement	Storage requirement familiarization course is performed for the storage keepers
13	The storage keepers are not familiar With GMM	GMM training course is planned to be performed
14	There is no safety requirement program	The program is submitted and approved
15	By reviewing the TLB Sheets ,found that , some sheets not including PDC Maintenance Release and ECM data	An inspection Circular is issued for the maintenance personnel sign PDC Release after PDC performing

1.17.2.2 Safety oversight carried out on Flash Airline on 16 Jul 2003 before AMO Certificate renewal

The oversight findings and the relevant actions taken by the airline are shown in the table below

	Findings	Action Taken
1	There is no W&B Program	The program is submitted and approved
2	Human factors training program for the engineers not yet submitted to ECAA for approval	Human factors training program for engineers is submitted to ECAA and approved

1.17.3. Relevant Flash Airlines procedures:

1.17.3.1 Flash Airlines procedures regarding use of autopilot when recovering from unusual attitudes
Refer to Flash Airline FOM (Ops Group)

1.17.3.2 Flash Airlines procedures regarding Upset Recovery training

MCA requirements regarding Upset Recovery are not mandatory.
Refer to Flash Airline FOM (Ops Group)

1.17.3.3 Flash Airlines procedures regarding “training about PNF assuming control when the PF is not responding to situations, callouts"

4. CREW HEALTH PRECAUTIONS

A crew member's sickness/illness, his feeling unwell/indisposed or the impairment of his senses and reflexes by narcotics, drugs or pharmaceutical preparations/medicaments have quite often contributed to incidents and accidents.
Therefore, crew health is of the highest importance and has a direct impact upon flight safety. This is reflected in very stringent requirements for regular medical examinations and medical certificates. It hardly needs to be mentioned that living health - consciously is in the self-interest of every crew member.
Note: For incapacitation of crew members
crew member shall not perform duties on an aeroplane if he is in any doubt of being able to accomplish his assigned duties, or if he knows or suspects that he is suffering from fatigue, or feels unfit to the extent that the flight may be endangered.

4.1 Incapacitation of Crew Members

4.1.1 Definition

Incapacitation of a crew member is defined as any condition which affects the health of a crew member during the performance of duties - associated with the duty/position assigned to him - which renders him incapable of performing the assigned duties.

The definition includes either total or partial incapacitation which does not allow the fulfilment of duties in the "normal" way.

4.1.2 General

In-flight pilot incapacitation is a valid safety hazard and has already caused many accidents. Incapacities have occurred more frequently than other emergencies which are the subject of extensive training (such as engine failure, cabin fire etc). Aviation history and statistics indicate that incapacities may occur in all age groups and during all phases of the flight. There are many forms of incapacitation ranging from obvious sudden death to a lingering and difficult to detect partial loss of functions.

4.1.3 Types of Incapacitation

Obvious incapacitation; means total functional failure and loss of capabilities. This generally will be easily detectable and will be a prolonged condition. Among the possible causes are heart disorders, severe brain disorders, severe internal bleeding, etc.
Subtle incapacitation; this may be considered a more significant operational hazard, because it is difficult to detect and the effects can range from partial loss of functions to a complete unconsciousness. Possible causes might be minor brain seizures, hypoglycemia (low blood sugar), other various medical

disorders or preoccupation with personal problems. Since the crew member concerned may not be aware of, or capable of rationally evaluating his situation, this type of incapacitation is more dangerous!

4.1.4 Causes and Effects

As explained before, incapacitation may range from minor cases of physiological up-sets associated with intercurrent mild disease or mental stress which may result in reduced levels of judgement or physical coordination up to a complete collapse.

Among the causes for a mild incapacitation one may list: Body pains such as toothache, headache, gastroentehtis, the delayed effects of alcohol, drugs or medication, common disorders such as a cold, etc. Heart troubles, an acute infec-tion thrombosis, epilepsy, hypoglycemia (extremely low level sugar) and others belong to the more serious causes of a sudden collapse. At least one incident is known, where a crew member had a heart attack right after his aviation medical examination, so a passed medical exam is not a guarantee!

It is obvious that living more health consciously may reduce the number of occurrences of also the avoidance of stress in your business and private life. Chapter **4.1** covers the subject of health precautions.

4.1.5 Recognition of an Incapacity

An early recognition of a incapacity is of outmost importance. A silent collapse will hardly be detected during normal activities (for instance during the cruise phase of a flight), as communications may sometimes be reduced to a minimum. This requires that all crew members monitor each other very closely.

"Closely" means, observing the other crew members for any "abnormal" reaction/action or behavior. One good method is to use the so called "TWO COMMUNICATION RULE". This simply means, that one crew member's comment must be answered by the other crew member(s).

If - for instance - the PNF reports the aeroplane being left of course, it is essential, that the PF not only corrects this problem but also confirms this verbally. If a crew member doesn't answer any question or checklist item in the normal way, there is reason to believe that there might be the beginning of a subtle incapacitation.

crew member incapacitation. This includes avoidance of drugs, moderate consumption of alcohol, adequate rest time -and its proper use for recreation - adequate sleep and nutrition but

Here is an illustration of the use of the Two Communication Rule:

1. the PNF, for example, notices the airplane is left of course,

2. the PNF notifies the PF of the abnormal condition (the first communication), but
3. the PF does not respond in any manner (verbally or by correcting the flight path),
4. the PNF repeats the abnormal condition to the PF (the second communication),
5. the PF again fails to respond,
6. after the PF fails to respond to the second communication, the PNF should assume the PF is incapacitated and should take action as described in Section **4.1.6**

At the worst he may simply have fallen asleep.
Other symptoms of the beginning of an incapacitation are:

- incoherent speech;
- strange behaviour;
- irregular breathing;
- pale fixed facial expression;
- jerky motions that are either delayed or too rapid.

If any of these are present, incapacitation must be suspected and action taken to check the state of the crew member.

4.1.6 Actions to be taken when an incapacity is recognised.

First Step

- take over control of the aeroplane by announcing "I have control",
- engage autopilot,
- declare an urgency or emergency -whichever is applicable -,
- have an incapacitated cockpit crew member removed from his seat. In any case his seat should be moved fully back to prevent obstruction of flight controls, switches, levers, etc. The help of other crew members or passengers might be required,
- if necessary, reset COM and NAV to your side

Second Step

- take care of the incapacitated crew member by trying to provide first aid (ask if doctors or other medical persons are aboard),
- arrange a landing as soon as practicable after considering all pertinent factors,
- arrange medical assistance after landing
- giving as many details about the condition of the affected crew member as possible.

Third Step

- prepare for landing (cockpit and cabin), but do not press for a hasty approach
- perform approach checklist earlier than normal (request assistance from other crew members or "capable" persons),
- request radar vectoring and make an extended approach where possible - to reduce workload,
- for landing do not change seats - fly the aeroplane from

that position you initially were assigned to.

- organise work after landing; this shall include
  - depending on the situation, a change of seats for taxiing in, but only after the aeroplane has come to a complete stop;
  - having the incapacitated crew member offloaded and to the ambulance as quickly as possible;
  - arrangements for the parking of the aeroplane.

NOTE:

1. The company operations department must be kept informed at all times regarding the above circumstances for immediate relay to the Manager Flight Operations.
2. In case of incapacitation of the system panel operator, pilots shall refer to procedures as published in the AOM.

4.1.7 Summary

The problems involved with incapacitation of crew members may be summarised as follows:

1) If you do not feel well, say "NO" before the flight.

2) Remember, that the best medical examination as well as a health conscious life still do not guarantee that an incapacitation during flight will not happen to you or to your other crew members.

3) The "TWO COMMUNICATION RULE" must be used in order to have a chance of detecting any incapacitation in time. Take notice of any abnormal or unusual action of another crew member, as this might also be an indication of onset of incapacitation.

4. Once an incapacitation is identified, remember the three basic steps:

Step 1) Take over the aeroplane and bring it under YOUR control.

Step 2) Take care of the incapacitated pilot (either have him removed from his seat or fixed so that he will not interfere the controls).

Step 3) Prepare for landing.

Finally, it is emphasised that incapacitation requires special actions using the good judgement of the crew member left in command of the aeroplane.

4.2 ALCOHOLIC BERVERAGES

The use of intoxicating beverages by **FLASH AIR** flight crew members must of necessity be strictly regulated.

The following rules must be strictly observed by all flight crew members at all times:

1. No alcoholic beverage shall be consumed on the same calendar day that a crew

1.17.3.4 *Flash Airlines training/operational information regarding intervention by the non-flying pilot when the flying pilot fails to respond to calls for correcting an unsafe situation*.
Refer to previous item

1.17.3.5 Regularity (or irregularity) rules regarding sleeping schedules on and off-duty. Strategies for obtaining adequate rest and managing crew on-duty alertness
Refer to Flash Airline FOM (Ops Group)

1.17.3.6 General description about Flash Airline.
(Date of foundation or transition, location of offices and bases, number of aircrafts operated, number of pilots and other personnel, annual flights, passengers carried,revenues, routes flown, and financial health)
(All relevant information are already included in the Factual Report)

1.17.3.7 Labor management issues, growth trends, and main competitors.
Closed

1.17.3.8 Egyptian requirements for the training of pilots at an airline such as Flash Airlines.

GENERAL. The following outline is intended to clarify the six categories of training used by operators and defined in Part 121, Subpart N. This clarification is intended to both define the type of training and describe for the Operator when each category of training is applicable.

APPLICABILITY OF TRAINING CATEGORIES. Usually, operators will need to conduct training in all six categories of training. Recurrent training applies to all operators. Initial equipment training, transition training, upgrade training, and requalification training apply in most situations. However, transition training is not applicable for an operator who operates only one aircraft type. Initial new hire training applies to operators who train and qualify newly hired personnel or personnel who have not been previously qualified as a crewmember by that operator.

CATEGORIES OF TRAINING. There are six basic categories of training applicable to Part 121 operators. The primary factors which determine the appropriate category of training are the student's previous experience with the operator and previous duty position. Each category of training consists of one or more curriculums, each one of which is specific to an aircraft type and a duty position (for example: A-320 SIC, and A-320 PIC). Training should be identified with and organized according to specific categories of training. When discussing training requirements, MoCA inspectors should be specific regarding the category of training being discussed and use the same references as are stated in Part 121 Subpart N. Inspectors should encourage operators to use this nomenclature when developing new training curriculums or revising existing training curriculums. Use of this common nomenclature improves standardization and mutual understanding. The six categories of training are briefly discussed in the following subparagraphs:

A. Initial New Hire Training. This training category is for personnel who have not had previous experience with the operator (newly hired personnel). It also applies, however, to personnel employed by the operator who have not previously held a cockpit crewmember duty position with that operator. Initial new hire training includes basic indoctrination training and training for a specific duty position and aircraft type. Except for a basic indoctrination curriculum segment, the regulatory requirements for "initial new hire" and "initial equipment" training are the same. Since initial new hire training is usually the employee's first exposure to specific company methods, systems, and procedures, it must be the most comprehensive of the six categories of training. For this reason, initial new hire training is a distinct separate category of training and should not be confused with initial equipment training. Initial equipment training is a separate category of training.

B. Initial Equipment Training (PIC and SIC). This category of training is for personnel who have been previously trained and qualified for a duty position by the operator (not new hires) and who are being reassigned for any of the following reasons:

(a) Reassignment is to any duty position on an airplane of a different group (Group IIIP is reciprocating and turbopropeller powered and Group IIIJ is turbojet powered).

(b) Reassignment is to a different duty position on a different airplane type when the cockpit crewmember has not been previously trained and qualified by the operator for that duty position and airplane type.

C. Transition Training. This category of training is for an employee who has been previously trained and qualified for a specific duty position by the operator and who is being assigned to the same duty position on a different aircraft type and the different type aircraft must be in the same group. If it is not in the same group, initial equipment training is the applicable category of training.

D. Upgrade Training. This category of training is for an employee who has been previously trained and qualified as SIC or PIC (not eligible for requalification training) by the operator and is being assigned as PIC to the same aircraft type for which the employee was previously trained and qualified as SIC or PIC on the same type.

E. Recurrent Training. This category of training is for an employee who has been trained and qualified by the operator, who will continue to serve in the same duty position and aircraft type, and who must receive recurring training and/or checking within an appropriate eligibility period to maintain currency.

F. Requalification Training. This category of training is for an employee who has been trained and qualified by the operator, but has become unqualified to serve in a particular duty position and/or aircraft due to not having received recurrent training and/or a required flight or competency check within the appropriate eligibility period. Requalification training is also applicable in the following situations:

* PICs who are being reassigned as SICs on the same aircraft type when seat dependent training is required
* PICs and SICs who are being reassigned as FEs on the same aircraft type, provided they were previously qualified as FEs on that aircraft type

G. Summary of Categories of Training. The categories of training are summarized in general terms as follows:

(a) All personnel not previously employed by the operator must complete initial new hire training.

(b) All personnel must complete recurrent training for the duty position and aircraft type for which they are currently assigned within the appropriate eligibility period.

(c) All personnel who have become unqualified for a duty position on an aircraft type with the operator must complete requalification training to reestablish qualification for that duty position and aircraft type.

(d) All personnel who are being assigned by the operator to a different duty position and/or aircraft type must complete either initial equipment, transition, upgrade, or requalification training depending on the aircraft type and duty position for which they were previously qualified.

Experience Hours Pre-Requisites for Different Training

ECAR Part 121.400 Groups of aircraft	*Requirements For*	Upgrade	*Initial New Equipment*		*Initial New Hire*	
(A) 121 - Air Taxi. **Not exceed 5700 kg's**			*SIC*	*PIC*	*SIC*	*PIC*
Group (I): Single Engine Airplane	1.Total Flight Experience. 2.Flight Experience on Aeroplane Group. 3.Flight Experience on Aeroplane Type.	2150 300 100	500 300	2150 300	200	2150 300
Group (II) : Multi -Engines Airplane	1.Total Flight Experience. 2.Flight Experience on Aeroplane Group. 3.Flight Experience on Aeroplane Type.	2500 500 150	500 300	2500 500	200	2500 500
(B) 121 –Air Carriers & Air Taxi **Group (IIIP)** >5700 kg						
Reciprocating power	1.Total Flight Experience. 2. Flight Experience on Aeroplane Group. 3.Flight Experience on Aeroplane Type.	3000 750 300	500 300	3000 750	200	3000 750
Turbopropeller powered	1.Total Flight Experience. 2.Flight Experience on Aeroplane Group. 3.Flight Experience on Aeroplane Type.	3500 1500 500	700 500	3500 1500	200	3000 1500
Group (IIIJ) >5700 kg Turbo– Jet Powered	1.Total Flight Experience. 2.Flight Experience on Aeroplane Group. 3.Flight Experience on Aeroplane Type.	4000 2500 300	1200 1000	4000 2500	300	4000 2500
(C) 121 – Air Carriers & Air Taxi Helicopter	1.Total Flight Experience. 2. Flight Experience on Aircraft Category. 3.Flight Experience on Aircraft Type.	1000 300 120	450 300	1000 300	150	1000 300

Two Pilots Flight Training Minimum Hours Required

ECAR Part 121.400 Groups of aircraft	Upgrade SIC to PIC	Transition		*Initial New Equipment*		*Initial New Hire*	
(A) 121 - Air Taxi. Not exceed 5700 kg's		*SIC*	*PIC*	*SIC*	*PIC*	*SIC*	*PIC*
Group (I): Single Engine	2	4	4	4	4	8	8
Group (I) & (II): VFR only	4	4	4	4	4	4	4
Group (II) & (II): IFR/VFR	4	8	8	12	12	16	16
(B) 121 – Air Carriers & Air Taxi							
Group (IIIP) : Exceeds 5700 kg							
• **Reciprocating power**	12	20	20	20	20	24	24
• **Turbopropeller powered**	12	20	20	20	20	24	24
Group (IIIJ) : Turbo– Jet Powered	12	24	24	24	24	28	28
(C) 121 – Air Carriers & Air Taxi Helicopter							
• **VFR only**	4	4	4	4	4	4	4
• **IFR/VFR**	4	8	8	12	12	16	16

One Pilot Flight Training Minimum Hours Required

ECAR Part 121.400 Groups of aircraft	Upgrade SIC to PIC	Transition		*Initial New Equipment*		*Initial New Hire*	
(A) 121 - Air Taxi. Not exceed 5700 kg's		***SIC***	***PIC***	***SIC***	***PIC***	***SIC***	***PIC***
Group (I): Single Engine	4	4	4	4	4	6	6
Group (I) & (II): VFR only	2	3	3	3	3	4	4
Group (II) & (II): IFR/VFR	4	6	6	6	6	8	8
(B) 121 – Air Carriers & Air Taxi							
Group (IIIP) : Exceeds 5700 kg							
• **Reciprocating power**	6	12	12	14	14	14	14
• **Turbopropeller powered**	6	12	12	15	15	15	15
Group (IIIJ) : Turbo– Jet Powered	6	12	12	16	20	16	20
(C) 121 – Air Carriers & Air Taxi Helicopter							
• **VFR only**	2	3	3	3	3	4	4
• **IFR/VFR**	4	6	6	8	8	10	10

See also Pilots training documents included in items 1.5.1 and 1.5.2

1.17.3.9 The training that was actually provided to all Flash Airlines pilots
Pilots training documents are included (refer to 1.5.1 and 1.5.2)

1.17.3.10 Flash Airlines procedures regarding pilots training and checking on operation of the auto flight system. .
No specific form is available (refer to 1.5.1 and 1.5.2)

1.17.3.11 Flash Airlines program for training and checking pilots in the field of CRM and human factors (as contained in the company training manual)
No mandatory training was required by ECAR at the time of the accident. However, CRM course is outlined in Flash Airline Training Manual 4.10

1.17.3.12 Flash Airlines pilots procedures for training and checking pilots on spatial disorientation countermeasures and upset recovery
Spatial Disorientation training is not a requirement by Civil Aviation Authorities. However, some literature about this subject is included in Flash Airline Training Manual.

1.17.3.13 Flash Airlines policies regarding use of CRM.
Refer to 1.17.3.11.

1.17.3.14 Flash Airlines policies relating to assertiveness and company guidelines as to when a first officer should take control of an aircraft from a captain.
Refer to 1.17.3.3.

1.17.3.15 Flash Air general company policies related to crew communication, assertiveness, and other CRM-related behaviors
Refer to 1.17.3.3.

1.17.3.16 Flash Airlines policies regarding use of the auto flight system
(To be referred to the OPS group)

1.17.3.17 Regulations governing operators (like Flash Airlines) regarding Oversight audits by ECAA.
ECAA regulations require every operator to undergo an oversight audit once every 12 month

1.17.3.18 Details about the ECAA oversight audit on Flash Airlines
Is already included in the Factual Report

1.17.3.19 Outcomes of Oversight audits (previous violations, fines, or bans levied by ECAA)
Is already included in the Factual Report

1.17.3.20 Previous violations, fines, or bans levied foreign aviation regulatory agencies.
None identified

Reviewing this report indicated that the ban was due to a conflict on financial issues and no relevant safety issues were mentioned.

1.17.3.21 Selected additional information regarding Flash Airlines Organization including:

- Organization and responsibilities Chapter 1 FSH 1.5.1/ 1.5.2
- Organization and responsibilities Chapter 1 FSH 1.8.7
- Qualification requirements Chapter 3 FSH 3.3.1/ 3.3.2
- Crew Health Precautions Chapter 4 FSH-4.1.1- 4.1.4
- Operating Procedures Chapter 6 FSH 6.3.44/ 6.3.45/ 6.3.46
- Training details Flash Training Manual Chapt 05 Page 7

All pertinent information are included in the Factual Report

1.17.3.22 Airline Simulator program contract with RAM, ECAA letter of approval

ARAB REPUBLIC OF EGYPT
MINISTRY OF CIVIL AVIATION
Egyptian Civil Aviation Safety & Security Authority

Full Flight Simulator Approval Certificate

Aircraft Type B737 - 500

Issued to: ***EgyptAir***

AIR OPERATOR CERTIFICATE

AOC Number: ***MSR-AC 010 (B737/500SIM-2DG)***

Simulator Operator: **Air Maroc – Casablanca**

CAIRO
September, 2003

Our Ref. MSR - AC010 – B737-500 FLT SIM-2/D
Date: **24**, *September 2003*

The General Manager Flight Training (GMFT)
Flight Operations, EgyptAir,
Cairo International Airport,
Cairo, Egypt.

To: GMFT, EgyptAir

APPROVAL TO USE THE FLIGHT SIMULATOR SPECIFIED IN THE ENCLOSED DOCUMENTATION

Please find enclosed the required Approval Certificate and Licensing Considerations for the use of the requested Flight Simulator.

Yours sincerely,

Issued at: ***Cairo, Egypt***
Date: **24**, ***September 2003***

Signature: SALEH.A.MOUSSA
Head of,
Egyptian Civil Aviation Safety & Security Authority

Enclosure.

1. ***B737-500.FLT. SIM Approval to EgyptAir.***
2. ***Approval Certificate to Air Maroc, Casablanca***
3. ***Licensing Considerations***
4. ***Terms of Approval***

Arab Republic of Egypt Ministry of Civil Aviation **Egyptian Civil Aviation Safety & Security Authority**		جمهورية مصر العربية وزارة الطيران المدني سلطة الطيران المدني المصري

CERTIFICATE OF APPROVAL

FLIGHT SIMULATOR

*Number: **MSR-AC010-B737-500 FLT. SIM-2D***

This Certificate is issued to:

EgyptAir

Whose Business Address is:

Cairo International Airport
Cairo, Egypt.

On behalf of the Egyptian Civil Aviation,
It is hereby certified that the Flight Simulator for

B737-500

Located at

Royal Air Maroc,
Casablanca Airport
Anfa

Has Satisfied the Qualification Requirements Prescribed In

Egyptian Civil Aviation Regulations (ECARs) Part 121 Section 121- 407 Approval of Aircraft Simulators, and Appendices "E" and "F" Flight Training, Proficiency Check Requirements Respectively, and Appendix H to Part 121- Advanced Simulation. The Simulator must Maintain French DGCA, Approval and Qualification Level with JAR STD 1A as Reference

Subject to the conditions of the attached Specifications.

*This Certificate is not transferable, and unless cancelled, revoked, suspended or varied shall continue in effect **from September 24th 2003 until the end of September, 2004***

Issued at: ***Cairo, Egypt***
Date: 24, ***September 2003***

Signature: SALEH.A. MOUSSA
Head of,
Egyptian Civil Aviation Safety & Security Authority

Arab Republic of Egypt Ministry of Civil Aviation **Egyptian Civil Aviation Safety & Security Authority**		جمهورية مصر العربية وزارة الطيران المدنى سلطة الطيران المدنى المصري

APPROVAL CERTIFICATE

FLIGHT SIMULATOR

This Certificate is issued to:

Air Maroc

Whose Business Address is:

Air Maroc,
Casablanca
RAM

Upon finding that its organization complies in all respects with the requirements of the Egyptian Civil Aviation Regulations relating to the establishment of a Flight Simulator as described below, for the approved Training and Testing for ***EgyptAir-Cairo***. This certificate, unless cancelled, suspended or revoked, shall continue in effect until ***end of September 2004***

Simulator Specifications:

Aeroplane/Type/Class Simulated Category Data Package	*B737/400-500* : *Full Flight Simulator* : *Boeing STD*
Manufactured by Approval and Level	: *CAE Electronics LTD - 1993.* : *JAR – STD 1A Level "GD"*
Engines Type Engine Instrumentation	: *CFM – 56 – C1* : *Boeing Standard*
AFCS / EFIS *Flight Management System*	: ***Honywell / Collins*** : ***Smith Industires***
Visual System Manufacturer ;and Type	: *Vital VII, Day / Bright Day / Dusk / Night.* : *180 *40*
Motion System/ and control loading Manufacturer	: *CAE/Hydraulic actuator with digital control electronics* : *6 Degrees of Freedom CAE series 500 6 DOF*
Other Equipment	: TCAS-ATIS & RT Chatter-SATCOM-EGPWS-GPS
Simulated Computer Manufacturer; and Type (Host Computer)	: *IBM Risc 6000*
Instructor's Station	: *Dual Indigo Touchscreen*

Note: (1) A satisfactory assessment of one simulator session is required before use.

Note: (2) A satisfactory assessment of flight Simulator Operators is required by ECASSA Flight Inspector.

No. and Date of Issue: ***MSR-B737/500 2D*** ***24, September 2003***	*Signature:* SALEH.A.MOUSSA ***Head of,*** **Egyptian Civil Aviation Safety & Security Authority**

Arab Republic of Egypt Ministry of Civil Aviation Egyptian Civil Aviation Safety & Security Authority		جمهورية مصر العربية وزارة الطيران المدنى سلطة الطيران المدنى المصري

TERMS OF APPROVAL

Issued To: ***Royal Air Maroc - Casablanca***
Number: ***MSR-AOC-AC 010 –B737/500 FLT SIM - Issue 1***
Date of Issue: ***24/09/2003***

The following terms of approval have been granted to ***Royal Air Maroc - Casablanca*** *in respect of their organization at:*

Royal Air Maroc,
Casablanca Airport
Anfa

1. ***B737/500 Simulator to maintain French DGCA Approval.***
2. ***The Simulator maintains Qualification Level "D" with JAR -STD 1A as reference Document until the end of September 2004, unless sooner refused, revoked, suspend or varied.***

Issued at: ***Cairo, Egypt***
Date: ***24th of September 2003***

Signature: SALEH A. MOUSSA
Head of,
Egyptian Civil Aviation Safety & Security Authority

Liberté · Égalité · Fraternité

RÉPUBLIQUE FRANÇAISE

ministère de l'Equipement des Transports du Logement du Tourisme et de la Mer

direction générale de l'Aviation civile

service de la Formation aéronautique et du Contrôle technique

Certificat de Qualification STD

(STD QUALIFICATION CERTIFICATE)

Nr F-173Z

Pour le compte de la Direction Générale de l'Aviation Civile, membre des Autorités Conjointes de l'Aviation (JAA), il est déclaré par ce document que le simulateur de vol

(on behalf of the French DGAC, a member of the Joint Aviation Authorities it is hereby certified that the under mentioned flight simulator)

B 737-500

Situé à

(located at)

[redacted]

A satisfait les exigences de qualification du JAR-STD 1A et est qualifié pour le niveau **DG**

(has satisfied the qualification requirements prescribed in JAR-STD 1A and is qualified for level DG)

Ce certificat n'est pas transmissible et, à moins qu'il ne soit suspendu, retiré ou modifié, reste valable jusqu'au :

(this certificate is not transferable and unless sooner suspended revoked or varied, shall continue in effect until)

[redacted] *(31st October 2005)*

L'adjoint au Chef du Bureau des Équipages et des Procédures

Paris, le 27 Octobre 2004 *(Paris, on 27th October 2004)*

B. [illegible]

Ingénieur Principal des Études et de l'Exploitation de l'Aviation Civile

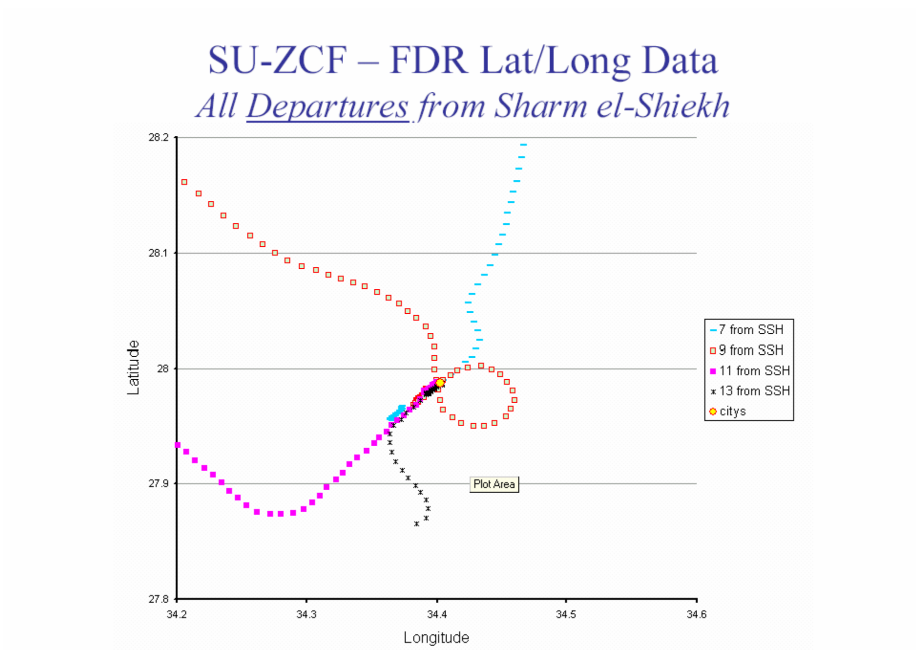
1.17.3.23 Simulator used by Flash Airlines at RAM).
Including

- FCC options
- Ground proximity
- Bank angle options
- Display type installed
- FD type (split or integrated cue)

See section 1.16.1.10.

1.17.3.24 *Flash Airlines procedures regarding which pilot (PF or PNF) engages the autopilot, Boeing recommended practice*
No written procedure was found in Flash Airline FOM regarding this issue. Boeing procedures and common practices are for PF to connect the autopilot.

1.17.3.25 Additional information regarding dispatch from SSH
A. All departures from SSH (accident aircraft)



-7 Departure from SSH
-9 Departure from SSH
-11 Departure from SSH
-13 Departure from SSH

Same crew did flight no13 "Accident flight" and flight no 9 "SSH /TRN", following a comparison between the two flights.

FDR SSH Departure no.	Flight 13 Accident Flight	Flight no.9
Date	3rd Jan, 04	2nd Jan, 04
Take off Time	2.42 GMT	4.37 GMT
Runway	22R	04L
Captain	Khedr Aabdalla Saad	Khedr Aabdalla Saad
First officer	Amr Mahmoud Shafe	Amr Mahmoud Shafe

Autopilot in Command	A	A
Autopilot engaged at	3392 ft	2836 ft
Autopilot Mode	CMD /Heading Select	CMD /Heading Select

B- Extension of the outbound legs before beginning the turn

Interviewing Flash Airlines chief pilot:
Flash Airlines chief pilot stated that during the departure from SSH, Flash Airline pilots might extend the circuit as the situations need whether day or night departures (departure over water is mandatory)

Actual pattern flown depends on airplane performance (weight, OAT, etc). Most airplanes widen the pattern to gain additional altitude as a pilot technique. VOR crossing altitude restriction is shown on charts. This information should be added to Operations Group Notes.

1.18. Additional Information

Flash Airlines Flight 604 Investigation
Crew Behavior Subcommittee

Minutes of a Meeting Held at the Offices of the Ministry of Civil Aviation

Cairo, Egypt
August 23-26, 2004

Materials Provided by MCA

1. Paragraph interview summaries
2. One page summary of medical records provided to MCA by Egyptian Air Force after the retirement of the accident captain
3. Ops group chairman's factual report
4. Capt's flight time summary & schedule for previous 30 days
5. FO's flight time summary & schedule for previous 30 days
6. Capt's MCA pilot certification file
7. Capt's CV (1-page summary of qualifications and type certificates)
8. Captain's meteorology training course certificate from Egyptian Air Force (taken by Capt in 1984 and provided to MCA when he became civil pilot)
9. Capt's Proficiency Check Form from May 12, 2003 and transition training form from May 13, 2003
10. Capt's recurrent training form from Dec 16, 2003
11. Capt's Line Check form from July 23, 2003
12. Capt's Oral Exam form from May 12, 2003
13. Capt’s ICE training form from May 28, 2003
14. Capt's Fixed Base Sim training record from April 28, 2003
15. Capt's Full Flight Sim training record from May 3-12, 2003
16. Capt’s flight time records from the Air Force, Dec 14, 1999
17. FO's MCA pilot certification file
18. FO's transition training record from June, 2002
19. Flash Air Ground syllabus for 737 -300 course
20. FO's Proficiency Check Form from June 30, 2002
21. page #2 of previous
22. FO's Proficiency Check Form from July 11,2002 (difficult to read)
23. FO's ICE training form from Aug 12, 2002
24. page #2 and #3 of previous
25. FO's Competency Check (ground school on emergency operations- training conducted at Egypt Air) from May 22, 2002
26. FO's Proficiency Check form from May 15-16, 2003
27. FO's Recurrent Training form from Dec 11, 2003
28. FO's Flash Air special course on emergency procedures, HAZMA T, first aid (practical test tied to handling dangerous goods)
29. FO's MCA test performance and systems certification oral exam
30. FO's basic indoctrination course form (from MCA at Egypt Air facility)
31. FO's ICE form

32-39 -FO's full flight simulator training form from June 22-July 7, 2002

40. MCA CVR-FDR overlay plots (3 pages)

Materials made available for review during the meeting:
- MCA medical certification records of the captain

- Flash Air general operations manual

- Flash Air training manual

Definition of spatial disorientation

Spatial disorientation is an incorrect perception of attitude, altitude or motion of one's own aircraft relative to the position of the Earth.

Type I spatial disorientation:

Unrecognized spatial disorientation. No conscious perception of SD. Distractions are often antecedents to the accident. Crash with no distress or concern expressed. No mayday or other than routine communications. Unusual or inappropriate aircraft attitude, but pilot does not make any appropriate corrective action. Pilot is apparently oblivious to the situation.

Type II recognized:

Conscious manifestation of a problem. Pilots often incorrectly refer to this experience as vertigo. Pilot recognizes conflict between perceived and intended or expected attitude. Can assume that the instruments are operating incorrectly. Might not properly react because of difficulty accepting indicated correct control input or might just be puzzled about the situation. Confusion might persist after recovery and lead to compounding of SD problem.

{Veronneau, S.J.H. & Evans, R.. (2004). Spatial disorientation mishap classification, data and investigation. Previc, F.H. & Ercoline, W.R. (Eds) Spatial disorientation in aviation. American institute of Aeronautics and Astronautics.}

Conditions for establishing spatial disorientation

1. Presence of inaccurate or misleading vestibular cues.
2. Absence of visual cues or presence of misleading visual cues.
3. Presence of a distraction capable of drawing attention away from attitude displays.

Closing Comments

This is a preliminary report. More work is needed to comprehensively address all human factors issues relevant to this accident, as needed.
Complete minutes of CBS meeting will be made available to the sub committee for further work and analysis

Interviews regarding Captain Kheider Abdullah

- **A.V.M. Ibrahim Omran,**
  Worked together in the Egyptian Air Force and later in Civil Aviation.
  A religious man, accurate in his work, does not recall medical complaints or use of any significant medication, was aware of maintaining his health, had self respect in all dealing with others.

- **MRS. Olfat – wife of Captain Kheider**
  Spoke very highly of him; he never created any problem for her all through their married life – chose to cure any minor health problem by using natural components such as herbs – played soccer until five years ago – never complained of headaches, dizziness or unbalance, did not mention any work related problems to her or his children.

- **Meeting with Captain Khedr's wife 24/10/2004**
  All his life Captain Khedr motivation for flight was very high he used to care of his health and eat organic foods and much salad. When he is expecting a journey he used to close his room to have a good sleep while taking off the telephone. He was married since 30 years; he has 3 children and one grand child. Two children are living with him.
  No accidents either aeroplane or crush car was reported. He was much praised at work. In the year 1997 he was awarded a prize when he landed in a difficult weather in Sarayevo.

- **First Officer Yasser Elseesy**
  Important note: F/O Elseesy flew with Captain Kheider 48 hours prior to the crash.
  Had good relations with everybody regardless of position or rank. The last flight was the F/O birthday and the Captain celebrated the event on the A/C by sharing a cake with all the crew, this gesture left a very positive impression on everybody.

- **First Officer Hany El Meligy**
  Says Captain Kheider was calm and balanced person and in spite of his long experience he always took time to read and prepare well before any flight, he was well disciplined and did not smoke.

- **First Officer Sherif Darwish**
  Flew frequently with Captain Kheider, learnt a lot from him and his long experience, was of good character, calm during flights and he did not observe anything about his behavior that was not normal.

- **First Officer Heba Darwish**
  Flew frequently with Captain Kheider, she says that he was intelligent, observant and highly concentrated on his work during flights, balanced, calm and disciplined.

- **Meeting with traffic officer Mr. Amr Shawky**
  (Sharm El Sheikh Station Manager)

Mr. Amr met the 3 crew members and he know them well during the months proceeding the accident. Crew members:

1) Captain Khedr.
2) F/O Amr El Shafy.
3) Engineer Mostafa Askar.

He used to see them in the office during work and a lot during rest periods in Sharm El Sheikh City. Either staying in a hotel or taking supper together in a restaurant in the City.

He noticed they were pleasant and within normal behavior. No special incidents or accidents or quarries occurred during that period.

Captain Khedr was specially accurate and meticulous in his work and famous for his punctuality. He likes his work very much and talks about it with pride and satisfaction. He used to smile and talk nicely to all crew members specially before flights. Between journeys he used to stay at hotel taking complete rest. I used to see Captain Khedr daily in between trips.

On the 3rd day before accident nothing specially was observed with normal relationship with a crew.

- **<u>On the day of the accident</u>**

Due to pressures of reservation in hotels, Captain Khedr and F/O were in Fantasia hotel and the rest of the crew was in Coral Beach Hotel. The bus brought the crew first then the Captain and first officer from the 2nd hotel with a difference of 15 min. the aeroplane arrived and I gave them the documents and Captain Khedr requested the usual questions (like the № of passengers).

Captain Khedr was joking with me and told me I can take you with me now to Cairo (on aeroplane) this happened while the first officer is busy checking, the different systems of aeroplane and entering the computerized route plan he is usual a calm person with little but pleasant talking.

1.19. New Investigation Techniques

1.19.1 Spatial disorientation :

- Definition
- The way the SD works
- Crew fatigue
- Human related factors

Refer to (tests and researches), 1.16.4. Tests and researches conducted by MCA, Spatial Disorientation Studies
Additional work can be done through adding the report of the CBS group meeting)

Exhibits

Exhibit A

AIRCRAFT MAINTENANCE RECORDS GROUP FACTUAL REPORT

Ministry of Civil Aviation
Accident Investigation Central Administration
Accident Investigation Team
Cairo, January 26,2004

AIRCRAFT MAINTENANCE RECORDS GROUP
FACTUAL REPORT

A. ACCIDENT

Location:	Sharm El Sheikh Airport, South Sinai
Date:	January 3, 2004
Time:	0246 UTC, 0446 Local Time
Aircraft:	Flash Airlines, Flight FSH 604,B737-3Q8, SU-ZCF.

B. **AIRCRAFT MAINTENANCE RECORDS GROUP**

C. SUMMARY

On January 3, 2004, about 0246 UTC, Flash Airlines flight FSH604, a B737-3Q8, SU-ZCF plunged into the Red Sea shortly after takeoff from Sharm El Sheikh International Airport (SSH) in South Sinai, Egypt. The flight was a passenger charter flight to Charles de Gaulle Airport (CDG), France with a stopover in Cairo international Airport (CAI) for refueling. Two cockpit crewmembers (Pilot and Co-pilot), three cabin attendants and 143 passengers (135 French and 8 Egyptian) onboard were killed. The airplane was destroyed due to impact forces with the red sea.

On January 11, 2004, the Aircraft Maintenance and Records Group convened at Flash Airlines Headquarter in 166b El Hegaz St, Heliopolis, Cairo Egypt in order to meet and interview Flash Airlines Technical Director and his staff. They collected all documents and records available for the subject aircraft. The rest of the aircraft records were delivered to the Accident Investigation Team on January 14, 2004. The Aircraft Maintenance and Records Group examined Flash Airlines maintenance program and the airplane records of SU-ZCF. The Aircraft Maintenance and Records Group completed the field review and examination on January 26, 2004.

The Aircraft Maintenance and Records Group performed a review of airworthiness directives, maintenance program , weight and balance report, supplemental type certificates, maintenance discrepancies, and contracts. Results of these reviews are summarized in this report.

All Interviews are attached to Appendix A of this report.

D. DETAILS OF THE INVESTIGATION

1.0 Flash Airlines Air Operator Certificate (AOC)

Flash Airlines is approved as air operator (charter air carrier) under ECAR 121 by the ECAA, and operating under approval no 018.

Flash Airlines has its main office in Cairo, Egypt at 166b El Hegaz St. Heliopolis . Beginning in 2000, Flash Airlines leased the first B737-300 from the International Lease Financial Cooperation ILFC. In June 2001 another B737-300 from ILFC was added to Flash Airlines fleet which made the company fleet two aircraft the same type. The Operations Specifications was issued to the company in Feb 2000 and last revision was on October 29th 2003.

2.0 Aircraft History

Per Egyptian Civil Aviation Safety and Security Authority (ECASSA), civil aviation aircraft registration records , the International Lease Financial Cooperation (ILFC) leased the accident aircraft, serial number 26283, to Flash Airlines on May 14, 2001. It was registered in Egypt on June 17, 2001 under tail number SU-ZCF to be operated by Flash Airlines. The subject aircraft basic information as following:

Aircraft Type	: B737-3Q8
Minimum Crew	: 2 (Pilot and Copilot)
Registration Mark	: SU-ZCF
Serial Number	: 26283
Manufacture Date	: October 1992
Line Number	: 2383
Variable No	: PQ294

Interior Configuration : Total 148 Economy Class

ECAA Minimum Number of Flight Attendant : 3

3.0 Aircraft Maintenance

3.1 Maintenance Program Summary- Flash Airlines B737-300

Flash Airlines has developed their customized Maintenance Program . The Maintenance Program last revision was issued on January 20, 2003 and approved by the Egyptian Civil Aviation Safety and Security Authority (ECASSA), Airworthiness Central Administration under approval No MOCA/FLASH/737-300/MP/R2/03. This Maintenance Program was incorporated guidance from Boeing Maintenance Planning Document (MPD) Revision July 2002.

The Periodic Service Check is accomplished on layover. The check is performed as a walk-around, visual inspection and servicing when necessary.

The Routine Inspection is performed every 250 flight-hours (A Checks). A Routine Inspection Procedures Index is used to assure the check is completed. The Inspection consists of a visual inspection of the aircraft's major components, servicing, operational and functional checks.

The Maintenance Program contains subparts related to:

1- Line Maintenance Checks: Transient, Daily and Weekly Checks.
2- "A" Checks which should be carried out at 250 Flight Hours Interval and its multiples. The following chart will show how are the "A" checks cycled:

"A" Check Cycle (250 Flight Hours Intervals per Cycle – 16 "C" Check)																
Check	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2A		x		x		x		x		x		x		x		x
4A				x				x				x				x
8A								x								x

3- "C" Check which should be carried out every 4000 flight hours and its multiples. The following chart will show how are the "C" checks cycled.

“C” Check Cycle (4000 Flight Hours Intervals per Cycle)								
Checks	1	2	3	4	5	6	7	8
1C	x	x	x	x	x	x	x	x
2C		x		x		x		x
4C				x				x
6C						x		
8C								x

4- Components: This section contains general information on selected airframe and engine components. They are Condition Monitoring, On Condition or Hard Time.
5- Structure Inspection which should be carried out every 24000 Flight Hours. Structural inspections are performed in accordance with guidelines set down by the manufacturer Boeing MPD.
6- Corrosion Prevention Control Program (CPCP)
7- Pylon Inspections (ATA 54) the 15 Months and 45 Months Checks

The checks and inspection times can not be exceeded except by using the short term escalation as authorized per the Operations Specifications D95 issued by ECASSA to Flash Airlines and considered as a part of the air operator certificate AOC No 18.

The last “A” check accomplished by Flash Airlines and the last “C” check and Structural inspection carried by Braathens Engineering and Maintenance for the SU-ZCF were as follows:

“8A” Check	:	December 12, 2003	at 25423:50 Flight Hours
“7C” Check	:	From Nov 3 - Dec 21, 2002	at 23531 Flight Hours
Last SI Check	:	From Nov 3 - Dec 21, 2002	at 23531 Flight Hours
Last 15 M Chk	:	From Nov 3 - Dec 21, 2002	
Last 45 M Chk	:	From Nov 3 - Dec 21, 2002	

Copy of the checks done on the aircraft is attached (attachment 01)

3.2 Maintenance Time Limitations

Scheduled maintenance checks are approved by ECASSA (Flash Airlines Operations Specifications D88), and are in accordance with the Boeing 737-300 Maintenance Planning Documents MPD[1].

[1] The Boeing 737-300 Maintenance Planning Data (MPD) document provides maintenance planning information necessary for each 737 operator to develop a customized scheduled maintenance program

Transient Check:	Before each flight
Daily Check:	Every 24 hours that the airplane is in service.
7 days check:	Every 7 Calendar days.
Check "A" Systems and multiples:	Every 250 Flying hours and multiples.
Check "C" Systems and multiples:	Every 4000 Flying hours.
Structural Inspections:	Every 24000 Flying hours

3.3 Aircraft Summary

Total Hours at Time of Accident:	25603	Flight Hours
Total Cycles at Time of Accident:	17976	Flight Cycles

3.4 Weights and Balance Summary

According to the Egyptian Civil Aviation Regulations, ECAR 91 Appendix H attachment 1 the aircraft has to be reweighed every three years . Furthermore, aircraft must be reweighed if the effect of modifications on the mass and balance is not accuratly known. Flash Airlines aircraft was weighed last time on December 19, 2002 in Braathens SAFE, Stavangar, Norway. and recalculated by Flash Airlines after the reenforced cockpit door modification installation on November 1st, 2003, and the results were as follows.

Empty Weight	:	70794 lbs
Moment	:	45921358.6 lb.in
% AMC	:	17.42%

3.5 Engines: CFM56-3C-1

Engines are maintained in accordance with Flash Airlines Maintenance program and are based on the life cycle limits of the rotating components. CFMI Engine maintenance manual together with the applicable Service Bulletins and engine teardown data determine these limits. Overhauls are performed at the SNECMA MOROCCO Workshop or other authorized Certified Repair Station.

	Engine Position 1 (Left Side)	Engine Position 2 (Right Side)
Serial Number (ESN)	857352	856481
Time Since New (TSN)	25314 hours	26045 hours

Cycles Since New (CSN)	17815 Cycles	17523 Cycles
Date of Installation on SU-ZCF	August 1998	Jan 3, 2003
Time Since Last O/H	8741 Hours	1828 Hours
Cycles Since Last O/H	6188 Cycles	909 Cycles

Engine Disks and First Limiters Status as per attached (attachment 02)

3.6 Engine Monitoring System

Flash Airlines engines are monitored as per the manufacturer (CFMI) engine condition monitoring program (Sage Trend Analysis program). Sage is a set of programs which collectively provide the functionality to perform standard condition monitoring of CFMI engines. Sage is designed to work in an interactive environment with the major analytical calculations performed at scheduled times throughout the day.
By reviewing the engine condition monitoring trend reports for both engines, they showed no deviation or important shift, the EGT margin is considerable ok. Engine Condition Monitoring cruise trend sheet is attached (attachment 14)

3.7 Flight Data Recorder/ Cockpit Voice Recorder.

Description	P/N	S/N	Test Date	Workshop
Sundstrand FDR	980-4120-DXUN	10069	O/H 18/11/02	Air Transport Avionic
CVR	93A100-80	57994	Tested 12/11/02	Braathens

3.8 Aircraft Status

3.8.1 Minimum Equipment List (MEL)

Flash Airlines Customized Minimum Equipment List CMEL was approved by the ECASSA on Feb 23rd, 2002 under approval number ECASSA/FLASH/MEL/737-300/02/02 according to MMEL[2] R40, meanwhile another revision according to the last Master Minimum Equipment List (MMEL) revision 45 is currently under approval by the ECAA.

[2] The Master Minimum Equipment List (MMEL) is a FAA approved document, with participation by the aviation industry, intended to assist airline operations and maintenance organizations in developing the procedures required to operate the aircraft in various nonstandard configurations. It is also intended to permit operation with inoperative items of equipment for a period until repair can be accomplished. In order to maintain an acceptable level of safety and reliability, the MMEL establishes limitations on the duration of and conditions for operation with inoperative equipment. It is the basis for development of individual operator MEL that take into consideration the operator's equipment configuration and operational conditions.

3.8.2 Aircraft Condition Report (A/C deferred defects)

No deferred items were recorded in the aircraft deferred snags log Book

3.8.3 Type Certificate Data Sheet

FAA "Type Certificate Data Sheet" number A16WE (revision 28, dated October 29, 1999) for B737-300 series airplanes was reviewed for compliance conditions and limitations. No discrepancies were noted. Type certificate Data Sheet attached (attachment 15)

3.8.4 Supplemental Type Certificates

Supplemental Type Certificates supplied by Flash Airlines were reviewed.
One Supplemental Type Certificate was issued to install a Matsushita Audio Entertainment System in accordance with General Aerospace Engineering Order No GA-23-1042. STC attached (attachment 16)

3.8.5 Airworthiness Directives (AD) Summary and Service Bulletins (SB) Summary

The Airworthiness Directives compliance status list dated January 12th, 2004 (attachment 03) submitted by Flash Airlines was reviewed with special concentration on AD's carried out after the aircraft was leased by Flash Airlines.
The previous AD's Status which was forward to Flash Airlines during the aircraft delivery was reviewed with special attention to those AD's which had an open or repetitive status.
All listed Airworthiness Directives and Service Bulletins have been complied with no discrepancies noted.
Service Bulletins compliance status attached (attachment 17).

3.8.6 Time Controlled Components

Time Controlled items listed on the Boeing 737-300 Maintenance Program, including task card number, part/serial numbers, and the time interval, were reviewed. The listing by task card noted categories (inspections, functional check, restoration, or scrap). Flash Airlines has no exceedance for the MPD recommendations. No discrepancies were noted. Components list replaced by Flash Airlines attached (attachment 04)

3.8.7 Prior Discrepancies/Accidents Involving SU-ZCF

Per Flash Airlines records, no previous accidents were reported for the accident aircraft.

3.8.8 Logbook Forms

The original aircraft Technical Log Book sheets were reviewed for the last three months from September 27, 2003 through December 2003 for discrepancies, no trends or discrepancies noted. The list of the reviewed Technical Log Book sheets is attached:

Few number of pilot reports are recorded. Some corrective actions recorded by the maintenance staff without pilot reports. Copy of the Tech Log Book entry listing is attached (attachment 05)

Copies of the Technical Log Book sheets following the original copies (from Dec 27, to Dec 31, 2003) were reviewed also. The following are the review results:

- The Line Maintenance checks (transient, PDC and Daily) are properly carried out and recorded by the certified staff.
- All Pilots acceptance are recorded.
- Pilots reports are very limited, however many corrective actions are recorded by the maintenance staff.
- Some Technical Log Book sheets are missed From serial no 1998 up to the accident flight. (Shown as per attached schedule)

4.0 Maintenance Participants

Prior to the accident, the most recent scheduled maintenance performed on the accident aircraft was (8A check) done by Flash Airlines, Cairo base on December 11, 2003. Also, the PDC check was carried out by Flash Airlines Engineer at SSH station just before the accident. Due to the unavailability of the missed technical log book sheets, an interview, and document review were conducted to obtain information about the maintenance performed at this station before the accident flight.
The on board ground engineer said that there weren't any abnormal problem with the aircraft during the flight to SSH from VCE. And nothing was reported from the pilot. Interview attached (attachment 06)

4.1 Flash Airlines Approved Maintenance Organization (AMO)

Flash Airlines is also approved under ECAR 145 as a repair station . The approval number is CAI/FLASH?AS/1/2001. The certificate is valid until July 30th, 2004 and was issued on July 31, 2001. The certificate is limited to line maintenance up to the 8A check for the B737-300. Flash Airlines maintenance base is Cairo international Airport.

Flash Airlines coordinates the maintenance program through its ECAR Part 145 certificate. The Company General Maintenance Manual (GMM) provide guidance related to the Aircraft Maintenance program as the Maintenance Procedures, Maintenance staff Training… etc.

Personnel working on Flash Airlines Fleet at the various maintenance facilities must be familiar with the policies and procedures spelled out in the company GMM. The Quality Control Manager puts the newly hired employees through a twelve-hour Indoctrination Course. The Indoctrination course Flash Airlines policy and procedures, and training practices. It is accomplished before maintenance engineer begins to work at the Flash Airlines facility. The training is documented on a maintenance training attendance record, recorded on the employee's training file.

4.2 Contracted Repair Station Listing

- EgyptAir Maintenance and Engineering
- Braathens Maintenance and Engineering
- Snecma Morroco Engine Services.

5.0 Personnel Training and Authorization

According to ECAR 65 the requirements for granting authorization for ground engineer are as follow:

1- Graduation from Faculty of Engineering or an approved training institute.
2- Passing the approved Basic training Course at approved Training Center or institute.
3- On Job Training for 18 months.
4- Passing written, practical and oral exams by the authority for License without Type Rating (LWTR).
5- Passing an approved training course for a specific type airframe and engine.
6- On Job Training (OJT) on the type airframe and engine for 9 months.
7- Attendance of training course for the company exposition procedure manual.
8- Passing oral and practical examination in front of the Company Examination Board (approved by the authority)
9- Getting the company approval.

Flash Airlines maintains its training program in compliance with Egyptian Civil Aviation Regulation requirements. The Maintenance Director and the Quality Control Manager have joint responsibility for assuring all required training is performed and recorded. Indoctrination training proceeds an employee's start date. The employee is given a 4-hour introduction course that trains one on Flash Airlines maintenance policies and procedures. The training will be documented on a maintenance training attendance record and maintained in the employee's training file.

The aircraft systems training for the A & C Engineers is accomplished through formal systems training and On-the-Job Training (OJT) Worksheets.

Engineer Mostafa Erfan Askr does the last flight release.

Engineer Mostafa was graduated from the National Civil Aviation Training Organization on September a6th 1972. He worked as a mechanic for the Kuwait Airways for twenty years during which he received the following training courses:

1- B 747-269B Mechanics Familiarization during the period between Feb 17th 1979 to March 3rd 1979. (Kuwait Airways).
2- Airbus Mechanics Familiarization Course during the period between October 6th to October 18th 1984 (Kuwait Airways).
3- B767 Mechanics Familiarization A&C Course during the period between February 7th to February 19th, 1987 (Kuwait Airways).

In 1991 he took the Cessna 188 course at DEVCO training center, then he got his Egyptian license without type rating (LWTR) No 1525 on August 1st 1992 which is valid until July 27th, 2004.

He joined Flash Airlines two years ago, during this two years he had the following training and exams:

1- B737-300 type course at EgyptAir approved training center during the period between December 22nd, 2002 to February 27th, 2003.
2- Basic Indoctrination Course during the period between 13-14 June 2003.
3- An on Job Training for 9 months on Flash Airlines B737-300 fleet.
4- An approval authorization exam for the engine on November 2nd, 2003 and for the airframe November 3rd, 2003.

His approval No: 014	Valid until: July 26th, 2004	Issued on: Nov 28th, 2003
LWTR No: 1525	Valid until: July 27th, 2004	issued on: August 1st, 1992

6.0 Contracts

6.1 Flash Airlines and EgyptAir Approved Maintenance Organization Contract

The contract between Flash Airlines and EgyptAir Maintenance and Engineering Approved Maintenance Organization (attachment 07) was signed January , 2000. There are 15 agreement statements throughout the contract identifying conditions in which the two companies will work together.

Per the contract, EgyptAir will perform maintenance routine checks (A check and its multiples and C Checks and its multiples) and any requested AD's accomplishment on the B7373-300 operated by Flash Airlines.

Flash Airlines provides the work package for the required routine check including the routine task cards, engineering orders weather for Airworthiness Directives, Service Bulletins, or modifications as well as other non-routine task cards that may be required to be accomplished concurrently with the routine check, in addition to any rectified defects by EgyptAir during the check.

EgyptAir is an approved maintenance organization as per ECAR 145 under approval No CAI/EGYPTAIR/AS/01/98 issued by ECASSA

6.2 Flash Airlines and Braathens Maintenance and Engineering Contract.

The contract between Flash airlines and Braathens Maintenance and Engineering in Stavangar, Norway (attachment 08). It became effective on November 3rd, 2002. There are thirty statements of understanding and two Appendices that explain the conditions of the Agreement.

Flash Airlines provides the required work scope as per their approved maintenance program. Braathens Maintenance and Engineering supplies the necessary consumables, routable parts, and equipment.

Braathens Maintenance and Engineering is approved as Per ECAR 145 approved maintenance organization under approval CAI/BRAATHENS/AS/1/2002.

6.3 Flash Airlines and SNECMA MOROCCO ENGINE SERVICES.

The contract between Flash Airlines and SNECMA MORROCO ENGINE SERVICES (attachment 09) was signed on November 7th, 2002. There are 22 agreement statements throughout the contract identifying conditions in which the two companies will work together.

Per the contract, Flash Airlines and Snecma MORROCO ENGINE SERVICES have entered into this agreement to stipulate and regulate terms and conditions for repair/overhaul of Flash Airlines CFM56-3C-1 Engines rated 22 klbs.
According to the agreed workscope, it includes repair, engine performance restoration, and application of any applicable AD's.

SNECMA MOROCCO ENGINE SERVICES is approved as Per ECAR 145 approved maintenance organization under approval CAI/SNECMA MOROCCO/AS/1/2002

7.0 Maintenance Performed on the A/C before the accident flight.

7.1 Maintenance done by Flash Airlines Tech Staff at Cairo Base

The Last Check carried out on the accident aircraft was an 8A check. The check was performed by Flash Airlines Technical staff at Cairo base station. The check workpackage included visual inspection, servicing, and operational checks. A routine borescope inspection for the HPT nozzles guide vanes and the combustion chamber was performed on both engines by EgyptAir with no findings. The workpackage was reviewed with no discrepancies.

7.2 Transient Check carried out for the Flight VCE/SSH

A transient check was carried out in VCE by engineer Motaz Awad on January 2nd, 2004 a copy of the interview with him is attached (attachment 06)

7.3 Last PDC Carried out for the Accident Flight

On January 3rd, 2003, aircraft SU-ZCF, a daily check was performed in accordance with the approved checklist as per the company maintenance schedule at SSH station just before the flight. The check was carried out by the accident flight, on board engineer (Eng Mostafa Askar).

7.4 Aircraft Refueling before the Accident Flight and investigations done after the accident.

The Refueling was done for the accident aircraft on January 3rd, 2004 between 03:50 and 04:00 local time (UTC +2) for the quantity of 3500Liters by truck no 4432 belonging to Misr Petroleum Company (service invoice is attached) attachment 10.

The same truck had refueled the following airplanes on the same date:

- EgyptAir aircraft A320 SU-GBF at 02:05 LT before the accident aircraft.
- Taroum aircraft YR-GGX at 04:20 LT after the accident aircraft.
- EgyptAir aircraft SU-GCD at 05:10 LT after the accident aircraft.

After the aircraft accident, Three fuel samples had been drawn from the Misr Petroleum fuel truck on January 3rd, 2004 at 12:45 local time. One of them was used for a dehydrated Copper Sulfate capsule field inspection for fuel water content, which was satisfactory (attachment 11). The two others samples were sent to the following laboratories for analysis:

- The Egyptian Petroleum Research Institute Nasr City, Cairo (attachment 12).
- Misr Petroleum Company, Ghamra Research Center Laboratory (attachment 13).

The Egyptian Petroleum Research Institute (EPRI) performed the Jet (A-1) fuel analysis, ASTM distillation and ASTM D-86. The results of these analyses show that all the values are within limits except for the water content, ppm, which is 48, and the max is 30.

The Misr Petroleum Co, Ghamra Research Center Laboratory performed the same analyses done by (EPRI), all the results comply with the requirements of DES-STAN 91-91 issue 4 (DERD 2494) and the joint fueling systems “Checklist” specifications for JET A-1 issue 19 Sept, 2002.

Appendix A

Attachment Listing

Attachment 01: List of Checks done on the accident aircraft.

Attachment 02: Engine Disks and first limiters status

Attachment 03: Airworthiness compliance status.

Attachment 04: Components list replaced by Flash Airlines.

Attachment 05: Copy of the Tech Log Book Entry Listing.

Attachment 06: Eng [redacted] Interview.

Attachment 07: EgyptAir Contract

Attachment 08: Braathens Engineering and Maintenance Contract.

Attachment 09: Snecma Morocco Contract

Attachment 10: Fuel Service Invoice.

Attachment 11: On spot fuel field inspection.

Attachment 12: Egyptian Petroleum Research Institute Analyses Report.

Attachment 13: Misr Petroleum Co, Ghamra Laboratory analyses report.

Attachment 14: Engine Condition Monitoring Cruise Trend Sheets.

Attachment 15: Type Certificate Data Sheet.

Attachment 16: Supplemental Type Certificate, STC.

Attachment 17: Service Bulletins compliance list

Service Bulletins compliance list
S Dates

1551-1575	From	27-9-03 to 4-10-03
1576-1600	From	3-10-03 to 9-10-03
1601-1625	From	10-10-03 to 18-10-03
1626-1650	From	18-10-03 to 22-10-03
1651-1675	From	23-10-03 to 27-10-03
1676-1700	From	27-10-03 to 1-11-03
1701-1725	From	1-11-03 to 7-11-03
1726-1750	From	7-11-03 to 12-11-03
1751-1775	From	12-11-03 to 17-11-03
1776- 1800	From	17-11-03 to 23-11-03
1801-1825	From	23-11-03 to 30-11-03
1826- 1850	From	30-11-03 to 11-12-03
1851- 1875	From	12-12-03 to 22-12-03
1876- 1900	From	22-12-o3 to 27-12-03

Exhibit B

Flight Data Recorder (FDR) Group Factual Report

Ministry of civil aviation

Accidents Department

Egypt, Cairo

October14, 2004

Group Chairman's Factual Report - Flight Data Recorder

ACCIDENT

Location:	Red Sea off Sharm el-Sheikh
Date:	January3, 2004
Time:	2:45:06 GMT
Operator:	Flash Airlines – Flight 604

The group convened at MCA headquarters in Cairo from January16, 2004 for readout of the FDR. The readout included transcription of the accident flight data. In addition, a transcription of the entire 25-hour contents of the FDR was accomplished.

SUMMARY

On January 3, 2004, about 02:45:06 UTC, 04:45:06 Local time, Flash Airlines flight FSH604, a Boeing 737-300, Egyptian registration SU-ZCF, operated by Flash Airlines, crashed into the Red Sea shortly after takeoff from Sharm el-Sheikh International Airport (SSH) in South Sinai, Egypt. The flight was a passenger charter flight to Charles de Gaulle Airport (CDG), France with a stopover in Cairo international Airport (CAI) for refueling. Flight 604 departed from Sharm el-Sheikh airport with 2 pilots (Captain and First Officer), 1 observer, 4 cabin crew, 6 off-duty crew members and 135 passengers on board. The airplane was destroyed due to impact forces with the red sea with no survivals.

Details of Investigation

- The accident airplane's flight data recorder (SSFDR), part number 980-4120-DXUN S/N 10069, was retrieved from the Red Sea on January16, 2004 by the French Navy. The FDR was immersed in water and sealed in an ice chest and transported to MOCA, accident investigation laboratory at Cairo.

- Readout of the FDR was accomplished using the laboratory's playback hardware, Hand held Down Load unit manufactured by ALLIED SIGNAL Part No. 964-0446-001 and recovery/ analysis/ presentation system (RAPS) software.
- Inspite of the damage that had occurred to the external case of SSFDR, the internal solid state memory was in good condition and all the available data was retrieved. RAPS considered the recorded signal and data quality to be very good.

- Data plots and tabular listings of each data parameter for the entire accident flight are included in this report. The entire 25-hour contents of the FDR were also transcribed, and the data provided to the parties to the investigation.

After the cockpit voice recorder (CVR) timing had been compared to the SSFDR vhf microphone keying and Autopilot disengages warning, a time correlation was developed.

Unreliable parameters

- **Control Wheel Position**

The position of the control wheel is sensed by a position transmitter mounted under the flight deck floor. The transmitter measures the rotation of a shaft that is connected to the lateral control system with a cable and pulley arrangement. The body of the transmitter is cylindrical and is held in place by a clamp. The output may be adjusted by rotating the body of transmitter within clamp which is then tightened. The recorded position of the control wheel tended to follow the recorded position of the ailerons, and therefore appears to have the correct profile. However there was an offset or bias between the recorded position and the expected position. The value of the bias changed at irregular intervals, often when large control wheel inputs were made, and also every time that a control wheel freedom-of-motion check was conducted prior to takeoff. The shifting bias was evident in all 25 hours of FDR data.

- **Left Engine N1**

The fan speed of the left engine appears to behave normally during the first 17 hours of recorded data. During the last 8 hours (including the accident flight), the parameter recording fan speed alternates between two fixed values. All other engine parameters for both the left and right engine are operating normally. The aerodynamic performance and simulation match discussed in section 1.16 indicates that the left engine was operating normally.

- **Slat #1 Mid Extend Discrete**

Slats position is recorded by three discrete parameters as follows:

- “Slats full extended”
- “Slats in transit”
- “Slats mid extended”

. Normally, during cruise, the slats are up, during takeoff, the slats are in the mid-extend position to provide increased low-speed lift capability. During landing, the slats are normally in the fully extended position to further increase low-speed lift capability. The position of each slat is indicated by discrete parameters on the FDR. With the exception of the "LE Slat 1 Mid Extend" parameter, all of the slat indications recorded on the FDR change in a consistent manner

Comments

1) The transition of the Air/Ground discrete parameter from “Ground” to “Air” had occurred at 2:42:33 GMT, the last recovered data was recorded at 2:45:5 GMT.

2) TOGA mode had been engaged at 2:42:02 GMT for two seconds, and then disengaged. While checking the TOGA mode operation all over the FDR 25 Hr. Data, We notice that every time the mode engaged, one second or two seconds later disengage.

3) During takeoff with the aircraft magnetic heading constant, the right aileron indication was up and the left aileron indication was down.

4) Heading Select and Level Change modes had been selected as Flight director modes.

5) The FDR data indicates that the airplane was turning to the left after takeoff, and rolling back towards wings level before the autopilot engagement.

6) The autopilot had been engaged at 2:43:59 GMT and disengaged at 2:44:02GMT. At 2:44:03 GMT, the autopilot disengage warning was recorded.

7) At autopilot engagement, the Heading Select Mode was disengaged and reverted to CWS R Mode.

8) Between the time of the autopilot engagement and disengagement, the FDR records momentary aileron surfaces movements. The right aileron deflected to 7.2 degree TEU for one second.

9) After autopilot disengagement, the aircraft had turned to the right and on the other hand the ailerons repetitively moved between the neutral and the roll right direction.

10) At 2:44:58GMT, the aircraft roll angel reached 111.094˚to the right, next second both ailerons reversed their directions and initiated aircraft recovery.

11) Hydraulic pressure, Engine Oil Quantity, Speed Brake Handle Position, Selected Heading and Selected Course no.1 Parameters were retrieved according to Boeing Document "Enclosure B-H200-17884-ASI"

Attachments:

A- Attachment 1, Tabular data of the accident flight.
B- Attachment 2, FDR Plots
C- Attachment 3, Five plots represent FDR and CVR correlation.

Note: Soft Copy for all 25 hours FDR data is available at MCA upon request

Attachment 1, Tabular data of the accident flight.

Flash Air B737-300 Accident
Preliminary Data Created: January 20 2004
MCA

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
91864	2	34	50	216	45	309.375	0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.988558	-0.00301	-0.04574	1.23047	0.175781	0
							0.988558	-0.00504	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.988558					
91865				216	45	309.375	0.988558	-0.00097	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
91866				216	45	309.375	0.988558	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00504	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
91867				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00504	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.990848					
91868	2	34	54	216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					
							0.990848					
							0.990848					
91869				216	45	309.375	0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00504	-0.04574		0.175781	
							0.990848					
							0.988558					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558					
							0.990848					
91870				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91871				216	45	309.375	0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.988558	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00097	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.990848					
91872	2	34	58	216	45	309.375	0.990848	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00097	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.990848					
91873				216	45	309.375	0.988558	-0.00301	-0.04574	1.23047	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.988558					
							0.990848					
							0.988558					
							0.990848					
91874				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.988558					
91875				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91876	2	35	2	216	45	309.375	0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITU ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.990848					
91877				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
91878				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.988558					
							0.990848					
91879				216	45	309.375	0.988558	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00097	-0.0437		0.175781	
							0.990848					
							0.988558					
							0.988558					
							0.990848					
91880	2	35	6	216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00504	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.0437		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91881				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.993137	-0.00504	-0.0437	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91882				216	45	309.375	0.988558	-0.00097	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848					
							0.990848					
91883				216	45	309.375	0.988558	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00504	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
91884	2	35	10	216	45	309.375	0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00504	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91885				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.0437		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91886				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.990848					
91887				216	45	309.375	0.990848	-0.00504	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91888	2	35	14	216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00097	-0.04574		0.175781	
							0.988558					
							0.988558					
							0.990848					
							0.988558					
91889				216	45	309.375	0.990848	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574	1.05469	0.175781	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00097	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91890				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					
							0.990848					
							0.988558					
91891				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
91892	2	35	18	216	45	309.375	0.990848	-0.00097	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.0437		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.990848					
91893				216	45	309.375	0.990848	-0.00097	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00504	-0.04574		0.175781	
							0.990848	-0.00504	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91894				216	45	309.375	0.990848	-0.00097	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00504	-0.04777		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
91895				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.988558					
							0.990848					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558					
							0.988558					
91896	2	35	22	216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.23047	0.175781	0
							0.988558	-0.00301	-0.0437		0.175781	
							0.990848	-0.00504	-0.04777		0.175781	
							0.990848					
							0.988558					
							0.988558					
							0.988558					
91897				216	45	309.375	0.988558	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00097	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04777		0.175781	
							0.988558	-0.00504	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91898				216	45	309.375	0.988558	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04777	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.0437		0.175781	
							0.988558					
							0.993137					
							0.990848					
							0.988558					
91899				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					
							0.990848					
							0.990848					
91900	2	35	26	216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00504	-0.04777		0.175781	
							0.988558					
							0.988558					
							0.990848					
							0.993137					
91901				216	45	309.375	0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04777		0.175781	
							0.990848	-0.00504	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91902				216	45	309.375	0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00504	-0.0437		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.990848					
91903				216	45	309.375	0.988558	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.0437		0.175781	
							0.990848					
							0.988558					
							0.988558					
							0.990848					
91904	2	35	30	216	45	309.375	0.993137	-0.00301	-0.04777	1.23047	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.0437		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91905				216	45	309.375	0.993137	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91906				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00097	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91907				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.993137	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					
							0.990848					
							0.990848					
91908	2	35	34	216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848					
							0.988558					
91909				216	45	309.375	0.988558	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91910				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91911				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00504	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91912	2	35	38	216	45	309.375	0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.988558					
91913				216	45	309.375	0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91914				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.0437		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.988558					
91915				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITU ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91916	2	35	42	216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.990848					
91917				216	45	309.375	0.988558	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.988558					
91918				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					
							0.988558					
							0.990848					
91919				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					
							0.988558					
							0.990848					
91920	2	35	46	216	45	309.375	0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00504	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.988558					
							0.988558					
91921				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848					
							0.990848					
91922				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.988558					
91923				216	45	309.375	0.988558	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.988558					
91924	2	35	50	216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.990848					
91925				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00504	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.990848					
91926				216	45	309.375	0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.988558	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00504	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91927				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91928	2	35	54	216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848	-0.00301	-0.0437		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.990848					
91929				216	45	309.375	0.988558	-0.00301	-0.04777	1.05469	0.175781	0
							0.986269	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848	-0.00301	-0.04777		0.175781	
							0.988558					
							0.988558					
							0.990848					
							0.990848					
91930				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					
							0.988558					
							0.990848					
91931				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91932	2	35	58	216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91933				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.990848					
91934				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848					
							0.988558					
91935				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					
							0.990848					
							0.990848					
91936	2	36	2	216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.988558					
91937				216	45	309.375	0.988558	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.988558					
91938				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91939				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91940	2	36	6	216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.990848					
91941				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.0437		0.175781	
							0.990848					
							0.988558					
							0.988558					
							0.988558					
91942				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.983979	-0.00301	-0.0437		0.175781	
							0.993137					
							0.995426					
							0.993137					
							0.990848					
91943				216	45	309.375	0.993137	-0.00301	-0.04574	1.05469	0.175781	0
							0.995426	-0.00301	-0.0437	1.05469	0.175781	0
							0.993137	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.993137					
							0.993137					
91944	2	36	10	216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.990848					
91945				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.990848					
91946				216	45	309.375	0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.993137					
							0.990848					
							0.988558					
91947				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITU ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848					
							0.990848					
91948	2	36	14	216	45	309.375	0.990848	-0.00504	-0.0437	1.23047	0.175781	0
							0.988558	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
91949				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
91950				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.990848					
91951				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.988558					
							0.988558					
							0.990848					
91952	2	36	18	216	45	309.375	0.993137	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91953				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91954				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.23047	0.175781	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.993137	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					
							0.990848					
							0.990848					
91955				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437		0.175781	
							0.993137	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.988558					
							0.990848					
91956	2	36	22	216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91957				216	45	309.375	0.990848	-0.00301	-0.0437	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.990848					
91958				216	45	309.375	0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.988558					
91959				216	45	309.375	0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.990848					
91960	2	36	26	216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848					
							0.990848					
91961				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					
							0.990848					
							0.990848					
91962				216	45	309.375	0.990848	-0.00301	-0.0437	1.23047	0.175781	0
							0.988558	-0.00301	-0.04574	1.23047	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.988558					
							0.990848					
91963				216	45	309.375	0.990848	-0.00097	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.0437		0.175781	
							0.993137					
							0.988558					
							0.988558					
							0.990848					
91964	2	36	30	216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.988558					
91965				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.0437		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.990848					
91966				216	45	309.375	0.988558	-0.00504	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					
							0.990848					
							0.990848					
91967				216	45	309.375	0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00504	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.988558					
							0.990848					
91968	2	36	34	216	45	309.375	0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.988558					
91969				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91970				216	45	309.375	0.990848	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
91971				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.990848					
91972	2	36	38	216	45	309.375	0.988558	-0.00301	-0.0437	1.05469	0.175781	0
							0.988558	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.988558					
							0.988558					
							0.990848					
91973				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558					
							0.988558					
91974				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
91975				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.05794		0.175781	
							0.990848	-0.00301	-0.05387		0.175781	
							0.990848					
							0.977111					
							0.98169					
							0.98169					
91976	2	36	42	216	45	309.375	0.98169	-0.00301	-0.05387	1.05469	0.175781	0
							0.979401	-0.00301	-0.05387	1.05469	0.175781	0
							0.979401	-0.00301	-0.05387		0.175781	
							0.98169	-0.00301	-0.05387		0.175781	
							0.98169					
							0.98169					
							0.98169					
							0.98169					
91977				216	45	309.375	0.98169	-0.00504	-0.05387	1.05469	0.175781	0
							0.98169	-0.00301	-0.05387	1.05469	0.175781	0
							0.98169	-0.00301	-0.05387		0.175781	
							0.98169	-0.00301	-0.05387		0.175781	
							0.98169					
							0.98169					
							0.98169					
							0.98169					
91978				216	45	309.375	0.993137	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.990848					
91979				216	45	309.375	0.990848	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
91980	2	36	46	216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00504	-0.04574	1.05469	0.175781	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECONDS	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.990848					
91981				216	45	309.375	0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.988558					
							0.993137					
							0.990848					
91982				216	45	309.375	0.988558	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04777	1.23047	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.993137	-0.00301	-0.0437		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.990848					
91983				216	45	309.375	0.988558	-0.00097	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00504	-0.04574		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
91984	2	36	50	216	45	309.375	0.990848	-0.00097	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.988558					
91985				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00097	-0.0437	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
91986				216	45	309.375	0.990848	-0.00504	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558					
							0.988558					
91987				216	45	309.375	0.990848	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91988	2	36	54	216	45	309.375	0.990848	-0.00504	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.990848					
91989				216	45	309.375	0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.05794		0.175781	
							0.990848	-0.00301	-0.05387		0.175781	
							0.988558					
							0.979401					
							0.98169					
							0.98169					
91990				216	45	309.375	0.98169	-0.00301	-0.05387	1.23047	0.175781	0
							0.98169	-0.00504	-0.05387	1.05469	0.175781	0
							0.98169	-0.00301	-0.05387		0.175781	
							0.98169	-0.00301	-0.05387		0.175781	
							0.98169					
							0.979401					
							0.98169					
							0.98169					
91991				216	45	309.375	0.98169	-0.00301	-0.05387	1.23047	0.175781	0
							0.98169	-0.00301	-0.05387	1.05469	0.175781	0
							0.979401	-0.00301	-0.05387		0.175781	
							0.98169	-0.00504	-0.05591		0.175781	
							0.98169					
							0.98169					
							0.98169					
							0.98169					
91992	2	36	58	216	45	309.375	0.98169	-0.00301	-0.05387	1.23047	0.175781	0
							0.98169	-0.00301	-0.05387	1.05469	0.175781	0
							0.979401	-0.00301	-0.05387		0.175781	
							0.98169	-0.00504	-0.05387		0.175781	
							0.98169					
							0.98169					
							0.98169					
							0.979401					
91993				216	45	309.375	0.983979	-0.00301	-0.05387	1.23047	0.175781	0
							0.98169	-0.00301	-0.05387	1.05469	0.175781	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.98169	-0.00301	-0.05387		0.175781	
							0.979401	-0.00504	-0.05387		0.175781	
							0.98169					
							0.98169					
							0.98169					
							0.98169					
91994				216	45	309.375	0.98169	-0.00301	-0.05387	1.23047	0.175781	0
							0.98169	-0.00301	-0.05387	1.23047	0.175781	0
							0.98169	-0.00301	-0.05387		0.175781	
							0.979401	-0.00301	-0.0437		0.175781	
							0.98169					
							0.98169					
							0.98169					
							0.988558					
91995				216	45	309.375	0.990848	-0.00504	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.990848					
91996	2	37	2	216	45	309.375	0.990848	-0.00504	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.990848					
91997				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.988558	-0.00504	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.990848					
91998				216	45	309.375	0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.988558	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
91999				216	45	309.375	0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558					
							0.988558					
92000	2	37	6	216	45	309.375	0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
92001				216	45	309.375	0.988558	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
92002				216	45	309.375	0.988558	-0.00301	-0.04574	1.23047	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.990848					
92003				216	45	309.375	0.990848	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.988558	-0.00301	-0.0437		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.990848					
92004	2	37	10	216	45	309.375	0.993137	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04777	1.23047	0.175781	0
							0.988558	-0.00301	-0.04777		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.988558					
92005				216	45	309.375	0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.988558	-0.00301	-0.04574		0.175781	
							0.988558					
							0.990848					
							0.990848					
							0.990848					
92006				216	45	309.375	0.990848	-0.00504	-0.04574	1.23047	0.175781	0
							0.988558	-0.00301	-0.04574	1.05469	0.175781	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.990848					
92007				216	45	309.375	0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.988558					
							0.990848					
92008	2	37	14	216	45	309.375	0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.988558					
							0.990848					
							0.990848					
92009				216	45	309.375	0.988558	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
92010				216	45	309.375	0.990848	-0.00301	-0.0437	1.23047	0.175781	0
							0.988558	-0.00301	-0.0437	1.05469	0.175781	0
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848	-0.00301	-0.04574		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
92011				216	45	309.375	0.990848	-0.00301	-0.04574	1.23047	0.175781	0
							0.990848	-0.00301	-0.04574	1.05469	0.175781	0
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					
							0.990848					
							0.990848					
92012	2	37	18	216	45	309.375	0.990848	-0.00301	-0.0437	1.23047	0.175781	0
							0.990848	-0.00301	-0.0437	1.23047	0.175781	0
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848	-0.00301	-0.0437		0.175781	
							0.990848					
							0.990848					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848					
							0.988558					
92013				216	45	309.375	0.995426	-0.00301	-0.0437	1.05469	0.175781	0
							0.993137	-0.00301	-0.0437	1.23047	0.175781	0
							0.993137	-0.00301	-0.04167		0.175781	
							0.993137	-0.00301	-0.04167		0.175781	
							0.995426					
							0.993137					
							0.993137					
							0.993137					
92014				216	45	309.375	0.995426	-0.00301	-0.04167	1.05469	0.175781	0
							0.995426	-0.00301	-0.04167	1.05469	0.175781	0
							0.993137	-0.00301	-0.04167		0.175781	
							0.993137	-0.00301	-0.03963		0.175781	
							0.993137					
							0.995426					
							0.993137					
							0.993137					
92015				216	45	309.375	0.993137	-0.00301	-0.03963	1.23047	0.175781	0
							0.993137	-0.00301	-0.0376	1.05469	0.175781	0
							0.995426	-0.00097	-0.03556		0.175781	
							0.993137	-0.00301	-0.03353		0.175781	
							0.993137					
							0.993137					
							0.995426					
							0.993137					
92016	2	37	22	216	45	309.375	0.995426	-0.00301	-0.02946	1.23047	0.175781	0
							0.995426	-0.00504	-0.02743	1.05469	0.175781	0
							0.993137	-0.00504	-0.02743		0.175781	
							0.997715	-0.00301	-0.02539		0.175781	
							0.995426					
							0.995426					
							0.997715					
							0.995426					
92017				216	45	309.375	0.993137	-0.00301	-0.02539	1.05469	0.175781	0
							0.993137	-0.00301	-0.02336	1.05469	0.175781	0
							0.995426	-0.00097	-0.01929		0.175781	
							0.997715	-0.00097	-0.01725		0.175781	
							0.997715					
							0.993137					
							0.997715					
							0.995426					
92018				216	45	309.375	0.995426	0.001057	-0.01318	1.05469	0.175781	0
							0.995426	-0.00301	-0.00911	1.05469	0.175781	0
							0.995426	-0.00504	-0.00505		0.175781	
							0.995426	-0.00301	0.001058		0.175781	
							0.995426					
							0.997715					
							0.997715					
							0.993137					
92019				216	45	309.375	0.995426	-0.00504	0.003092	1.05469	0.175781	0
							0.997715	0.003092	0.003092	1.23047	0.175781	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.997715	-0.00097	0.007161		0.175781	
							0.997715	-0.00504	0.007161		0.175781	
							0.997715					
							0.997715					
							0.995426					
							1.00001					
92020	2	37	26	216	45	309.375	1.00001	-0.00301	-0.00098	1.05469	0.175781	0
							1.00001	0.001057	-0.01929	1.23047	0.175781	0
							1.01603	-0.00097	-0.00098		0.175781	
							1.00001	0.003092	-0.01115		0.175781	
							0.963375					
							0.967954					
							1.00001					
							1.02061					
92021				216	45	309.727	1.00001	-0.00504	-0.00911	1.05469	0.175781	0
							0.977111	-0.01114	-0.01725	1.05469	0.175781	0
							0.995426	-0.00097	-0.01318		0.175781	
							1.01374	0.001057	-0.01725		0.175781	
							1.00458					
							0.979401					
							0.977111					
							1.00229					
92022				216	45	309.727	1.02977	0.001057	-0.02743	1.05469	0.175781	0
							1.00458	-0.00504	-0.02946	1.05469	0.175781	0
							0.967954	-0.00301	-0.02743		0.175781	
							0.986269	0.003092	-0.02336		0.175781	
							1.01603					
							1.00001					
							0.967954					
							0.983979					
92023				216	45	310.078	1.01832	0.001057	-0.01929	1.05469	0.175781	0
							1.00916	-0.01114	-0.03353	1.23047	0.175781	0
							0.979401	-0.00301	-0.02743		0.175781	
							0.997715	0.005126	-0.02946		0.175781	
							1.02519					
							0.997715					
							0.961086					
							0.988558					
92024	2	37	30	216	45	311.133	1.02519	-0.00301	-0.03149	1.23047	0.175781	0
							1.00916	-0.00097	-0.02132	1.23047	0.175781	0
							0.963375	0.003092	-0.03963		0.175781	
							0.977111	0.015299	-0.02743		0.175781	
							1.00458					
							1.02977					
							1.00458					
							0.970243					
92025				216	45	312.188	0.98169	0.007161	-0.03353	1.23047	0.175781	0
							1.01603	-0.00301	-0.02946	1.23047	0.175781	0
							1.01145	0.007161	-0.0376		0	
							0.979401	0.013264	-0.02336		0	
							0.977111					
							1.00916					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.01832					
							0.979401					
92026				216	45	314.648	0.956507	0.005126	-0.03149	1.23047	0	0
							1.00229	0.009195	-0.03556	1.05469	0	0
							1.03663	0.017333	-0.03556		0	
							1.00229	0.009195	-0.0376		0	
							0.965664					
							0.983979					
							1.0229					
							1.00229					
92027				216	45	317.109	0.965664	0.013264	-0.02743	1.05469	0	0
							0.970243	0.01123	-0.0376	1.23047	0	0
							1.00001	0.019368	-0.0376		0	
							1.02061	0.003092	-0.03963		0	
							1.01145					
							0.98169					
							0.986269					
							1.00001					
92028	2	37	34	216	45	321.328	1.00229	0.01123	-0.0498	1.05469	0	0
							1.01374	0.019368	-0.03963	1.05469	0.175781	0
							0.993137	0.021403	-0.05387		0	
							0.970243	0.02954	-0.0437		0	
							0.967954					
							1.00916					
							1.02977					
							0.970243					
92029				216	45	325.195	0.972533	0.037679	-0.05184	1.23047	-0.17578	-0.35156
							1.00916	0.02954	-0.04167	1.05469	-0.17578	-0.35156
							1.01145	0.021403	-0.05387		-0.17578	
							0.988558	0.045817	-0.04574		-0.17578	
							0.979401					
							1.00229					
							1.01374					
							0.979401					
92030				216	45	331.523	0.983979	0.039713	-0.05184	1.23047	-0.17578	-0.35156
							1.01374	0.027506	-0.04777	1.23047	-0.17578	-0.35156
							0.995426	0.041747	-0.0498		-0.35156	
							0.977111	0.035644	-0.04777		-0.35156	
							0.997715					
							1.00229					
							0.986269					
							0.986269					
92031				216	45	337.5	1.00001	0.023437	-0.05387	1.23047	-0.35156	0
							1.02519	0.027506	-0.0498	1.05469	-0.35156	0
							1.00001	0.049886	-0.05998		-0.35156	
							0.970243	0.043782	-0.04167		-0.35156	
							0.974822					
							1.00687					
							1.01374					
							0.965664					
92032	2	37	38	216	45	345.234	0.967954	0.031575	-0.04777	1.05469	-0.35156	0
							1.01374	0.031575	-0.04167	1.05469	-0.35156	-0.35156

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.01832	0.035644	-0.0437		-0.35156	
							0.983979	0.049886	-0.04574		-0.17578	
							0.974822					
							1.00458					
							1.01145					
							0.995426					
92033				216	45	351.211	0.977111	0.045817	-0.04574	1.05469	-0.17578	-0.70312
							0.974822	0.053955	-0.04167	1.05469	-0.17578	-0.70312
							1.00001	0.058024	-0.0376		-0.17578	
							0.997715	0.023437	-0.04777		-0.17578	
							0.979401					
							1.00001					
							1.02519					
							1.02061					
92034				216	45	358.945	0.967954	0.027506	-0.0376	1.05469	-0.17578	-0.35156
							0.958796	0.049886	-0.0376	1.05469	-0.17578	-0.35156
							1.00229	0.041747	-0.0437		0	
							1.02061	0.037679	-0.0498		0	
							1.00916					
							0.990848					
							0.990848					
							1.01374					
92035				216	45	4.92188	1.00001	0.035644	-0.04777	1.05469	0	0
							0.986269	0.025471	-0.03963	1.05469	0	-0.35156
							0.983979	0.045817	-0.03963		0	
							0.986269	0.053955	-0.0376		0	
							0.988558					
							0.993137					
							1.00229					
							1.00001					
92036	2	37	42	216	45	12.3047	1.00001	0.039713	-0.0437	1.05469	0	0
							0.993137	0.037679	-0.03963	1.05469	0	0
							0.979401	0.02954	-0.0437		0	
							0.986269	0.02954	-0.03353		0	
							1.00229					
							1.01145					
							0.986269					
							0.972533					
92037				216	45	17.9297	1.00687	0.031575	-0.0437	1.05469	0	0
							1.02748	0.02954	-0.03556	1.05469	0	0.351562
							0.995426	0.025471	-0.0437		0	
							0.965664	0.017333	-0.04167		0	
							0.98169					
							1.02519					
							1.01603					
							0.977111					
92038				216	45	23.5547	0.98169	0.02954	-0.0437	1.05469	0	0.351562
							1.00687	0.023437	-0.04574	1.05469	0	0.703124
							1.00687	0.017333	-0.04167		0	
							0.988558	0.019368	-0.0437		0	
							0.979401					
							0.988558					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.00687					
							1.00687					
92039				216	45	28.4766	0.988558	0.007161	-0.0437	1.05469	0	0.703124
							0.983979	0.015299	-0.0437	1.05469	0	1.05469
							0.997715	0.013264	-0.03963		0	
							1.00229	0.001057	-0.03963		-0.17578	
							0.995426					
							0.988558					
							0.997715					
							1.00687					
92040	2	37	46	216	45	34.1016	0.993137	0.009195	-0.0376	1.05469	-0.17578	1.05469
							0.98169	0.01123	-0.04167	1.05469	-0.17578	1.05469
							1.00229	0.013264	-0.04574		-0.17578	
							1.00001	0.009195	-0.0437		-0.17578	
							0.98169					
							0.997715					
							1.00687					
							0.990848					
92041				216	45	38.3203	0.990848	0.01123	-0.04777	1.05469	-0.17578	1.05469
							0.997715	0.015299	-0.05591	1.05469	-0.35156	1.05469
							0.983979	0.017333	-0.0498		-0.35156	
							0.997715	0.015299	-0.05591		-0.35156	
							1.00458					
							0.986269					
							0.990848					
							1.00916					
92042				216	45	43.5938	0.995426	0.013264	-0.05184	1.05469	-0.35156	1.05469
							0.98169	0.021403	-0.05387	1.05469	-0.35156	0.703124
							0.997715	0.025471	-0.05387		-0.52734	
							1.00458	0.027506	-0.05387		-0.52734	
							0.986269					
							0.986269					
							0.993137					
							1.00458					
92043				216	45	50.625	1.00001	0.031575	-0.05184	1.05469	-0.52734	0.703124
							0.988558	0.02954	-0.05184	1.05469	-0.52734	0.703124
							0.995426	0.035644	-0.05184		-0.52734	
							0.993137	0.037679	-0.05591		-0.52734	
							0.995426					
							0.997715					
							0.983979					
							1.00229					
92044	2	37	50	216	45	56.9531	1.01145	0.039713	-0.04574	1.23047	-0.52734	0.703124
							0.979401	0.041747	-0.04777	1.05469	-0.52734	0.351562
							0.986269	0.043782	-0.05184		-0.52734	
							1.00229	0.049886	-0.0498		-0.52734	
							0.990848					
							0.995426					
							1.00001					
							0.995426					
92045				216	45	65.7422	0.990848	0.047851	-0.04777	1.23047	-0.52734	0.351562
							0.993137	0.047851	-0.0437	1.23047	-0.52734	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.997715	0.055989	-0.0437		-0.35156	
							0.993137	0.049886	-0.04167		-0.35156	
							0.988558					
							1.00001					
							1.00001					
							0.993137					
92046				216	45	73.125	0.997715	0.055989	-0.04777	1.23047	-0.35156	0
							0.995426	0.070231	-0.05184	1.23047	-0.35156	-0.35156
							1.00001	0.066162	-0.0498		-0.35156	
							1.00229	0.058024	-0.0498		-0.35156	
							1.00229					
							0.995426					
							0.997715					
							0.993137					
92047				216	45	82.9688	0.98169	0.064127	-0.04574	1.23047	-0.52734	-0.35156
							0.983979	0.0743	-0.04574	1.23047	-0.52734	-0.35156
							0.977111	0.058024	-0.05184		-0.52734	
							1.00001	0.055989	-0.05184		-0.52734	
							1.01603					
							1.01145					
							0.98169					
							0.967954					
92048	2	37	54	216	45	90	1.01603	0.064127	-0.05998	1.23047	-0.52734	-0.35156
							1.02977	0.066162	-0.0498	1.23047	-0.52734	-0.35156
							0.98169	0.060058	-0.05184		-0.52734	
							0.958796	0.062093	-0.05184		-0.52734	
							0.965664					
							1.01374					
							1.05266					
							1.00916					
92049				216	45	99.4922	0.935903	0.058024	-0.04167	1.23047	-0.52734	-0.35156
							0.940481	0.068196	-0.04777	1.23047	-0.52734	-0.70312
							1.01374	0.084472	-0.0437		-0.52734	
							1.02977	0.066162	-0.04167		-0.52734	
							0.970243					
							0.967954					
							1.00458					
							1.01832					
92050				216	45	106.523	1.01374	0.055989	-0.04167	1.23047	-0.52734	-0.35156
							0.983979	0.060058	-0.0437	1.23047	-0.52734	-0.35156
							0.988558	0.05192	-0.04574		-0.52734	
							1.00916	0.060058	-0.03963		-0.52734	
							0.993137					
							0.986269					
							0.997715					
							0.995426					
92051				216	45	115.312	1.00001	0.062093	-0.0437	1.23047	-0.52734	-0.35156
							1.00229	0.045817	-0.04167	1.23047	-0.52734	-0.35156
							0.997715	0.058024	-0.04574		-0.52734	
							0.979401	0.058024	-0.0437		-0.52734	
							0.979401					
							1.01374					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.02061					
							0.988558					
92052	2	37	58	216	45	121.641	0.967954	0.047851	-0.04167	1.23047	-0.52734	-0.35156
							0.986269	0.060058	-0.04167	1.23047	-0.52734	-0.35156
							1.00916	0.041747	-0.03963		-0.52734	
							1.00916	0.035644	-0.03556		-0.52734	
							1.00458					
							0.983979					
							0.977111					
							0.995426					
92053				216	45	127.969	1.01374	0.039713	-0.03963	1.23047	-0.52734	-0.35156
							1.01145	0.031575	-0.0376	1.23047	-0.52734	-0.35156
							0.986269	0.037679	-0.04574		-0.52734	
							0.972533	0.03361	-0.03963		-0.52734	
							0.995426					
							1.02061					
							1.00916					
							0.963375					
92054				216	45	131.133	0.965664	0.019368	-0.0437	1.23047	-0.52734	-0.35156
							1.00916	0.017333	-0.04777	1.23047	-0.70312	0
							1.03892	0.009195	-0.04574		-0.70312	
							1.00916	0.013264	-0.05387		-0.70312	
							0.94735					
							0.970243					
							1.00916					
							1.03206					
92055				216	45	133.594	1.01374	0.017333	-0.03963	1.23047	-0.52734	0
							0.958796	0.01123	-0.0437	1.23047	-0.52734	0
							0.970243	0.009195	-0.04167		-0.52734	
							1.00458	0.001057	-0.04167		-0.35156	
							1.03892					
							0.997715					
							0.961086					
							0.990848					
92056	2	38	2	216	45	134.648	1.0229	-0.00301	-0.04574	1.23047	-0.35156	0
							1.02061	0.005126	-0.03353	1.23047	0	0
							0.990848	0.009195	-0.04574		0	
							0.954217	0.005126	-0.03353		0.175781	
							0.977111					
							1.0435					
							1.04121					
							0.965664					
92057				216	45	135.703	0.940481	0.001057	-0.03963	1.23047	0.175781	-0.35156
							1.00229	0.01123	-0.0376	1.23047	0.175781	-0.35156
							1.05724	0.007161	-0.03556		0	
							1.00916	0.007161	-0.06201		0	
							0.940481					
							0.956507					
							1.00229					
							1.08471					
92058				216	45	135.703	1.05953	0.005126	-0.05184	1.23047	0	-0.35156
							0.956507	-0.00097	-0.05794	1.23047	0	-0.35156

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITU ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.956507	0.001057	-0.05591		-0.17578	
							1.00687	-0.00301	-0.0498		-0.35156	
							1.0435					
							0.995426					
							0.915298					
							0.933613					
92059				216	45	135.352	1.02748	0.003092	-0.04777	1.23047	-0.35156	-0.70312
							1.03663	-0.00097	-0.03963	1.23047	-0.35156	-0.35156
							0.954217	-0.00301	-0.06201		-0.52734	
							0.935903	0.017333	-0.05591		-0.52734	
							1.00916					
							1.07327					
							1.00916					
							0.935903					
92060	2	38	6	216	45	135.352	0.933613	0.007161	-0.06405	1.23047	-0.52734	-0.35156
							1.00458	0.005126	-0.05591	1.23047	-0.52734	-0.35156
							1.05495	0.001057	-0.04167		-0.52734	
							0.983979	0.005126	-0.05184		-0.52734	
							0.929034					
							0.949639					
							1.03892					
							1.05724					
92061				216	45	135.703	0.98169	0.005126	-0.03963	1.23047	-0.52734	-0.35156
							0.933613	-0.00301	-0.05184	1.23047	-0.52734	-0.35156
							0.993137	0.005126	-0.0437		-0.52734	
							1.04808	0.015299	-0.05184		-0.35156	
							1.01145					
							0.958796					
							0.94506					
							1.02061					
92062				212	45	136.055	1.05953	0.01123	-0.04574	1.23047	-0.52734	-0.35156
							0.98169	0.007161	-0.04777	1.23047	-0.52734	0
							0.94277	0.003092	-0.04777		-0.52734	
							0.995426	-0.00301	-0.0498		-0.52734	
							1.02977					
							1.01145					
							0.979401					
							0.979401					
92063				216	45	136.406	1.00458	0.01123	-0.0437	1.23047	-0.52734	-0.35156
							1.00229	0.001057	-0.04574	1.23047	-0.52734	-0.35156
							0.983979	0.001057	-0.0498		-0.52734	
							0.988558	0.007161	-0.03556		-0.52734	
							1.0229					
							1.02061					
							0.94735					
							0.935903					
92064	2	38	10	212	45	137.109	1.02519	-0.00708	-0.05387	1.23047	-0.52734	0
							1.0664	0.001057	-0.04167	1.23047	-0.52734	0
							1.00687	-0.00301	-0.05591		-0.52734	
							0.94735	-0.00301	-0.04574		-0.70312	
							0.956507					
							1.03206					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.04579					
							0.963375					
92065				212	45	137.109	0.922166	-0.00097	-0.05184	1.23047	-0.8789	0
							0.990848	-0.01318	-0.05794	1.23047	-0.8789	0
							1.05953	-0.00097	-0.0437		-0.8789	
							1.02977	-0.00708	-0.05998		-0.8789	
							0.949639					
							0.935903					
							1.00458					
							1.05953					
92066				212	45	136.406	1.00916	-0.00911	-0.04777	1.23047	-0.8789	0
							0.956507	-0.01114	-0.04574	1.23047	-0.8789	0
							0.94506	-0.01521	-0.05184		-0.8789	
							0.988558	-0.00708	-0.04167		-1.05469	
							1.04808					
							1.0229					
							0.94735					
							0.940481					
92067				212	45	134.297	0.990848	-0.00708	-0.05794	1.23047	-1.05469	-0.35156
							1.04579	-0.00504	-0.03963	1.23047	-0.8789	0
							1.03435	-0.01521	-0.05591		-0.8789	
							0.954217	-0.02335	-0.04777		-1.05469	
							0.956507					
							1.0435					
							1.0664					
							0.979401					
92068	2	38	14	212	45	132.891	0.892404	-0.00708	-0.03963	1.23047	-1.05469	-0.35156
							0.931324	-0.00504	-0.05387	1.23047	-0.8789	-0.35156
							1.0435	-0.02132	-0.04574		-0.8789	
							1.09158	-0.01521	-0.05794		-0.8789	
							1.02061					
							0.94277					
							0.935903					
							1.01603					
92069				212	45	131.133	1.05495	-0.00301	-0.04574	1.23047	-0.8789	-0.35156
							0.995426	-0.02335	-0.0498	1.23047	-1.05469	-0.35156
							0.94277	-0.01521	-0.05591		-1.05469	
							0.958796	0.007161	-0.05184		-1.05469	
							1.02519					
							1.03435					
							1.00229					
							0.993137					
92070				212	45	129.727	0.995426	-0.00911	-0.05794	1.23047	-1.05469	-0.35156
							0.997715	-0.01318	-0.04777	1.23047	-1.05469	-0.35156
							0.974822	0.007161	-0.04777		-1.05469	
							0.961086	-0.00911	-0.06201		-1.05469	
							0.990848					
							0.970243					
							0.990848					
							1.02519					
92071				212	45	129.375	1.00229	-0.00911	-0.06201	1.23047	-1.05469	0
							0.963375	-0.01521	-0.07829	1.23047	-1.05469	-0.35156

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.935903	-0.00301	-0.08439		-1.05469	
							1.01145	0.001057	-0.07422		-1.05469	
							1.08929					
							1.00229					
							0.899272					
							0.90843					
92072	2	38	18	212	45	129.023	1.01832	-0.01114	-0.0966	1.23047	-1.23047	-0.35156
							1.04808	-0.00911	-0.08846	1.23047	-1.23047	-0.35156
							0.990848	-0.00504	-0.09863		-1.05469	
							0.94735	-0.00301	-0.08439		-1.23047	
							0.972533					
							1.03435					
							1.01374					
							0.938192					
92073				212	45	128.32	0.90843	0.003092	-0.09456	1.23047	-1.23047	-0.35156
							0.988558	-0.00097	-0.08846	1.23047	-1.05469	-0.35156
							1.05724	-0.00708	-0.09863		-1.05469	
							0.995426	-0.00911	-0.0966		-1.05469	
							0.926745					
							0.988558					
							1.04121					
							0.995426					
92074				212	45	127.266	0.913009	-0.01114	-0.08643	1.23047	-1.05469	-0.35156
							0.94735	-0.00504	-0.09456	1.23047	-1.05469	-0.35156
							1.05953	-0.01114	-0.08236		-1.05469	
							1.07555	-0.00708	-0.0966		-1.05469	
							0.94735					
							0.899272					
							0.974822					
							1.05495					
92075				212	45	126.211	1.01603	-0.01114	-0.06812	1.23047	-1.05469	-0.35156
							0.94735	-0.02945	-0.07625	1.23047	-1.05469	0
							0.922166	-0.03759	-0.07829		-1.23047	
							1.00458	-0.01114	-0.05794		-1.05469	
							1.07327					
							1.00229					
							0.949639					
							0.94735					
92076	2	38	22	212	45	124.102	1.01145	-0.01725	-0.07218	1.23047	-1.05469	-0.35156
							1.08013	-0.03556	-0.07015	1.23047	-1.05469	-0.35156
							1.02519	-0.04166	-0.05998		-1.05469	
							0.958796	-0.02335	-0.04777		-1.05469	
							0.974822					
							0.958796					
							0.954217					
							0.990848					
92077				208	45	121.992	1.03663	-0.03963	-0.05184	1.23047	-1.05469	-0.35156
							0.997715	-0.04573	-0.05184	1.23047	-1.05469	0
							1.00687	-0.0559	-0.04777		-0.8789	
							1.01374	-0.0498	-0.04777		-0.8789	
							0.990848					
							0.983979					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848					
							0.997715					
92078				208	45	117.422	1.00229	-0.05183	-0.04777	1.23047	-1.05469	0
							0.995426	-0.06201	-0.05184	1.23047	-1.05469	0
							0.983979	-0.06811	-0.0498		-0.8789	
							1.00229	-0.07014	-0.05184		-1.05469	
							1.01374					
							0.988558					
							0.972533					
							1.00687					
92079				208	45	111.797	1.00229	-0.08032	-0.0498	1.23047	-1.05469	0
							0.979401	-0.08439	-0.05387	1.23047	-1.05469	0.351562
							0.977111	-0.08439	-0.04574		-1.05469	
							1.00458	-0.09456	-0.05591		-1.05469	
							1.01603					
							0.967954					
							0.974822					
							1.01832					
92080	2	38	26	208	45	104.062	1.02519	-0.09863	-0.05184	1.23047	-1.05469	0.351562
							0.990848	-0.1027	-0.05184	1.23047	-1.23047	0.703124
							0.965664	-0.10473	-0.05387		-1.23047	
							0.98169	-0.11084	-0.0498		-1.05469	
							0.995426					
							1.00916					
							0.997715					
							0.98169					
92081				208	45	97.0312	0.951928	-0.12101	-0.05387	1.23047	-1.05469	0.703124
							0.995426	-0.12101	-0.04167	1.23047	-1.05469	0.703124
							1.05495	-0.12915	-0.0437		-1.05469	
							0.990848	-0.1149	-0.0498		-0.8789	
							0.94506					
							0.98169					
							1.02519					
							1.02748					
92082				208	45	87.1875	0.983979	-0.12101	-0.04777	1.23047	-0.8789	0.703124
							0.977111	-0.12915	-0.05591	1.23047	-0.8789	0.351562
							1.01145	-0.12101	-0.03963		-0.8789	
							1.03663	-0.1149	-0.05387		-0.8789	
							0.988558					
							0.917587					
							0.974822					
							1.05266					
92083				208	45	79.4531	1.04808	-0.11694	-0.05184	1.23047	-0.8789	0.703124
							0.986269	-0.11897	-0.0437	1.23047	-0.8789	0.703124
							0.940481	-0.11897	-0.0498		-0.8789	
							0.963375	-0.12508	-0.04574		-0.70312	
							1.00458					
							1.02748					
							1.00687					
							0.974822					
92084	2	38	30	208	45	69.9609	0.993137	-0.12915	-0.04777	1.23047	-0.70312	1.05469
							1.00916	-0.1149	-0.04574	1.23047	-0.70312	1.05469

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.98169	-0.1149	-0.0498		-0.70312	
							0.979401	-0.12915	-0.0498		-0.70312	
							1.00229					
							1.01832					
							1.00916					
							0.98169					
92085				208	45	62.9297	0.98169	-0.11694	-0.04574	1.23047	-0.52734	0.703124
							0.990848	-0.10677	-0.04574	1.23047	-0.70312	0.703124
							0.997715	-0.11084	-0.05184		-0.70312	
							0.993137	-0.10677	-0.04777		-0.52734	
							0.972533					
							1.00916					
							1.0229					
							0.990848					
92086				208	45	54.4922	0.977111	-0.11084	-0.0498	1.23047	-0.52734	0.703124
							0.986269	-0.10473	-0.04777	1.23047	-0.52734	0.703124
							1.00229	-0.09863	-0.0498		-0.52734	
							0.997715	-0.09659	-0.0498		-0.52734	
							0.995426					
							0.990848					
							0.990848					
							1.00001					
92087				208	45	48.8672	0.995426	-0.09252	-0.04777	1.23047	-0.52734	0.703124
							0.974822	-0.08846	-0.0498	1.23047	-0.52734	1.05469
							0.988558	-0.09049	-0.0498		-0.35156	
							1.01603	-0.08439	-0.0498		-0.35156	
							1.00458					
							0.979401					
							0.977111					
							1.00229					
92088	2	38	34	208	45	43.2422	1.01832	-0.07625	-0.0498	1.23047	-0.35156	1.05469
							0.995426	-0.07421	-0.05184	1.23047	-0.35156	1.05469
							0.974822	-0.06201	-0.05184		-0.35156	
							0.993137	-0.05794	-0.05184		-0.35156	
							1.00458					
							0.988558					
							0.983979					
							1.00001					
92089				208	45	40.0781	1.01145	-0.05387	-0.04777	1.23047	-0.35156	1.05469
							0.98169	-0.05183	-0.05591	1.23047	-0.35156	1.05469
							0.983979	-0.05183	-0.05184		-0.35156	
							1.01832	-0.04166	-0.05184		-0.35156	
							1.00229					
							0.983979					
							0.995426					
							0.997715					
92090				208	45	38.3203	0.993137	-0.03352	-0.05387	1.23047	-0.35156	0.703124
							0.990848	-0.02539	-0.05794	1.23047	-0.35156	0.703124
							0.995426	-0.01928	-0.0498		-0.35156	
							0.990848	-0.02335	-0.0437		-0.35156	
							0.993137					
							0.990848					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.970243					
							0.979401					
92091				208	45	37.2656	1.01374	-0.02539	-0.04777	1.23047	-0.35156	0.703124
							1.00916	-0.01725	-0.04574	1.23047	-0.35156	0.703124
							0.979401	-0.00911	-0.0498		-0.35156	
							0.993137	-0.02132	-0.0498		-0.35156	
							1.01145					
							1.00458					
							1.00687					
							0.995426					
92092	2	38	38	208	45	37.2656	0.986269	-0.02132	-0.0498	1.23047	-0.35156	1.05469
							0.993137	-0.01318	-0.04574	1.23047	-0.35156	1.05469
							1.00001	-0.01521	-0.04777		-0.35156	
							0.979401	-0.02335	-0.04574		-0.35156	
							0.995426					
							1.00916					
							0.979401					
							0.986269					
92093				208	45	37.6172	1.00229	-0.01521	-0.04777	1.23047	-0.35156	1.05469
							1.00458	-0.01521	-0.05184	1.23047	-0.35156	1.05469
							1.00229	-0.02742	-0.0498		-0.35156	
							1.00229	-0.02335	-0.0498		-0.35156	
							0.993137					
							0.983979					
							0.990848					
							0.997715					
92094				208	45	37.6172	0.986269	-0.02335	-0.04777	1.23047	-0.35156	1.05469
							0.997715	-0.02539	-0.04574	1.23047	-0.35156	1.05469
							1.00229	-0.02132	-0.04777		-0.35156	
							0.983979	-0.02132	-0.0498		-0.35156	
							0.988558					
							1.00458					
							0.995426					
							0.995426					
92095				208	45	37.2656	1.00001	-0.02132	-0.04777	1.23047	-0.35156	0.703124
							0.993137	-0.01928	-0.04777	1.23047	-0.35156	0.703124
							0.988558	-0.01928	-0.0498		-0.35156	
							0.993137	-0.02539	-0.04777		-0.35156	
							1.00229					
							0.997715					
							0.997715					
							0.988558					
92096	2	38	42	208	45	37.2656	0.993137	-0.02335	-0.0498	1.23047	-0.35156	0.703124
							1.00229	-0.01521	-0.0498	1.23047	-0.35156	0.703124
							0.995426	-0.01725	-0.0498		-0.35156	
							0.986269	-0.01725	-0.05184		-0.35156	
							0.995426					
							1.00229					
							0.990848					
							0.993137					
92097				208	45	36.9141	1.00229	-0.01318	-0.05184	1.23047	-0.35156	0.703124
							0.995426	-0.00708	-0.05387	1.23047	-0.35156	0.351562

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558	-0.00708	-0.0498		-0.35156	
							0.993137	-0.00911	-0.0498		-0.35156	
							0.990848					
							0.993137					
							0.997715					
							0.990848					
92098				208	45	37.2656	0.997715	-0.00301	-0.0498	1.23047	-0.35156	0.703124
							0.997715	-0.00097	-0.0498	1.23047	-0.35156	0.703124
							0.979401	-0.00708	-0.04574		-0.35156	
							0.988558	-0.00911	-0.04574		-0.35156	
							1.00916					
							1.00229					
							0.98169					
							0.993137					
92099				208	45	38.3203	1.00229	-0.00708	-0.0498	1.23047	-0.35156	0.703124
							0.997715	-0.01114	-0.04777	1.23047	-0.35156	0.703124
							0.990848	-0.01318	-0.05184		-0.35156	
							0.993137	-0.00708	-0.0498		-0.35156	
							0.997715					
							1.00001					
							0.995426					
							0.993137					
92100	2	38	46	208	45	38.3203	0.988558	-0.00911	-0.0498	1.23047	-0.35156	0.703124
							0.993137	-0.00708	-0.0498	1.23047	-0.35156	0.351562
							0.993137	-0.00911	-0.0498		-0.35156	
							0.997715	-0.00911	-0.0498		-0.35156	
							1.00001					
							0.995426					
							0.997715					
							0.986269					
92101				208	45	38.6719	0.974822	-0.00708	-0.0498	1.23047	-0.35156	0.351562
							0.997715	-0.00708	-0.04777	1.23047	-0.35156	0.703124
							1.01374	-0.00301	-0.0498		-0.35156	
							0.990848	-0.01114	-0.0498		-0.35156	
							0.983979					
							1.00229					
							1.00229					
							0.993137					
92102				208	45	39.0234	0.995426	-0.01114	-0.0498	1.23047	-0.35156	0.703124
							0.993137	-0.00301	-0.0498	1.23047	-0.35156	0.703124
							0.997715	-0.00708	-0.04777		-0.35156	
							0.997715	-0.01114	-0.04777		-0.35156	
							0.979401					
							0.995426					
							1.00458					
							0.983979					
92103				204	45	39.375	0.997715	-0.00504	-0.04777	1.23047	-0.35156	0.703124
							1.00916	-0.00911	-0.0498	1.23047	-0.35156	0.703124
							0.983979	-0.00911	-0.04777		-0.35156	
							0.993137	-0.00301	-0.04574		-0.35156	
							0.993137					
							0.98169					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.00001					
							1.00458					
92104	2	38	50	204	45	39.7266	0.983979	-0.00911	-0.04777	1.23047	-0.35156	0.703124
							1.00458	-0.01725	-0.04777	1.23047	-0.35156	0.703124
							1.01374	-0.01521	-0.04574		-0.35156	
							0.993137	-0.01725	-0.0498		-0.35156	
							0.993137					
							0.995426					
							0.990848					
							1.00229					
92105				204	45	40.0781	0.995426	-0.01725	-0.04574	1.23047	-0.35156	0.703124
							0.979401	-0.01521	-0.04777	1.23047	-0.35156	0.703124
							0.995426	-0.01725	-0.04777		-0.35156	
							1.00687	-0.01725	-0.05184		-0.35156	
							0.988558					
							0.983979					
							1.00229					
							1.00916					
92106				204	45	39.7266	0.997715	-0.01928	-0.0498	1.23047	-0.35156	0.703124
							0.993137	-0.02335	-0.04777	1.23047	-0.35156	0.703124
							0.986269	-0.01114	-0.0498		-0.35156	
							0.977111	-0.01521	-0.04777		-0.35156	
							0.986269					
							1.00458					
							1.00229					
							0.988558					
92107				204	45	39.7266	1.00001	-0.02132	-0.0498	1.23047	-0.35156	0.703124
							0.995426	-0.01114	-0.0498	1.23047	-0.35156	0.703124
							0.986269	-0.01725	-0.04777		-0.35156	
							0.997715	-0.02132	-0.04777		-0.35156	
							0.995426					
							0.986269					
							1.00458					
							0.997715					
92108	2	38	54	204	45	39.375	0.983979	-0.01928	-0.0498	1.23047	-0.35156	1.05469
							1.00687	-0.02742	-0.04777	1.23047	-0.35156	1.05469
							1.00687	-0.02132	-0.0437		-0.35156	
							0.98169	-0.02539	-0.05184		-0.52734	
							0.997715					
							0.993137					
							0.977111					
							1.01145					
92109				204	45	39.0234	1.01374	-0.02945	-0.0498	1.23047	-0.52734	1.05469
							0.977111	-0.02945	-0.0498	1.23047	-0.52734	0.703124
							0.974822	-0.01725	-0.04574		-0.52734	
							1.00458	-0.01521	-0.04777		-0.52734	
							1.00687					
							0.990848					
							0.986269					
							1.00687					
92110				208	45	39.0234	1.00687	-0.02335	-0.04574	1.23047	-0.52734	0.703124
							0.977111	-0.01928	-0.0498	1.23047	-0.35156	0.703124

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.993137	-0.01318	-0.04777		-0.35156	
							1.00458	-0.02335	-0.0498		-0.52734	
							0.995426					
							0.995426					
							0.993137					
							0.997715					
92111				204	45	39.0234	1.00229	-0.02132	-0.04574	1.23047	-0.35156	0.703124
							0.990848	-0.02132	-0.04777	1.23047	-0.35156	0.703124
							0.995426	-0.01725	-0.04777		-0.52734	
							0.997715	-0.02132	-0.0498		-0.52734	
							0.988558					
							0.997715					
							1.00001					
							0.988558					
92112	2	38	58	204	45	38.6719	1.00001	-0.01928	-0.0498	1.23047	-0.52734	0.703124
							1.00001	-0.01928	-0.04777	1.23047	-0.52734	0.703124
							0.983979	-0.02335	-0.0498		-0.52734	
							0.98169	-0.02335	-0.04574		-0.35156	
							0.997715					
							1.01145					
							1.00001					
							0.988558					
92113				204	45	38.6719	0.995426	-0.02539	-0.04574	1.23047	-0.35156	0.703124
							0.995426	-0.01928	-0.04777	1.23047	-0.35156	0.703124
							0.990848	-0.02132	-0.04777		-0.35156	
							1.00001	-0.02335	-0.0498		-0.35156	
							1.00001					
							0.986269					
							0.997715					
							1.00458					
92114				204	45	38.3203	1.00001	-0.02132	-0.0498	1.23047	-0.35156	0.703124
							0.983979	-0.01928	-0.05184	1.23047	-0.52734	0.703124
							0.986269	-0.01928	-0.0498		-0.52734	
							1.00458	-0.02132	-0.0498		-0.52734	
							0.997715					
							0.983979					
							0.988558					
							0.995426					
92115				204	45	37.9688	0.995426	-0.01725	-0.0498	1.23047	-0.52734	0.703124
							0.995426	-0.02132	-0.0498	1.23047	-0.52734	1.05469
							0.993137	-0.02539	-0.0498		-0.52734	
							1.00687	-0.02132	-0.0498		-0.52734	
							0.995426					
							0.986269					
							0.983979					
							0.995426					
92116	2	39	2	204	45	37.9688	1.00687	-0.01521	-0.0498	1.23047	-0.52734	0.703124
							1.00229	-0.01318	-0.0498	1.23047	-0.52734	0.703124
							0.986269	-0.01318	-0.04777		-0.52734	
							0.990848	-0.01114	-0.0498		-0.52734	
							0.995426					
							0.988558					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.997715					
							1.00001					
92117				204	45	38.3203	0.993137	-0.01521	-0.04777	1.23047	-0.52734	1.05469
							0.990848	-0.01318	-0.04777	1.23047	-0.52734	1.05469
							0.990848	-0.01521	-0.04777		-0.52734	
							1.00001	-0.01928	-0.04574		-0.52734	
							1.00229					
							0.997715					
							0.986269					
							0.983979					
92118				204	45	38.6719	0.993137	-0.01521	-0.04574	1.23047	-0.52734	1.05469
							0.997715	-0.01928	-0.04777	1.23047	-0.52734	0.703124
							1.00001	-0.01521	-0.0498		-0.52734	
							1.00001	-0.01725	-0.04777		-0.52734	
							0.997715					
							0.990848					
							0.990848					
							0.997715					
92119				204	45	38.6719	0.997715	-0.02335	-0.0498	1.23047	-0.52734	0.703124
							1.00001	-0.01725	-0.0498	1.23047	-0.52734	0.703124
							0.995426	-0.01318	-0.05184		-0.52734	
							0.990848	-0.01725	-0.04777		-0.52734	
							0.988558					
							1.00001					
							0.997715					
							0.979401					
92120	2	39	6	204	45	38.6719	0.98169	-0.01521	-0.04777	1.23047	-0.52734	0.703124
							0.997715	-0.00911	-0.04777	1.23047	-0.52734	0.703124
							1.00458	-0.01114	-0.05387		-0.52734	
							0.990848	-0.01318	-0.04777		-0.52734	
							0.988558					
							1.01374					
							0.997715					
							0.974822					
92121				204	45	39.0234	0.983979	-0.00708	-0.0498	1.23047	-0.52734	0.703124
							1.00916	-0.01114	-0.0498	1.23047	-0.52734	0.703124
							1.00458	-0.00708	-0.04777		-0.52734	
							0.988558	-0.01114	-0.04777		-0.52734	
							0.988558					
							0.988558					
							0.993137					
							1.00687					
92122				204	45	39.375	1.00458	-0.01928	-0.0498	1.23047	-0.52734	1.05469
							1.00001	-0.01928	-0.04777	1.23047	-0.52734	0.703124
							0.979401	-0.01114	-0.0498		-0.52734	
							0.977111	-0.01318	-0.04777		-0.52734	
							1.01374					
							1.01832					
							0.98169					
							0.967954					
92123				204	45	39.375	0.997715	-0.01318	-0.05184	1.23047	-0.52734	0.703124
							1.01603	-0.01318	-0.04574	1.23047	-0.52734	0.703124

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848	-0.01521	-0.0498		-0.52734	
							0.974822	-0.01725	-0.04574		-0.52734	
							0.993137					
							1.01374					
							1.00229					
							0.979401					
92124	2	39	10	204	45	39.375	0.990848	-0.01318	-0.05184	1.23047	-0.52734	0.703124
							1.01374	-0.01725	-0.04574	1.23047	-0.52734	0.703124
							1.00687	-0.02132	-0.0498		-0.52734	
							0.98169	-0.01725	-0.04777		-0.52734	
							0.979401					
							1.00229					
							1.00001					
							0.988558					
92125				204	45	39.7266	0.993137	-0.01928	-0.0498	1.23047	-0.52734	1.05469
							1.00229	-0.01928	-0.0498	1.23047	-0.52734	1.05469
							1.00687	-0.01725	-0.0498		-0.52734	
							0.983979	-0.01725	-0.05184		-0.52734	
							0.983979					
							1.00458					
							1.00229					
							0.995426					
92126				204	45	39.7266	0.979401	-0.01725	-0.0498	1.23047	-0.52734	0.703124
							0.986269	-0.01318	-0.0498	1.23047	-0.52734	0.703124
							1.00001	-0.01318	-0.04777		-0.52734	
							0.995426	-0.01318	-0.04574		-0.52734	
							0.995426					
							0.995426					
							0.995426					
							0.983979					
92127				204	45	39.7266	0.993137	-0.01521	-0.0498	1.23047	-0.52734	0.703124
							1.00687	-0.01725	-0.04574	1.23047	-0.52734	0.703124
							0.990848	-0.02132	-0.0498		-0.52734	
							0.98169	-0.02539	-0.04574		-0.52734	
							1.00229					
							1.00916					
							0.988558					
							0.974822					
92128	2	39	14	204	45	39.7266	1.00229	-0.01725	-0.05387	1.23047	-0.52734	1.05469
							1.02748	-0.02132	-0.04777	1.23047	-0.52734	1.05469
							1.01145	-0.02945	-0.05387		-0.70312	
							0.970243	-0.01928	-0.0498		-0.70312	
							0.956507					
							0.997715					
							1.01832					
							0.997715					
92129				204	45	39.375	0.970243	-0.02335	-0.04777	1.23047	-0.70312	1.05469
							0.98169	-0.02742	-0.04777	1.23047	-0.70312	1.05469
							1.00916	-0.02539	-0.04777		-0.52734	
							1.00229	-0.01928	-0.0498		-0.52734	
							0.979401					
							0.983979					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.01374					
							1.01145					
92130				200	45	39.375	1.00001	-0.02335	-0.04777	1.23047	-0.52734	1.05469
							0.988558	-0.03149	-0.0498	1.23047	-0.52734	0.703124
							0.983979	-0.02539	-0.04777		-0.52734	
							0.997715	-0.02335	-0.0498		-0.52734	
							0.988558					
							0.988558					
							0.997715					
							1.00458					
92131				204	45	39.0234	0.997715	-0.02335	-0.04777	1.23047	-0.52734	1.05469
							0.979401	-0.02132	-0.05184	1.23047	-0.52734	1.05469
							0.995426	-0.02539	-0.04574		-0.52734	
							1.01145	-0.02539	-0.05387		-0.52734	
							0.995426					
							0.972533					
							0.990848					
							1.02061					
92132	2	39	18	200	45	38.6719	1.00229	-0.02742	-0.04777	1.23047	-0.52734	1.05469
							0.974822	-0.02742	-0.05184	1.23047	-0.52734	0.703124
							0.977111	-0.02335	-0.0498		-0.70312	
							1.00916	-0.02132	-0.05184		-0.70312	
							1.00458					
							0.98169					
							0.986269					
							1.00458					
92133				200	45	38.3203	1.00229	-0.02335	-0.04777	1.23047	-0.70312	0.703124
							0.979401	-0.01928	-0.05184	1.23047	-0.70312	0.703124
							0.98169	-0.01928	-0.04777		-0.70312	
							1.00687	-0.02132	-0.04777		-0.70312	
							1.01145					
							0.979401					
							0.970243					
							1.00229					
92134				200	45	38.3203	1.01374	-0.02132	-0.0498	1.23047	-0.70312	1.05469
							1.00458	-0.02132	-0.0498	1.23047	-0.70312	1.05469
							0.983979	-0.01928	-0.05387		-0.70312	
							0.990848	-0.02132	-0.0498		-0.70312	
							1.00916					
							1.00916					
							0.986269					
							0.979401					
92135				200	45	38.3203	0.986269	-0.01928	-0.05184	1.23047	-0.70312	0.703124
							0.997715	-0.01725	-0.0498	1.23047	-0.70312	0.703124
							1.00916	-0.01928	-0.05184		-0.70312	
							0.993137	-0.02132	-0.05184		-0.70312	
							0.983979					
							1.00001					
							1.00229					
							0.988558					
92136	2	39	22	200	45	38.3203	0.988558	-0.01725	-0.05387	1.23047	-0.70312	0.703124
							0.997715	-0.01928	-0.05184	1.23047	-0.70312	0.703124

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.00229	-0.02132	-0.05387		-0.70312	
							0.983979	-0.01928	-0.05184		-0.70312	
							0.98169					
							1.00001					
							1.01374					
							0.995426					
92137				200	45	37.9688	0.986269	-0.02132	-0.05184	1.23047	-0.70312	0.703124
							0.986269	-0.01725	-0.05387	1.23047	-0.70312	1.05469
							0.997715	-0.02132	-0.05184		-0.70312	
							1.00687	-0.02132	-0.05387		-0.70312	
							0.995426					
							0.986269					
							0.986269					
							0.990848					
92138				200	45	37.9688	1.00458	-0.01114	-0.05387	1.23047	-0.70312	0.703124
							1.00001	-0.00911	-0.05387	1.23047	-0.70312	0.703124
							0.979401	-0.01521	-0.05387		-0.70312	
							0.986269	-0.00911	-0.05387		-0.70312	
							0.995426					
							0.993137					
							0.995426					
							0.993137					
92139				200	45	38.3203	0.993137	-0.01318	-0.05387	1.23047	-0.70312	1.05469
							0.993137	-0.01318	-0.05184	1.23047	-0.70312	1.05469
							0.990848	-0.01318	-0.05184		-0.70312	
							0.993137	-0.02335	-0.05184		-0.70312	
							1.00229					
							1.00229					
							1.00458					
							0.993137					
92140	2	39	26	200	45	38.6719	0.979401	-0.02335	-0.0498	1.23047	-0.70312	1.05469
							0.983979	-0.01725	-0.05387	1.23047	-0.70312	1.40625
							1.00916	-0.02539	-0.0498		-0.70312	
							1.01832	-0.02742	-0.05184		-0.70312	
							0.993137					
							0.974822					
							0.98169					
							1.00458					
92141				200	45	38.6719	1.00687	-0.01725	-0.0498	1.23047	-0.70312	1.05469
							0.995426	-0.02945	-0.05184	1.23047	-0.70312	1.05469
							0.986269	-0.02945	-0.05387		-0.70312	
							0.990848	-0.02539	-0.05387		-0.70312	
							1.00458					
							1.00229					
							0.993137					
							1.00001					
92142				200	45	37.9688	1.00458	-0.02539	-0.05591	1.23047	-0.70312	1.05469
							0.993137	-0.02539	-0.05184	1.23047	-0.70312	0.703124
							0.972533	-0.01725	-0.05387		-0.70312	
							0.965664	-0.02335	-0.05184		-0.70312	
							0.993137					
							1.01145					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITU ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.00458					
							0.983979					
92143				196	45	37.9688	0.990848	-0.03149	-0.05184	1.23047	-0.70312	1.05469
							1.00001	-0.02335	-0.0498	1.23047	-0.70312	1.05469
							1.00001	-0.02335	-0.05184		-0.70312	
							0.993137	-0.02539	-0.05387		-0.70312	
							0.986269					
							0.995426					
							1.00687					
							1.00001					
92144	2	39	30	196	45	37.9688	0.993137	-0.01928	-0.05387	1.23047	-0.70312	0.703124
							0.993137	-0.01725	-0.05184	1.23047	-0.70312	0.703124
							1.00001	-0.01521	-0.05184		-0.70312	
							0.997715	-0.01521	-0.05387		-0.70312	
							0.983979					
							0.977111					
							0.993137					
							1.00687					
92145				196	45	37.9688	0.997715	-0.00911	-0.05184	1.23047	-0.70312	0.703124
							0.988558	-0.01318	-0.05387	1.23047	-0.70312	0.703124
							0.988558	-0.01725	-0.05184		-0.70312	
							1.00687	-0.02132	-0.05387		-0.70312	
							1.00229					
							0.990848					
							0.993137					
							0.990848					
92146				196	45	37.9688	0.990848	-0.01928	-0.05184	1.23047	-0.70312	0.703124
							0.993137	-0.01521	-0.05184	1.23047	-0.70312	0.703124
							0.986269	-0.01725	-0.05184		-0.8789	
							0.990848	-0.02335	-0.05184		-0.70312	
							1.00458					
							0.993137					
							0.974822					
							0.986269					
92147				196	45	37.9688	1.01603	-0.02132	-0.05184	1.23047	-0.8789	0.703124
							1.01603	-0.02742	-0.0498	1.23047	-0.70312	0.703124
							0.98169	-0.02945	-0.05387		-0.70312	
							0.98169	-0.02335	-0.0498		-0.70312	
							1.00916					
							1.00687					
							0.977111					
							0.979401					
92148	2	39	34	196	45	37.2656	1.00458	-0.02335	-0.05387	1.23047	-0.70312	0.703124
							1.01374	-0.02945	-0.05184	1.23047	-0.70312	0.703124
							1.00001	-0.02539	-0.05184		-0.70312	
							0.979401	-0.02335	-0.05184		-0.70312	
							0.983979					
							1.00001					
							1.00687					
							0.993137					
92149				196	45	37.2656	0.974822	-0.02132	-0.04777	1.23047	-0.70312	1.05469
							0.983979	-0.02335	-0.05387	1.23047	-0.70312	1.05469

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.02061	-0.02335	-0.05184		-0.70312	
							1.01832	-0.01318	-0.05387		-0.52734	
							0.990848					
							0.974822					
							0.995426					
							1.01603					
92150				196	45	37.2656	1.00001	-0.01521	-0.05184	1.23047	-0.52734	1.05469
							0.983979	-0.01928	-0.05591	1.23047	-0.52734	1.05469
							1.00001	-0.01318	-0.05387		-0.52734	
							1.00916	-0.00911	-0.05387		-0.70312	
							0.993137					
							0.983979					
							0.993137					
							0.990848					
92151				196	45	37.6172	0.98169	-0.00097	-0.05184	1.23047	-0.70312	0.703124
							0.979401	0.001057	-0.0498	1.23047	-0.70312	0.703124
							0.993137	0.001057	-0.05387		-0.70312	
							0.995426	-0.00504	-0.05184		-0.52734	
							1.00229					
							1.01145					
							1.00001					
							0.983979					
92152	2	39	38	196	45	38.6719	0.997715	-0.00301	-0.05387	1.23047	-0.52734	0.703124
							1.00458	-0.00097	-0.0498	1.23047	-0.52734	0.703124
							0.986269	-0.00097	-0.05184		-0.52734	
							0.979401	-0.00708	-0.0498		-0.52734	
							0.995426					
							1.00001					
							1.00229					
							0.997715					
92153				196	45	39.375	0.997715	-0.00911	-0.04777	1.23047	-0.52734	0.703124
							0.986269	-0.00911	-0.05184	1.23047	-0.52734	0.703124
							0.979401	-0.01114	-0.05184		-0.52734	
							1.00687	-0.01521	-0.05387		-0.52734	
							1.01832					
							0.990848					
							0.98169					
							1.00001					
92154				196	45	39.375	1.00916	-0.01725	-0.0498	1.23047	-0.52734	0.703124
							0.986269	-0.01521	-0.0498	1.23047	-0.52734	0.703124
							0.974822	-0.02335	-0.05387		-0.35156	
							0.995426	-0.01725	-0.05184		-0.35156	
							1.01374					
							1.00458					
							0.983979					
							0.983979					
92155				192	45	39.375	1.00458	-0.01114	-0.05184	1.23047	-0.35156	0.703124
							1.00687	-0.01725	-0.05184	1.23047	-0.35156	0.703124
							0.995426	-0.01114	-0.05184		-0.35156	
							0.977111	-0.01114	-0.0498		-0.52734	
							0.988558					
							1.00001					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.993137					
							0.983979					
92156	2	39	42	192	45	39.7266	0.993137	-0.01928	-0.05184	1.23047	-0.52734	0.703124
							0.997715	-0.01521	-0.05184	1.23047	-0.52734	0.703124
							0.997715	-0.01318	-0.05387		-0.35156	
							0.990848	-0.01725	-0.0498		-0.35156	
							0.997715					
							1.00458					
							0.997715					
							0.974822					
92157				196	45	39.7266	0.983979	-0.01318	-0.05184	1.23047	-0.52734	0.703124
							1.00229	-0.01521	-0.05184	1.23047	-0.52734	0.703124
							1.01145	-0.01521	-0.0498		-0.35156	
							1.00458	-0.01725	-0.05184		-0.35156	
							0.979401					
							0.988558					
							1.02061					
							1.00687					
92158				192	45	39.7266	0.970243	-0.01725	-0.05184	1.23047	-0.35156	0.703124
							0.979401	-0.01318	-0.05387	1.23047	-0.35156	0.703124
							1.00916	-0.01725	-0.05184		-0.35156	
							1.01603	-0.01521	-0.05387		-0.35156	
							0.98169					
							0.979401					
							1.00458					
							1.00458					
92159				192	45	39.7266	0.988558	-0.01521	-0.05387	1.23047	-0.35156	0.703124
							0.990848	-0.01928	-0.05387	1.05469	-0.35156	0.703124
							1.00001	-0.01521	-0.05387		-0.35156	
							0.995426	-0.02132	-0.05387		-0.52734	
							0.977111					
							0.995426					
							1.00458					
							0.988558					
92160	2	39	46	192	45	39.7266	0.977111	-0.02132	-0.05591	1.05469	-0.35156	0.703124
							0.990848	-0.01725	-0.05591	1.23047	-0.35156	1.05469
							1.01374	-0.02742	-0.05387		-0.35156	
							1.01832	-0.02945	-0.05794		-0.35156	
							0.993137					
							0.979401					
							0.986269					
							1.00458					
92161				192	45	39.375	1.00001	-0.02335	-0.05591	1.05469	-0.35156	1.05469
							0.98169	-0.03149	-0.05998	1.23047	-0.52734	1.05469
							0.995426	-0.02539	-0.06201		-0.52734	
							0.997715	-0.02335	-0.06201		-0.35156	
							0.993137					
							0.995426					
							0.990848					
							0.988558					
92162				192	45	39.375	0.995426	-0.01928	-0.06405	1.23047	-0.35156	1.05469
							0.990848	-0.01725	-0.06608	1.23047	-0.35156	0.703124

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITU ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558	-0.01318	-0.06608		-0.35156	
							0.990848	-0.01114	-0.06405		-0.35156	
							0.995426					
							1.00001					
							1.00001					
							0.995426					
92163				192	45	39.7266	0.983979	-0.01521	-0.06405	1.23047	-0.52734	1.05469
							0.986269	-0.01521	-0.06405	1.05469	-0.35156	1.05469
							0.997715	-0.01521	-0.05794		-0.35156	
							1.00458	-0.01928	-0.05794		-0.35156	
							0.990848					
							0.98169					
							1.00687					
							1.00687					
92164	2	39	50	192	45	39.7266	0.988558	-0.02132	-0.05998	1.23047	-0.35156	1.05469
							0.98169	-0.01928	-0.05998	1.05469	-0.35156	1.05469
							0.995426	-0.02132	-0.05591		-0.35156	
							1.00001	-0.02132	-0.05998		-0.52734	
							0.988558					
							0.979401					
							1.00458					
							1.01603					
92165				192	45	39.375	0.995426	-0.02539	-0.05591	1.05469	-0.52734	1.05469
							0.965664	-0.02539	-0.05998	1.23047	-0.52734	1.05469
							0.972533	-0.01725	-0.06201		-0.52734	
							0.997715	-0.02132	-0.06405		-0.52734	
							1.01374					
							1.00687					
							0.98169					
							0.986269					
92166				192	45	39.375	1.00458	-0.02742	-0.06812	1.05469	-0.35156	1.05469
							1.00458	-0.02132	-0.07015	1.23047	-0.52734	1.05469
							1.00001	-0.01725	-0.06608		-0.52734	
							0.997715	-0.01928	-0.06608		-0.52734	
							0.986269					
							0.979401					
							0.995426					
							1.00229					
92167				192	45	39.375	0.986269	-0.01928	-0.06608	1.23047	-0.52734	1.05469
							0.98169	-0.01928	-0.06608	1.05469	-0.52734	0.703124
							0.997715	-0.02335	-0.06608		-0.52734	
							1.00001	-0.01928	-0.06608		-0.35156	
							1.00916					
							0.993137					
							0.977111					
							0.98169					
92168	2	39	54	192	45	39.375	1.01145	-0.00504	-0.07218	1.05469	-0.35156	0.703124
							1.02061	-0.01114	-0.06812	1.23047	-0.35156	0.703124
							1.00001	-0.01114	-0.07218		-0.35156	
							0.967954	-0.01521	-0.07015		-0.35156	
							0.972533					
							1.01145					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.02977					
							0.995426					
92169				192	45	39.375	0.961086	-0.02539	-0.07015	1.23047	-0.35156	1.05469
							0.977111	-0.01521	-0.06812	1.05469	-0.35156	0.703124
							1.00916	-0.01725	-0.06812		-0.35156	
							1.00687	-0.01928	-0.06405		-0.35156	
							0.98169					
							0.986269					
							1.01603					
							0.990848					
92170				192	45	39.7266	0.967954	-0.01725	-0.05998	1.05469	-0.35156	0.703124
							1.00001	-0.01725	-0.05387	1.05469	-0.35156	0.703124
							1.02061	-0.02335	-0.05591		-0.35156	
							0.997715	-0.02742	-0.05794		-0.35156	
							0.983979					
							0.986269					
							0.997715					
							1.00229					
92171				192	45	39.375	1.00458	-0.02539	-0.05998	1.23047	-0.35156	0.703124
							0.993137	-0.02132	-0.05794	1.05469	-0.35156	1.05469
							0.990848	-0.02539	-0.05387		-0.35156	
							0.986269	-0.03556	-0.05998		-0.35156	
							0.977111					
							0.972533					
							1.00229					
							1.01832					
92172	2	39	58	192	45	39.0234	1.00001	-0.03759	-0.05998	1.23047	-0.17578	0.703124
							0.979401	-0.03149	-0.07015	1.05469	-0.17578	0.703124
							0.990848	-0.02335	-0.07625		-0.17578	
							1.02519	-0.02335	-0.07218		-0.35156	
							1.0229					
							0.997715					
							0.98169					
							0.970243					
92173				192	45	38.3203	0.983979	-0.02945	-0.06608	1.23047	-0.35156	1.05469
							0.979401	-0.02539	-0.06608	1.23047	-0.35156	0.703124
							0.979401	-0.01318	-0.06608		-0.35156	
							1.00001	-0.01521	-0.06405		-0.17578	
							1.00916					
							1.00229					
							0.990848					
							0.988558					
92174				192	45	38.3203	0.997715	-0.02132	-0.06812	1.23047	-0.35156	1.05469
							1.00458	-0.02132	-0.06812	1.05469	-0.35156	1.05469
							0.983979	-0.02539	-0.07218		-0.35156	
							0.977111	-0.02945	-0.06608		-0.52734	
							1.00001					
							1.00687					
							0.993137					
							0.965664					
92175				192	45	38.3203	0.979401	-0.02742	-0.07015	1.23047	-0.52734	1.05469
							1.00916	-0.02132	-0.07015	1.05469	-0.52734	0.703124

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITU ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.00458	-0.01318	-0.07218		-0.52734	
							0.988558	-0.00911	-0.07422		-0.52734	
							0.979401					
							0.993137					
							1.00458					
							0.986269					
92176	2	40	2	192	45	38.3203	0.979401	-0.00911	-0.07422	1.05469	-0.52734	0.703124
							0.990848	-0.00911	-0.07422	1.23047	-0.52734	0.703124
							1.01832	-0.00911	-0.07422		-0.52734	
							1.00001	-0.00504	-0.07218		-0.52734	
							0.977111					
							0.98169					
							1.00001					
							1.00458					
92177				192	45	39.0234	0.98169	-0.01725	-0.07218	1.23047	-0.52734	0.703124
							0.990848	-0.01928	-0.07422	1.05469	-0.35156	0.703124
							1.00916	-0.01725	-0.07218		-0.35156	
							1.00916	-0.01521	-0.07422		-0.35156	
							0.986269					
							0.977111					
							0.993137					
							1.00687					
92178				192	45	39.0234	1.00458	-0.01521	-0.07218	1.05469	-0.35156	0.703124
							0.990848	-0.02539	-0.07422	1.23047	-0.35156	0.703124
							0.995426	-0.02132	-0.07422		-0.35156	
							0.995426	-0.01725	-0.07625		-0.35156	
							0.990848					
							0.986269					
							1.00229					
							1.01374					
92179				192	45	38.6719	0.986269	-0.02742	-0.06812	1.05469	-0.35156	0.703124
							0.963375	-0.02335	-0.07015	1.23047	-0.52734	0.351562
							0.974822	-0.01114	-0.07422		-0.52734	
							0.995426	-0.01318	-0.07015		-0.35156	
							0.993137					
							0.997715					
							1.00001					
							0.98169					
92180	2	40	6	192	45	38.3203	0.979401	-0.01318	-0.07015	1.05469	-0.52734	0.351562
							0.997715	-0.01928	-0.07625	1.23047	-0.52734	0.703124
							1.01603	-0.02335	-0.07625		-0.52734	
							1.00458	-0.00708	-0.07422		-0.35156	
							0.977111					
							0.974822					
							1.01603					
							1.00458					
92181				188	45	38.3203	0.972533	-0.02132	-0.07422	1.23047	-0.52734	1.05469
							0.983979	-0.02945	-0.07625	1.05469	-0.35156	0.703124
							1.00458	-0.01725	-0.07625		-0.35156	
							1.01145	-0.02132	-0.07218		-0.35156	
							0.983979					
							0.988558					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.01145					
							1.01374					
92182				192	45	38.3203	0.995426	-0.02335	-0.06405	1.05469	-0.35156	0.703124
							0.972533	-0.00911	-0.06405	1.23047	-0.35156	0.351562
							0.988558	-0.00301	-0.05794		-0.52734	
							1.01145	-0.00504	-0.05794		-0.52734	
							1.00001					
							0.974822					
							0.972533					
							0.997715					
92183				192	45	38.6719	0.993137	-0.00504	-0.05591	1.23047	-0.52734	0.351562
							0.990848	-0.01318	-0.05387	1.05469	-0.52734	0.703124
							0.997715	-0.01521	-0.05591		-0.52734	
							0.995426	-0.00911	-0.05387		-0.52734	
							0.995426					
							0.995426					
							0.993137					
							0.986269					
92184	2	40	10	192	45	38.6719	0.995426	-0.00504	-0.05794	1.23047	-0.52734	0.351562
							0.997715	-0.01114	-0.05794	1.05469	-0.52734	0.703124
							1.00001	-0.02132	-0.05387		-0.52734	
							1.00458	-0.02335	-0.05184		-0.52734	
							0.995426					
							0.988558					
							0.979401					
							0.995426					
92185				188	45	38.6719	1.00458	-0.01725	-0.05387	1.05469	-0.52734	0.703124
							0.995426	-0.01725	-0.0498	1.23047	-0.52734	0.703124
							0.997715	-0.01521	-0.05591		-0.35156	
							0.993137	-0.01521	-0.0498		-0.35156	
							0.990848					
							1.00001					
							1.00916					
							1.00229					
92186				192	45	38.3203	0.98169	-0.01928	-0.05387	1.05469	-0.35156	0.703124
							0.997715	-0.01318	-0.05184	1.23047	-0.35156	0.703124
							1.00458	-0.00911	-0.05184		-0.35156	
							0.990848	-0.01114	-0.0498		-0.35156	
							0.983979					
							0.995426					
							1.00458					
							0.988558					
92187				192	45	38.6719	0.986269	-0.00911	-0.0498	1.23047	-0.35156	0.703124
							0.993137	-0.00708	-0.05184	1.23047	-0.35156	0.703124
							0.997715	-0.01725	-0.05184		-0.35156	
							1.00458	-0.01928	-0.05184		-0.35156	
							1.00001					
							0.997715					
							0.990848					
							0.993137					
92188	2	40	14	188	45	38.6719	0.995426	-0.01521	-0.05387	1.23047	-0.35156	0.703124
							0.997715	-0.01521	-0.0498	1.23047	-0.35156	0.703124

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558	-0.01114	-0.05184		-0.35156	
							0.979401	-0.01114	-0.0498		-0.35156	
							0.993137					
							1.00001					
							1.00001					
							0.990848					
92189				192	45	39.0234	0.993137	-0.01928	-0.0498	1.05469	-0.35156	1.05469
							1.00687	-0.01928	-0.05387	1.23047	-0.35156	0.703124
							1.00001	-0.01521	-0.05184		-0.35156	
							0.997715	-0.01114	-0.05184		-0.35156	
							0.995426					
							0.993137					
							0.990848					
							0.986269					
92190				188	45	39.0234	0.988558	-0.00911	-0.05184	1.23047	-0.52734	0.703124
							0.995426	-0.00911	-0.05387	1.05469	-0.52734	0.703124
							1.00229	-0.01318	-0.0498		-0.52734	
							0.995426	-0.01521	-0.05184		-0.52734	
							0.98169					
							0.983979					
							0.995426					
							0.997715					
92191				188	45	39.375	0.986269	-0.02132	-0.0498	1.05469	-0.52734	0.703124
							0.990848	-0.01928	-0.05184	1.23047	-0.52734	0.703124
							1.00229	-0.01521	-0.05387		-0.52734	
							1.00229	-0.02132	-0.0498		-0.52734	
							0.988558					
							0.997715					
							1.01374					
							0.995426					
92192	2	40	18	188	45	39.0234	0.979401	-0.02132	-0.0498	1.05469	-0.52734	0.703124
							0.990848	-0.01521	-0.0498	1.23047	-0.35156	0.703124
							1.00687	-0.01521	-0.04777		-0.35156	
							0.997715	-0.01318	-0.05184		-0.35156	
							0.98169					
							0.986269					
							1.00229					
							1.01832					
92193				188	45	39.375	1.01145	-0.01318	-0.05184	1.23047	-0.35156	0.703124
							0.995426	-0.01928	-0.05184	1.23047	-0.17578	0.703124
							0.983979	-0.01521	-0.05184		-0.17578	
							0.986269	-0.00708	-0.05387		-0.35156	
							1.00001					
							1.00001					
							0.993137					
							0.990848					
92194				188	45	39.375	0.997715	-0.01521	-0.05184	1.05469	-0.35156	0.703124
							0.993137	-0.01521	-0.05184	1.23047	-0.35156	0.703124
							0.983979	-0.01114	-0.05184		-0.52734	
							0.988558	-0.01114	-0.05184		-0.52734	
							0.995426					
							0.993137					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.979401					
							0.986269					
92195				188	45	39.7266	1.00687	-0.00911	-0.05387	1.23047	-0.35156	0.703124
							1.00458	-0.00911	-0.05794	1.23047	-0.35156	0.703124
							0.98169	-0.00911	-0.06405		-0.35156	
							0.98169	-0.00911	-0.07015		-0.52734	
							1.00229					
							1.01603					
							1.00229					
							0.990848					
92196	2	40	22	188	45	40.0781	1.00687	-0.01521	-0.07015	1.23047	-0.52734	0.703124
							1.00229	-0.01725	-0.06405	1.23047	-0.52734	0.703124
							0.974822	-0.01521	-0.06812		-0.52734	
							0.963375	-0.01521	-0.06812		-0.52734	
							0.977111					
							1.00687					
							1.01145					
							1.00001					
92197				188	45	40.0781	0.990848	-0.01725	-0.07218	1.23047	-0.52734	0.703124
							0.995426	-0.01318	-0.07625	1.23047	-0.52734	0.703124
							0.990848	-0.00911	-0.07625		-0.52734	
							0.990848	-0.01114	-0.07218		-0.52734	
							0.997715					
							0.986269					
							0.983979					
							0.993137					
92198				188	45	40.0781	0.995426	-0.01114	-0.07015	1.23047	-0.52734	0.703124
							1.00001	-0.01928	-0.06608	1.23047	-0.52734	0.703124
							1.00687	-0.02539	-0.07015		-0.52734	
							1.00001	-0.02132	-0.07625		-0.52734	
							0.972533					
							0.986269					
							1.01374					
							1.00458					
92199				188	45	40.0781	0.967954	-0.01318	-0.07625	1.23047	-0.52734	0.351562
							0.977111	-0.01725	-0.07829	1.23047	-0.52734	0.351562
							1.01145	-0.01114	-0.07625		-0.52734	
							1.00229	-0.01521	-0.08032		-0.52734	
							0.983979					
							0.986269					
							1.00001					
							1.00458					
92200	2	40	26	188	45	39.7266	0.983979	-0.00911	-0.08439	1.23047	-0.52734	0.351562
							0.98169	-0.01114	-0.09456	1.05469	-0.52734	0.351562
							1.00229	-0.01725	-0.0966		-0.52734	
							1.00687	-0.01928	-0.09456		-0.52734	
							0.995426					
							0.986269					
							0.990848					
							0.993137					
92201				188	45	39.375	0.990848	-0.01521	-0.09456	1.23047	-0.35156	0.703124
							1.00001	-0.02132	-0.09253	1.23047	-0.35156	0.703124

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.993137	-0.02335	-0.0966		-0.35156	
							0.990848	-0.02132	-0.09863		-0.52734	
							0.995426					
							0.995426					
							0.997715					
							0.990848					
92202				188	45	39.0234	0.98169	-0.01725	-0.09863	1.23047	-0.52734	0.703124
							0.983979	-0.01318	-0.10474	1.23047	-0.52734	0.703124
							0.988558	-0.01928	-0.10677		-0.52734	
							1.00001	-0.01928	-0.10677		-0.52734	
							1.00001					
							0.995426					
							0.972533					
							0.98169					
92203				188	45	39.0234	1.00458	-0.01114	-0.10474	1.23047	-0.70312	0.703124
							0.995426	-0.01725	-0.10677	1.23047	-0.52734	0.703124
							0.98169	-0.02132	-0.1027		-0.52734	
							0.988558	-0.01725	-0.1027		-0.52734	
							1.00229					
							0.983979					
							0.986269					
							1.00001					
92204	2	40	30	188	45	39.0234	1.00458	-0.01725	-0.10067	1.23047	-0.52734	0.703124
							0.990848	-0.01725	-0.09049	1.23047	-0.52734	0.703124
							0.979401	-0.01521	-0.07422		-0.52734	
							0.995426	-0.02132	-0.07015		-0.52734	
							1.00687					
							0.997715					
							0.990848					
							0.997715					
92205				188	45	39.0234	1.00001	-0.02539	-0.06812	1.23047	-0.52734	1.05469
							0.986269	-0.02335	-0.06812	1.23047	-0.52734	0.703124
							0.977111	-0.01114	-0.07015		-0.52734	
							0.993137	-0.01928	-0.07422		-0.52734	
							1.00458					
							0.993137					
							0.988558					
							0.995426					
92206				188	45	39.0234	0.995426	-0.02132	-0.07829	1.23047	-0.52734	0.703124
							0.983979	-0.01521	-0.07625	1.23047	-0.52734	0.703124
							0.986269	-0.01725	-0.07625		-0.52734	
							0.995426	-0.02132	-0.07625		-0.52734	
							1.00229					
							0.993137					
							0.986269					
							0.993137					
92207				188	45	39.375	1.00916	-0.01725	-0.06405	1.23047	-0.52734	0.703124
							0.995426	-0.01521	-0.05591	1.23047	-0.52734	0.703124
							0.986269	-0.01725	-0.05794		-0.52734	
							0.988558	-0.02132	-0.05794		-0.52734	
							0.995426					
							1.00001					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.997715					
							0.988558					
92208	2	40	34	188	45	39.0234	0.993137	-0.02132	-0.06201	1.23047	-0.52734	0.703124
							1.00687	-0.02132	-0.06201	1.23047	-0.52734	0.703124
							0.997715	-0.02132	-0.06608		-0.52734	
							0.979401	-0.01521	-0.06608		-0.52734	
							0.98169					
							1.00001					
							1.00229					
							0.990848					
92209				188	45	38.6719	0.988558	-0.02132	-0.07015	1.23047	-0.52734	0.703124
							1.00001	-0.02132	-0.06608	1.23047	-0.52734	0.703124
							0.997715	-0.01725	-0.06812		-0.52734	
							0.986269	-0.01928	-0.06608		-0.35156	
							0.988558					
							1.00001					
							1.00458					
							0.988558					
92210				188	45	38.3203	0.98169	-0.01928	-0.06608	1.23047	-0.35156	0.703124
							0.997715	-0.02335	-0.06405	1.23047	-0.35156	1.05469
							0.997715	-0.02335	-0.06608		-0.35156	
							0.988558	-0.02742	-0.07015		-0.35156	
							0.993137					
							0.997715					
							0.997715					
							0.993137					
92211				188	45	38.3203	0.988558	-0.02132	-0.07422	1.23047	-0.35156	0.703124
							0.993137	-0.01725	-0.07218	1.23047	-0.52734	0.703124
							0.993137	-0.01725	-0.07218		-0.52734	
							0.997715	-0.02132	-0.06812		-0.52734	
							1.00229					
							1.00229					
							0.988558					
							0.979401					
92212	2	40	38	188	45	37.9688	0.990848	-0.01521	-0.06812	1.23047	-0.52734	0.703124
							0.997715	-0.01114	-0.06608	1.23047	-0.52734	0.703124
							0.983979	-0.02335	-0.07218		-0.70312	
							0.986269	-0.02335	-0.06812		-0.70312	
							1.00001					
							1.00001					
							0.986269					
							0.974822					
92213				188	45	37.9688	0.986269	-0.01521	-0.07218	1.23047	-0.70312	0.703124
							1.00687	-0.01928	-0.07218	1.23047	-0.70312	0.703124
							1.00229	-0.01928	-0.06812		-0.52734	
							0.990848	-0.01521	-0.06812		-0.52734	
							0.979401					
							0.993137					
							1.00916					
							0.993137					
92214				188	45	37.9688	0.98169	-0.01928	-0.06608	1.23047	-0.52734	0.703124
							0.988558	-0.01928	-0.06608	1.23047	-0.52734	0.703124

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.997715	-0.01521	-0.07218		-0.35156	
							0.997715	-0.01725	-0.07422		-0.35156	
							0.990848					
							1.00687					
							1.00001					
							0.995426					
92215				184	45	37.9688	0.983979	-0.01725	-0.07829	1.23047	-0.35156	0.703124
							0.993137	-0.02132	-0.08032	1.23047	-0.35156	0.703124
							1.00229	-0.01521	-0.08236		-0.35156	
							1.00001	-0.01725	-0.08032		-0.35156	
							0.983979					
							0.988558					
							1.01145					
							1.00001					
92216	2	40	42	188	45	37.9688	0.993137	-0.02539	-0.07829	1.23047	-0.17578	1.05469
							0.990848	-0.01725	-0.07829	1.23047	-0.35156	1.05469
							0.986269	-0.01725	-0.08236		-0.35156	
							0.986269	-0.01725	-0.07829		-0.35156	
							0.988558					
							1.00687					
							1.00001					
							0.98169					
92217				188	45	37.9688	0.979401	-0.02132	-0.08236	1.23047	-0.35156	1.05469
							1.00687	-0.01725	-0.07829	1.23047	-0.35156	0.703124
							1.00687	-0.01725	-0.08846		-0.35156	
							0.974822	-0.02335	-0.08439		-0.35156	
							0.972533					
							1.02061					
							1.01832					
							0.98169					
92218				188	45	38.3203	0.970243	-0.00911	-0.07829	1.23047	-0.35156	0.703124
							0.983979	-0.00911	-0.07422	1.23047	-0.52734	1.05469
							1.00458	-0.02945	-0.07422		-0.52734	
							0.995426	-0.02132	-0.07218		-0.52734	
							0.990848					
							0.990848					
							0.990848					
							0.983979					
92219				188	45	38.3203	0.988558	-0.01521	-0.07625	1.23047	-0.52734	0.703124
							1.00229	-0.01928	-0.07829	1.23047	-0.52734	0.703124
							1.00229	-0.01725	-0.08643		-0.52734	
							0.98169	-0.01318	-0.09049		-0.52734	
							0.98169					
							0.993137					
							1.00229					
							0.993137					
92220	2	40	46	188	45	38.3203	0.990848	-0.01725	-0.09049	1.23047	-0.52734	0.703124
							0.993137	-0.01725	-0.08846	1.23047	-0.52734	0.703124
							1.00001	-0.01521	-0.08643		-0.52734	
							0.990848	-0.01114	-0.08643		-0.52734	
							0.983979					
							0.995426					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.00229					
							0.995426					
92221				188	45	38.3203	0.979401	-0.01521	-0.08439	1.23047	-0.52734	0.703124
							0.990848	-0.01725	-0.08439	1.23047	-0.52734	0.703124
							1.00687	-0.01928	-0.08236		-0.52734	
							0.997715	-0.01725	-0.08236		-0.52734	
							0.98169					
							0.983979					
							1.00458					
							1.00458					
92222				184	45	38.6719	0.98169	-0.02132	-0.08032	1.23047	-0.52734	0.703124
							0.979401	-0.01928	-0.08236	1.05469	-0.52734	0.703124
							1.00001	-0.01928	-0.08032		-0.52734	
							1.00458	-0.01521	-0.07829		-0.35156	
							0.990848					
							0.988558					
							0.993137					
							1.00458					
92223				188	45	38.6719	0.997715	-0.01928	-0.07625	1.23047	-0.35156	1.05469
							0.986269	-0.02335	-0.07422	1.23047	-0.35156	0.703124
							0.990848	-0.01725	-0.07422		-0.35156	
							0.997715	-0.02335	-0.07218		-0.35156	
							0.997715					
							0.993137					
							0.986269					
							0.993137					
92224	2	40	50	188	45	38.6719	0.993137	-0.01521	-0.07218	1.23047	-0.35156	0.703124
							0.993137	-0.01114	-0.07218	1.23047	-0.35156	0.703124
							0.990848	-0.01521	-0.06812		-0.35156	
							0.993137	-0.01521	-0.06812		-0.35156	
							1.00001					
							0.988558					
							0.997715					
							1.00001					
92225				184	45	38.6719	0.988558	-0.02132	-0.06812	1.23047	-0.35156	0.703124
							0.995426	-0.02335	-0.07015	1.23047	-0.35156	0.703124
							0.993137	-0.01928	-0.07218		-0.52734	
							0.995426	-0.01725	-0.07625		-0.52734	
							0.995426					
							0.988558					
							0.993137					
							0.995426					
92226				184	45	38.6719	0.997715	-0.01521	-0.07422	1.23047	-0.52734	0.703124
							0.990848	-0.01725	-0.07218	1.23047	-0.52734	0.703124
							0.983979	-0.01114	-0.06812		-0.52734	
							0.995426	-0.00504	-0.07218		-0.52734	
							0.995426					
							0.986269					
							0.993137					
							0.997715					
92227				184	45	39.0234	0.990848	-0.00911	-0.07422	1.23047	-0.52734	0.703124
							0.988558	-0.00708	-0.08032	1.23047	-0.52734	0.703124

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.993137	-0.00504	-0.07625		-0.35156	
							1.00229	-0.00708	-0.07422		-0.35156	
							0.995426					
							0.983979					
							0.993137					
							0.995426					
92228	2	40	54	184	45	40.0781	0.997715	-0.00504	-0.07015	1.23047	-0.35156	0.703124
							0.997715	-0.00708	-0.06405	1.23047	-0.35156	0.703124
							0.988558	-0.00301	-0.05998		-0.35156	
							0.986269	-0.00504	-0.06201		-0.35156	
							0.995426					
							0.995426					
							1.00229					
							0.997715					
92229				184	45	41.4844	0.983979	-0.00708	-0.06405	1.23047	-0.35156	0.703124
							0.990848	-0.00097	-0.06608	1.23047	-0.35156	0.703124
							0.995426	-0.00097	-0.06812		-0.35156	
							0.997715	-0.00097	-0.07218		-0.35156	
							1.00001					
							0.990848					
							0.988558					
							0.993137					
92230				184	45	42.8906	0.995426	0.003092	-0.06812	1.23047	-0.52734	0.351562
							0.993137	0.003092	-0.06608	1.23047	-0.52734	0.351562
							0.990848	0.003092	-0.05591		-0.52734	
							0.997715	0.005126	-0.05387		-0.52734	
							0.993137					
							0.986269					
							0.995426					
							1.00001					
92231				184	45	45	0.997715	0.003092	-0.05387	1.23047	-0.52734	0.351562
							0.990848	0.001057	-0.05387	1.23047	-0.52734	0.351562
							0.990848	0.003092	-0.05387		-0.52734	
							0.997715	0.003092	-0.05591		-0.52734	
							0.993137					
							0.995426					
							1.00229					
							0.997715					
92232	2	40	58	184	45	47.1094	0.986269	0.001057	-0.05387	1.23047	-0.52734	0.351562
							0.986269	0.003092	-0.05387	1.05469	-0.52734	0.351562
							0.990848	0.007161	-0.05387		-0.52734	
							0.997715	0.005126	-0.05387		-0.52734	
							1.00458					
							0.995426					
							0.986269					
							0.988558					
92233				184	45	49.2188	0.995426	0.009195	-0.05184	1.23047	-0.52734	0.351562
							0.993137	0.009195	-0.05591	1.23047	-0.52734	0.351562
							0.993137	0.007161	-0.0498		-0.52734	
							1.00229	0.015299	-0.05387		-0.52734	
							0.988558					
							0.98169					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.997715					
							1.00687					
92234				184	45	52.0312	0.993137	0.013264	-0.05184	1.23047	-0.52734	0.351562
							0.979401	0.013264	-0.05387	1.23047	-0.35156	0.351562
							0.990848	0.013264	-0.05387		-0.52734	
							1.00458	0.017333	-0.05591		-0.52734	
							1.00229					
							0.990848					
							0.993137					
							1.00229					
92235				184	45	54.8438	0.995426	0.015299	-0.05387	1.23047	-0.52734	0.351562
							0.983979	0.019368	-0.05591	1.23047	-0.52734	0.351562
							0.993137	0.019368	-0.05387		-0.52734	
							1.00458	0.019368	-0.05387		-0.52734	
							0.997715					
							0.983979					
							0.988558					
							0.995426					
92236	2	41	2	184	45	59.7656	1.00229	0.015299	-0.05387	1.23047	-0.52734	0.351562
							0.995426	0.017333	-0.05184	1.23047	-0.52734	0.351562
							0.986269	0.019368	-0.05387		-0.70312	
							0.98169	0.017333	-0.05184		-0.70312	
							0.997715					
							1.00229					
							0.993137					
							0.990848					
92237				184	45	63.9844	1.00458	0.019368	-0.05591	1.23047	-0.70312	0.351562
							1.00001	0.019368	-0.05184	1.23047	-0.8789	0.351562
							0.986269	0.023437	-0.05794		-0.8789	
							0.98169	0.023437	-0.0498		-0.8789	
							0.995426					
							1.01374					
							0.990848					
							0.970243					
92238				184	45	69.2578	0.988558	0.02954	-0.05387	1.23047	-0.8789	0.351562
							1.01145	0.03361	-0.05184	1.23047	-0.8789	0.703124
							1.00916	0.023437	-0.0498		-0.70312	
							0.986269	0.025471	-0.04777		-0.70312	
							0.990848					
							0.997715					
							0.979401					
							0.990848					
92239				184	45	74.1797	1.01145	0.02954	-0.04777	1.23047	-0.70312	0.703124
							1.00687	0.019368	-0.04574	1.23047	-0.70312	0.351562
							0.988558	0.02954	-0.04777		-0.52734	
							0.983979	0.043782	-0.0437		-0.52734	
							1.01145					
							1.00458					
							0.988558					
							0.986269					
92240	2	41	6	184	45	80.1562	0.995426	0.043782	-0.04574	1.23047	-0.52734	0
							1.00001	0.045817	-0.04574	1.23047	-0.35156	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.98169	0.041747	-0.04574		-0.35156	
							1.00229	0.043782	-0.04777		-0.35156	
							1.02519					
							0.993137					
							0.970243					
							0.995426					
92241				184	45	85.0781	1.02519	0.049886	-0.05387	1.05469	-0.35156	0
							1.01374	0.045817	-0.05794	1.23047	-0.35156	-0.35156
							0.986269	0.043782	-0.06608		-0.35156	
							0.986269	0.058024	-0.06812		-0.52734	
							0.990848					
							0.986269					
							1.00458					
							1.00916					
92242				184	45	91.7578	0.990848	0.045817	-0.06201	1.23047	-0.52734	-0.35156
							0.974822	0.045817	-0.05998	1.23047	-0.52734	-0.35156
							0.986269	0.058024	-0.05794		-0.70312	
							1.00229	0.05192	-0.05998		-0.70312	
							0.986269					
							0.979401					
							0.995426					
							1.00458					
92243				184	45	96.6797	1.00001	0.05192	-0.05794	1.23047	-0.70312	-0.35156
							0.986269	0.043782	-0.05794	1.23047	-0.70312	-0.35156
							0.988558	0.039713	-0.05591		-0.70312	
							0.990848	0.047851	-0.05794		-0.70312	
							0.988558					
							0.993137					
							0.990848					
							0.997715					
92244	2	41	10	184	45	102.656	0.983979	0.047851	-0.05591	1.23047	-0.70312	-0.70312
							0.979401	0.053955	-0.05794	1.23047	-0.70312	-0.35156
							1.00001	0.047851	-0.05794		-0.70312	
							1.00687	0.035644	-0.05794		-0.70312	
							1.00001					
							0.993137					
							0.990848					
							0.988558					
92245				184	45	106.875	0.993137	0.045817	-0.05794	1.23047	-0.70312	-0.35156
							0.990848	0.045817	-0.06201	1.23047	-0.70312	-0.35156
							1.00229	0.041747	-0.06201		-0.70312	
							1.00458	0.05192	-0.05998		-0.70312	
							0.983979					
							0.977111					
							0.993137					
							1.01374					
92246				184	45	112.5	1.00687	0.041747	-0.04574	1.23047	-0.70312	-0.35156
							0.967954	0.02954	-0.05591	1.23047	-0.70312	-0.35156
							0.990848	0.045817	-0.04777		-0.70312	
							1.01603	0.043782	-0.05184		-0.70312	
							0.990848					
							0.979401					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848					
							1.00916					
92247				184	45	116.719	1.00001	0.035644	-0.0498	1.05469	-0.70312	-0.35156
							0.979401	0.041747	-0.05184	1.23047	-0.70312	-0.35156
							1.00001	0.043782	-0.0498		-0.70312	
							1.00916	0.037679	-0.0498		-0.70312	
							0.988558					
							0.979401					
							0.995426					
							1.00687					
92248	2	41	14	184	45	121.641	0.995426	0.03361	-0.04777	1.23047	-0.70312	-0.35156
							0.98169	0.039713	-0.05184	1.23047	-0.70312	-0.35156
							1.00001	0.035644	-0.0437		-0.70312	
							1.01145	0.02954	-0.04777		-0.70312	
							1.00001					
							0.974822					
							0.977111					
							1.00916					
92249				184	45	124.805	1.01832	0.02954	-0.0437	1.23047	-0.52734	-0.35156
							0.995426	0.015299	-0.04574	1.23047	-0.52734	-0.35156
							0.979401	0.017333	-0.04777		-0.52734	
							0.993137	0.019368	-0.04777		-0.52734	
							1.00458					
							0.995426					
							0.988558					
							0.988558					
92250				184	45	127.266	1.00229	0.013264	-0.0498	1.23047	-0.52734	-0.35156
							1.00001	0.013264	-0.0498	1.23047	-0.52734	-0.35156
							0.986269	0.01123	-0.0498		-0.52734	
							0.993137	0.009195	-0.0498		-0.52734	
							1.00001					
							0.993137					
							0.993137					
							0.993137					
92251				184	45	128.672	0.995426	0.007161	-0.0498	1.23047	-0.52734	-0.35156
							1.00001	0.009195	-0.0498	1.23047	-0.52734	-0.35156
							0.988558	0.01123	-0.0498		-0.52734	
							0.995426	0.013264	-0.0498		-0.52734	
							1.00229					
							0.995426					
							0.990848					
							0.990848					
92252	2	41	18	184	45	129.375	1.00687	0.013264	-0.0498	1.23047	-0.52734	-0.35156
							0.995426	0.01123	-0.04777	1.23047	-0.52734	-0.35156
							0.979401	0.003092	-0.05184		-0.70312	
							0.997715	0.009195	-0.0498		-0.70312	
							1.00916					
							1.00001					
							0.98169					
							0.98169					
92253				184	45	130.43	0.997715	0.017333	-0.0498	1.23047	-0.70312	-0.35156
							1.01145	0.009195	-0.0498	1.23047	-0.70312	-0.35156

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.997715	0.01123	-0.05387		-0.70312	
							0.979401	0.01123	-0.0498		-0.70312	
							0.988558					
							1.01145					
							1.00229					
							0.979401					
92254				184	45	131.133	0.986269	0.01123	-0.05184	1.23047	-0.70312	-0.35156
							1.00229	0.01123	-0.04777	1.23047	-0.70312	-0.35156
							1.00458	0.01123	-0.0498		-0.52734	
							0.988558	0.007161	-0.0498		-0.70312	
							0.986269					
							1.00001					
							1.00229					
							0.986269					
92255				184	45	131.836	0.983979	0.013264	-0.04777	1.23047	-0.70312	-0.70312
							0.997715	0.013264	-0.0498	1.23047	-0.52734	-0.35156
							1.00687	0.009195	-0.0498		-0.52734	
							0.997715	0.01123	-0.05184		-0.52734	
							0.983979					
							0.988558					
							1.00458					
							1.00229					
92256	2	41	22	184	45	132.539	0.993137	0.01123	-0.04574	1.23047	-0.52734	-0.70312
							0.979401	0.013264	-0.0498	1.23047	-0.52734	-0.70312
							0.995426	0.013264	-0.04777		-0.52734	
							1.00687	0.01123	-0.05184		-0.52734	
							1.00229					
							0.986269					
							0.990848					
							1.00687					
92257				184	45	133.242	1.00001	0.01123	-0.04777	1.23047	-0.52734	-0.70312
							0.983979	0.015299	-0.0498	1.23047	-0.52734	-0.70312
							0.98169	0.013264	-0.04777		-0.52734	
							1.00001	0.013264	-0.05184		-0.52734	
							1.00687					
							0.990848					
							0.98169					
							1.00001					
92258				184	45	133.594	1.00458	0.01123	-0.05184	1.23047	-0.52734	-0.70312
							0.990848	0.01123	-0.04777	1.23047	-0.52734	-0.70312
							0.988558	0.01123	-0.05184		-0.52734	
							0.988558	0.009195	-0.04777		-0.52734	
							1.00229					
							1.00687					
							0.988558					
							0.983979					
92259				180	45	134.297	0.993137	0.009195	-0.05184	1.23047	-0.52734	-0.70312
							1.00229	0.01123	-0.04777	1.23047	-0.52734	-0.70312
							0.995426	0.013264	-0.05184		-0.52734	
							0.979401	0.01123	-0.0498		-0.52734	
							0.990848					
							1.00687					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.00001					
							0.983979					
92260	2	41	26	180	45	134.648	0.993137	0.013264	-0.0498	1.05469	-0.52734	-0.70312
							1.00458	0.009195	-0.04574	1.23047	-0.52734	-0.70312
							1.00687	0.013264	-0.05184		-0.52734	
							0.983979	0.01123	-0.04777		-0.52734	
							0.977111					
							1.00687					
							1.01374					
							0.988558					
92261				180	45	135	0.972533	0.01123	-0.0498	1.23047	-0.52734	-0.70312
							1.00001	0.007161	-0.04574	1.23047	-0.52734	-0.70312
							1.01603	0.005126	-0.04777		-0.52734	
							0.988558	0.007161	-0.04574		-0.52734	
							0.979401					
							-0.26602					
							1.00458					
							0.988558					
92262				180	45	135	0.98169	0.013264	-0.04777	1.23047	-0.52734	-0.70312
							1.00001	0.005126	-0.0498	1.05469	-0.52734	-0.70312
							1.00458	0.003092	-0.05184		-0.52734	
							1.00001	0.001057	-0.0498		-0.52734	
							0.993137					
							0.995426					
							0.995426					
							0.990848					
92263				180	45	134.648	0.986269	0.009195	-0.05184	1.23047	-0.52734	-0.70312
							0.997715	0.005126	-0.0498	1.23047	-0.52734	-0.70312
							1.00687	0.003092	-0.05184		-0.52734	
							0.995426	0.003092	-0.05184		-0.52734	
							0.986269					
							0.995426					
							1.00458					
							0.995426					
92264	2	41	30	180	45	134.297	0.98169	0.003092	-0.0498	1.05469	-0.52734	-0.70312
							0.98169	0.005126	-0.05591	1.05469	-0.52734	-0.70312
							1.00229	0.007161	-0.05998		-0.52734	
							1.00229	0.003092	-0.07015		-0.52734	
							0.988558					
							0.990848					
							1.00001					
							0.993137					
92265				180	45	133.945	0.986269	0.01123	-0.07625	1.23047	-0.52734	-0.70312
							0.990848	0.007161	-0.08439	1.23047	-0.52734	-0.35156
							1.00001	0.009195	-0.08846		-0.52734	
							1.00001	0.01123	-0.09049		-0.52734	
							0.98169					
							0.988558					
							0.995426					
							1.00001					
92266				180	45	134.297	0.988558	0.009195	-0.09049	1.23047	-0.52734	-0.35156
							0.983979	0.009195	-0.09253	1.05469	-0.52734	-0.35156

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.995426	0.01123	-0.0966		-0.52734	
							1.00001	0.007161	-0.09253		-0.52734	
							0.98169					
							0.993137					
							1.00229					
							0.993137					
92267				180	45	135	0.98169	0.01123	-0.09253	1.05469	-0.52734	-0.35156
							0.990848	0.009195	-0.08846	1.23047	-0.52734	-0.35156
							1.00458	0.01123	-0.08846		-0.52734	
							0.993137	0.007161	-0.08846		-0.52734	
							0.977111					
							0.993137					
							1.00916					
							0.995426					
92268	2	41	34	180	45	135.352	0.98169	0.01123	-0.08032	1.23047	-0.52734	-0.35156
							0.988558	0.009195	-0.07625	1.23047	-0.52734	-0.35156
							0.997715	0.009195	-0.07015		-0.52734	
							0.995426	0.017333	-0.06608		-0.52734	
							0.993137					
							0.988558					
							0.993137					
							1.00001					
92269				180	45	136.406	0.995426	0.009195	-0.06608	1.23047	-0.52734	-0.35156
							0.988558	0.01123	-0.06608	1.23047	-0.52734	-0.35156
							0.983979	0.01123	-0.06812		-0.52734	
							0.997715	0.017333	-0.06812		-0.52734	
							1.00229					
							0.997715					
							0.986269					
							0.990848					
92270				180	45	137.109	0.997715	0.015299	-0.07422	1.23047	-0.52734	-0.35156
							1.00229	0.021403	-0.07422	1.23047	-0.70312	-0.35156
							0.997715	0.021403	-0.07422		-0.70312	
							0.983979	0.019368	-0.07218		-0.8789	
							0.995426					
							0.993137					
							0.986269					
							0.993137					
92271				180	45	138.867	1.00229	0.027506	-0.07218	1.23047	-0.8789	-0.35156
							0.995426	0.025471	-0.07625	1.23047	-0.8789	-0.70312
							0.983979	0.035644	-0.07015		-0.8789	
							0.986269	0.031575	-0.07218		-0.8789	
							1.00687					
							1.00001					
							0.958796					
							0.983979					
92272	2	41	38	180	45	141.328	1.01145	0.03361	-0.06812	1.23047	-0.8789	-0.70312
							0.993137	0.045817	-0.06405	1.23047	-0.8789	-0.70312
							0.977111	0.041747	-0.06201		-0.70312	
							0.988558	0.060058	-0.05591		-0.70312	
							1.00001					
							0.993137					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.979401					
							0.98169					
92273				180	45	146.602	0.993137	0.066162	-0.05794	1.23047	-0.52734	-1.05469
							1.02061	0.060058	-0.05591	1.23047	-0.35156	-1.05469
							1.00229	0.078369	-0.05794		-0.17578	
							0.977111	0.080403	-0.06201		-0.17578	
							0.988558					
							1.00001					
							1.02748					
							1.01374					
92274				180	45	152.227	0.979401	0.053955	-0.06405	1.23047	0	-0.70312
							0.988558	0.064127	-0.06201	1.23047	0	-0.70312
							1.01145	0.080403	-0.06608		0	
							0.993137	0.0743	-0.06608		0	
							0.977111					
							1.00458					
							1.01374					
							0.986269					
92275				180	45	160.664	0.98169	0.078369	-0.06812	1.23047	0	-0.70312
							1.00001	0.082438	-0.06812	1.23047	0	-0.35156
							1.00916	0.066162	-0.07015		0	
							1.00001	0.055989	-0.05591		-0.17578	
							0.993137					
							1.00687					
							1.00001					
							0.98169					
92276	2	41	42	180	45	167.695	0.983979	0.060058	-0.05184	1.23047	-0.17578	-0.35156
							0.997715	0.064127	-0.04574	1.23047	-0.17578	-0.70312
							0.990848	0.070231	-0.0498		-0.17578	
							0.977111	0.0743	-0.0498		-0.17578	
							0.988558					
							1.00687					
							0.995426					
							0.983979					
92277				180	45	175.078	0.988558	0.068196	-0.0498	1.23047	-0.17578	-0.70312
							0.997715	0.068196	-0.04574	1.23047	-0.17578	-0.70312
							0.995426	0.062093	-0.04777		-0.17578	
							0.990848	0.053955	-0.04777		-0.17578	
							0.993137					
							1.00916					
							1.00229					
							0.983979					
92278				180	45	182.109	0.983979	0.066162	-0.0498	1.23047	-0.17578	-0.70312
							1.00229	0.066162	-0.05184	1.05469	-0.17578	-0.70312
							1.00458	0.053955	-0.0498		-0.17578	
							0.993137	0.058024	-0.04574		-0.17578	
							0.986269					
							0.986269					
							1.00229					
							1.00001					
92279				180	45	188.438	0.993137	0.045817	-0.04777	1.23047	-0.17578	-0.70312
							0.993137	0.049886	-0.04777	1.23047	-0.17578	-0.70312

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECONDS	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.988558	0.064127	-0.0498		-0.17578	
							0.995426	0.05192	-0.05184		-0.17578	
							0.993137					
							1.00001					
							1.00687					
							0.993137					
92280	2	41	46	180	45	193.711	0.972533	0.045817	-0.04777	1.23047	-0.17578	-0.70312
							0.98169	0.049886	-0.05184	1.23047	-0.17578	-0.70312
							1.01374	0.043782	-0.04574		-0.17578	
							1.01832	0.05192	-0.05387		-0.17578	
							0.986269					
							0.965664					
							0.986269					
							1.01603					
92281				180	45	199.336	1.00458	0.058024	-0.04777	1.23047	-0.17578	-1.05469
							0.974822	0.05192	-0.0498	1.23047	-0.17578	-1.05469
							0.979401	0.055989	-0.04574		-0.17578	
							1.00229	0.05192	-0.05184		-0.17578	
							1.01145					
							0.988558					
							0.979401					
							1.00458					
92282				180	45	203.906	1.00458	0.053955	-0.04574	1.23047	-0.17578	-1.05469
							0.98169	0.05192	-0.05184	1.23047	-0.17578	-1.05469
							0.98169	0.047851	-0.0498		-0.17578	
							1.01145	0.049886	-0.05184		-0.17578	
							1.01374					
							0.98169					
							0.972533					
							1.00229					
92283				180	45	208.828	1.01374	0.047851	-0.04777	1.23047	-0.17578	-1.05469
							0.988558	0.043782	-0.04777	1.23047	-0.17578	-0.70312
							0.977111	0.043782	-0.04777		-0.17578	
							0.990848	0.039713	-0.0437		-0.17578	
							1.00916					
							1.00229					
							0.979401					
							0.986269					
92284	2	41	50	180	45	212.344	1.00916	0.02954	-0.03963	1.23047	0	-0.70312
							1.00001	0.031575	-0.03963	1.23047	0	-0.70312
							0.979401	0.031575	-0.04167		0	
							0.997715	0.027506	-0.0437		0	
							1.01374					
							1.00001					
							0.979401					
							0.988558					
92285				180	45	215.156	1.01145	0.031575	-0.0437	1.23047	0	-0.70312
							1.00458	0.023437	-0.0437	1.23047	0	-1.05469
							0.983979	0.025471	-0.04574		0	
							0.983979	0.025471	-0.0437		0	
							1.00458					
							1.00458					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.990848					
							0.990848					
92286				180	45	216.562	1.00001	0.021403	-0.0437	1.23047	0	-1.05469
							1.00001	0.025471	-0.04574	1.23047	0	-1.05469
							0.995426	0.025471	-0.03963		0	
							0.995426	0.021403	-0.0437		0	
							0.990848					
							0.983979					
							0.995426					
							1.00458					
92287				180	45	217.969	1.00001	0.025471	-0.04167	1.23047	0	-1.05469
							0.993137	0.021403	-0.04167	1.23047	0	-1.05469
							0.993137	0.023437	-0.04167		0	
							0.993137	0.02954	-0.03963		0	
							0.988558					
							0.997715					
							1.00001					
							0.997715					
92288	2	41	54	180	45	219.023	0.990848	0.021403	-0.03556	1.23047	0	-1.40625
							0.983979	0.025471	-0.03556	1.23047	0	-1.40625
							0.98169	0.027506	-0.03353		0	
							1.00687	0.021403	-0.03353		0	
							1.01374					
							0.986269					
							0.979401					
							0.997715					
92289				180	45	219.727	1.00916	0.025471	-0.03149	1.23047	0	-1.40625
							0.993137	0.021403	-0.02946	1.05469	0	-1.40625
							0.986269	0.019368	-0.02743		0	
							0.995426	0.023437	-0.02539		0	
							0.997715					
							1.00001					
							0.990848					
							0.993137					
92290				180	45	220.078	1.00229	0.013264	-0.02336	1.05469	0	-1.05469
							1.00229	0.019368	-0.02132	1.23047	0	-1.05469
							0.993137	0.015299	-0.01725		0	
							0.988558	0.017333	-0.01115		0	
							1.00458					
							1.00458					
							0.997715					
							0.993137					
92291				184	45	220.43	0.995426	0.021403	-0.00708	1.23047	0	-1.05469
							1.00229	0.015299	0.005127	1.23047	0	-1.05469
							1.01145	0.015299	0.017334		0	
							0.988558	0.017333	0.027507		0	
							0.98169					
							1.00001					
							1.00687					
							1.00001					
92292	2	41	58	180	45	220.781	0.988558	0.015299	0.029541	1.23047	0	-1.05469
							0.995426	0.017333	0.029541	1.23047	0	-1.05469

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.00916	0.015299	0.029541		0	
							1.00229	0.01123	0.029541		0	
							0.997715					
							0.993137					
							1.00458					
							1.00916					
92293				184	45	220.781	0.993137	0.01123	0.035644	1.23047	0	-1.05469
							0.993137	0.003092	0.043783	1.23047	0	-1.05469
							1.00458	0.013264	0.049886		0	
							1.00458	0.017333	0.05599		0	
							0.986269					
							0.986269					
							1.01145					
							1.00458					
92294				184	45	221.133	0.990848	0.021403	0.060059	1.23047	0	-1.40625
							1.00687	0.017333	0.070231	1.23047	0	-1.05469
							1.01145	0.023437	0.0743		0	
							1.00229	0.027506	0.076335		0	
							0.997715					
							1.00229					
							0.995426					
							0.995426					
92295				184	45	221.836	1.01145	0.025471	0.076335	1.23047	0	-1.40625
							1.01145	0.027506	0.076335	1.23047	0.175781	-1.40625
							0.995426	0.031575	0.078369		0.175781	
							0.988558	0.03361	0.080404		0.175781	
							1.00916					
							1.00687					
							0.98169					
							0.983979					
92296	2	42	2	188	45	223.242	1.00229	0.035644	0.080404	1.23047	0.175781	-1.40625
							1.00687	0.027506	0.076335	1.23047	0.351562	-1.05469
							1.02061	0.019368	0.082438		0.351562	
							1.02061	0.017333	0.094645		0.351562	
							1.01145					
							1.00001					
							0.997715					
							1.00687					
92297				188	45	223.594	1.00916	0.005126	0.112956	1.23047	0.175781	-0.70312
							0.997715	0.003092	0.127197	1.23047	0.175781	-0.70312
							0.995426	0.003092	0.151611		0.175781	
							1.00229	-0.00301	0.159749		0.175781	
							1.01145					
							0.986269					
							0.993137					
							1.00916					
92298				188	45	223.594	1.02061	-0.00504	0.171956	1.23047	0.175781	-0.70312
							1.00229	0.01123	0.167887	1.23047	0.175781	-1.05469
							1.00001	0.009195	0.169922		0.175781	
							1.0229	0.001057	0.163818		0.175781	
							1.0229					
							0.986269					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.972533					
							1.00687					
92299				188	45	223.945	1.01603	0.01123	0.163818	1.23047	0.175781	-1.05469
							1.01832	0.009195	0.171956	1.05469	0.175781	-1.05469
							1.00229	0.001057	0.180094		0.175781	
							0.997715	0.013264	0.184163		0.175781	
							1.01145					
							1.00458					
							1.00001					
							1.01374					
92300	2	42	6	192	45	223.594	1.0229	0.007161	0.17806	1.23047	0.351562	-1.05469
							1.0435	-0.00504	0.180094	1.23047	0.351562	-1.75781
							1.00687	0.001057	0.182129		0.351562	
							0.983979	0.027506	0.188232		0.175781	
							1.00458					
							1.01374					
							1.00458					
							0.977111					
92301				192	45.5	223.594	0.951928	0.009195	0.182129	1.23047	0.175781	-1.05469
							1.00916	-0.00708	0.180094	1.23047	0.175781	-1.40625
							1.07098	-0.00708	0.184163		0.175781	
							1.02748	-0.00911	0.182129		0.175781	
							0.972533					
							0.970243					
							1.00916					
							1.03206					
92302				192	49.5	222.891	1.00458	-0.01318	0.192301	1.23047	0.175781	-1.05469
							0.997715	-0.01318	0.200439	1.23047	0.175781	-1.05469
							1.05266	-0.01521	0.216715		0.351562	
							1.02977	-0.01521	0.206543		0.175781	
							0.979401					
							0.94277					
							0.986269					
							1.06411					
92303				196	56	222.188	1.05266	-0.01114	0.222819	1.23047	0.175781	-1.05469
							0.986269	-0.00911	0.222819	1.05469	0.175781	-1.05469
							0.974822	-0.00301	0.228922		0.351562	
							1.02519	-0.00097	0.23706		0.351562	
							1.07555					
							1.02748					
							0.951928					
							0.94506					
92304	2	42	10	196	61	222.188	1.00687	0.005126	0.226888	1.05469	0.175781	-1.40625
							1.03892	0.003092	0.228922	1.23047	0.175781	-1.05469
							0.993137	0.001057	0.21875		0	
							0.990848	0.007161	0.228922		0.175781	
							1.05495					
							1.04808					
							1.00001					
							0.98169					
92305				196	65	222.188	0.972533	0.003092	0.224853	1.05469	0.351562	-1.40625
							1.01603	0.007161	0.228922	1.05469	0.351562	-1.40625

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.03206	0.025471	0.226888		0.175781	
							1.01603	0.031575	0.228922		0.351562	
							1.0435					
							1.01603					
							1.04579					
							0.967954					
92306				196	70	222.891	0.883247	0.02954	0.226888	1.23047	0.351562	-1.40625
							0.94277	0.02954	0.220784	1.23047	0.351562	-1.40625
							1.11676	0.02954	0.230957		0.351562	
							1.12134	0.027506	0.228922		0.351562	
							1.01374					
							0.967954					
							0.931324					
							1.00916					
92307				200	75.5	222.891	1.0664	0.009195	0.224853	1.05469	0.351562	-1.40625
							1.03892	0.003092	0.230957	1.05469	0.351562	-1.40625
							0.986269	0.003092	0.210612		0.351562	
							0.913009	0.003092	0.212646		0.175781	
							0.995426					
							1.04808					
							1.04121					
							1.03663					
92308	2	42	14	200	78.5	222.188	1.02061	-0.01114	0.222819	0.878905	0.175781	-1.05469
							0.965664	-0.02945	0.216715	0.878905	0.175781	-1.40625
							0.954217	-0.01928	0.210612		0.351562	
							1.00458	-0.00301	0.222819		0.351562	
							1.05953					
							1.08471					
							1.01603					
							0.94735					
92309				200	83.5	222.188	0.979401	0.001057	0.214681	0.878905	0.351562	-1.05469
							0.974822	0.009195	0.212646	0.878905	0.351562	-1.40625
							0.986269	0.023437	0.214681		0.175781	
							1.01145	0.023437	0.212646		0.175781	
							1.05953					
							1.05266					
							0.94506					
							0.997715					
92310				200	89	222.539	1.09158	0.019368	0.216715	0.703124	0.351562	-1.05469
							1.02748	0.017333	0.212646	1.05469	0.351562	-1.40625
							0.929034	0.02954	0.202474		0.351562	
							0.940481	0.01123	0.206543		0.351562	
							1.00687					
							1.08013					
							1.02061					
							0.993137					
92311				200	93	222.188	0.965664	-0.01928	0.206543	0.878905	0.175781	-1.05469
							1.00458	-0.01928	0.204508	0.703124	0.175781	-1.05469
							1.06411	-0.01318	0.202474		0.351562	
							1.03892	-0.01318	0.200439		0.351562	
							0.972533					
							0.986269					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.00229					
							1.01603					
92312	2	42	18	200	97.5	221.836	1.02748	-0.02539	0.208577	0.527343	0.351562	-1.05469
							0.949639	-0.01928	0.198405	0.878905	0.351562	-1.05469
							0.94506	-0.00911	0.202474		0.175781	
							1.05266	-0.01318	0.204508		0.175781	
							1.05953					
							1.06182					
							0.979401					
							0.979401					
92313				204	101	221.836	0.979401	-0.00708	0.206543	0.527343	0.351562	-1.05469
							0.983979	0.013264	0.190267	0.878905	0.351562	-1.40625
							1.00001	0.023437	0.200439		0.351562	
							1.087	-0.00911	0.198405		0.351562	
							1.05266					
							1.00229					
							0.938192					
							0.977111					
92314				204	106.5	221.836	1.06869	-0.00504	0.190267	0.703124	0.351562	-1.05469
							1.0664	0.007161	0.194336	0.703124	0.351562	-1.40625
							0.933613	-0.00708	0.200439		0.351562	
							0.972533	-0.01318	0.194336		0.351562	
							0.997715					
							1.02061					
							1.13508					
							1.07555					
92315				204	109.5	221.484	0.885536	-0.00504	0.198405	0.351562	0.351562	-1.40625
							0.890115	-0.00301	0.186198	0.878905	0.351562	-1.40625
							0.949639	-0.01521	0.190267		0.351562	
							1.03663	0.009195	0.19637		0.351562	
							1.10761					
							1.07555					
							0.993137					
							0.967954					
92316	2	42	22	204	115.5	221.836	0.926745	0.009195	0.190267	0.703124	0.351562	-1.05469
							1.00001	0.013264	0.184163	0.878905	0.351562	-1.05469
							1.03206	0.021403	0.186198		0.351562	
							1.04121	0.015299	0.188232		0.351562	
							1.04808					
							0.98169					
							0.917587					
							1.01145					
92317				204	119.5	221.836	1.08013	-0.00301	0.17806	0.703124	0.351562	-1.05469
							1.07098	0.005126	0.184163	1.05469	0.351562	-1.40625
							0.988558	0.021403	0.17806		0.351562	
							0.876379	0.023437	0.184163		0.351562	
							0.98169					
							1.06869					
							1.0664					
							1.05266					
92318				204	123.5	222.188	0.983979	0.037679	0.190267	0.351562	0.351562	-1.05469
							0.94277	0.041747	0.180094	0.878905	0.351562	-1.05469

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECONDS	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.926745	0.035644	0.182129		0.527343	
							1.0435	0.045817	0.190267		0.527343	
							1.1099					
							1.0435					
							1.00916					
							0.954217					
92319				208	127.5	222.539	0.910719	0.02954	0.184163	0.703124	0.527343	-1.05469
							0.993137	0.015299	0.17806	0.878905	0.527343	-1.05469
							1.05495	0.035644	0.186198		0.527343	
							1.03892	0.003092	0.180094		0.527343	
							1.06869					
							0.974822					
							0.901562					
							0.972533					
92320	2	42	26	208	131.5	222.188	0.94735	-0.03149	0.163818	0.703124	0.527343	-1.40625
							1.08242	-0.01928	0.17806	0.527343	0.527343	-1.40625
							1.20376	-0.01521	0.180094		0.527343	
							1.02519	0.003092	0.173991		0.351562	
							0.844327					
							0.890115					
							1.03892					
							1.06411					
92321				208	135.5	222.539	1.08471	0.023437	0.180094	0.878905	0.527343	-1.05469
							0.961086	0.027506	0.157715	0.878905	0.527343	-1.05469
							0.874089	0.045817	0.169922		0.527343	
							1.06182	0.043782	0.188232		0.527343	
							1.16713					
							1.06411					
							0.977111					
							0.858064					
92322				208	139	222.891	0.848906	0.039713	0.169922	1.05469	0.527343	-1.05469
							1.08013	0.041747	0.17806	0.878905	0.703124	-1.40625
							1.18316	0.05192	0.194336		0.878905	
							1.09387	0.068196	0.186198		0.878905	
							0.963375					
							0.890115					
							0.963375					
							1.05266					
92323				204	142.5	222.891	1.08013	0.05192	0.17806	1.40625	1.23047	-1.05469
							1.06869	0.009195	0.188232	1.75781	1.40625	-1.40625
							0.954217	0.005126	0.188232		1.58203	
							0.915298	-0.00708	0.188232		1.58203	
							0.995426					
							1.00687					
							1.01145					
							1.00916					
92324	2	42	30	204	146	222.188	0.983979	-0.03759	0.184163	2.28515	1.75781	-1.05469
							0.995426	-0.05183	0.190267	2.46093	1.93359	-1.40625
							1.02748	-0.03963	0.19637		1.93359	
							1.00001	-0.03352	0.198405		2.10937	
							0.993137					
							0.970243					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.997715					
							1.02977					
92325				196	150	221.133	1.07784	-0.02945	0.210612	2.98828	2.63671	-1.40625
							0.988558	-0.02742	0.212646	4.04296	2.8125	-1.05469
							0.970243	-0.0437	0.216715		3.33984	
							1.00229	-0.03963	0.226888		3.86718	
							0.98169					
							0.986269					
							0.979401					
							0.970243					
92326				192	152	220.781	1.01145	-0.02335	0.23706	5.62499	4.21874	-1.40625
							1.00687	-0.01725	0.245198	6.85546	5.09765	-1.05469
							0.993137	-0.02742	0.249267		5.27343	
							1.03892	-0.02539	0.255371		6.32812	
							1.05037					
							0.990848					
							0.993137					
							1.01145					
92327				192	155.5	221.133	1.00458	-0.01318	0.261474	8.43749	6.67968	-1.05469
							0.997715	-0.01318	0.263509	9.84374	7.03124	-1.40625
							1.02748	-0.00504	0.269613		7.73436	
							1.01603	-0.00911	0.273682		7.91014	
							0.977111					
							1.00458					
							1.02061					
							1.03435					
92328	2	42	34	196	159	221.133	1.03892	-0.01318	0.273682	10.7226	8.26171	-1.05469
							1.0435	-0.00708	0.273682	10.8984	8.61327	-0.70312
							1.04579	-0.00301	0.273682		8.78905	
							1.05037	-0.01318	0.269613		8.96483	
							1.06411					
							1.06182					
							1.05495					
							1.05724					
92329				208	162	220.781	1.04579	-0.01521	0.265544	10.7226	8.96483	-0.70312
							1.03663	-0.01725	0.263509	10.1953	8.96483	-1.05469
							1.02977	-0.01928	0.263509		8.96483	
							1.01832	-0.01928	0.261474		8.96483	
							1.01374					
							1.01145					
							1.01603					
							1.0229					
92330				220	165.5	220.781	1.03435	-0.01318	0.261474	10.3711	9.14061	-1.05469
							1.05037	-0.01114	0.265544	10.7226	9.49217	-1.40625
							1.0664	-0.01114	0.269613		9.84374	
							1.07784	-0.01725	0.273682		10.5469	
							1.08929					
							1.1099					
							1.12134					
							1.13508					
92331				240	167.5	220.781	1.14195	-0.02539	0.275716	11.6015	10.8984	-1.05469
							1.15568	-0.01725	0.277751	11.9531	11.0742	-1.05469

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.15797	-0.00708	0.277751		11.9531	
							1.16713	-0.00911	0.279785		12.3047	
							1.16484					
							1.16942					
							1.174					
							1.18316					
92332	2	42	38	268	169.5	221.133	1.18773	-0.00708	0.28182	12.3047	12.832	-0.70312
							1.1946	-0.00708	0.277751	12.3047	13.0078	-0.35156
							1.19002	-0.00911	0.277751		13.3594	
							1.1946	-0.00097	0.275716		13.7109	
							1.19231					
							1.19231					
							1.19231					
							1.18544					
92333				300	171.5	221.836	1.174	-0.00301	0.271647	11.9531	13.8867	0
							1.16713	-0.00097	0.271647	11.4258	14.0625	0
							1.16255	0.003092	0.269613		14.414	
							1.16255	0.01123	0.273682		14.5898	
							1.15339					
							1.14653					
							1.1511					
							1.15568					
92334				328	172	222.188	1.15568	0.009195	0.277751	11.4258	14.7656	0.703124
							1.15568	0.009195	0.279785	11.25	15.1172	1.05469
							1.16484	0.007161	0.275716		15.2929	
							1.16942	0.003092	0.271647		15.6445	
							1.16484					
							1.17171					
							1.16026					
							1.1511					
92335				364	173	222.539	1.14424	0.001057	0.267578	10.8984	15.6445	1.75781
							1.12821	-0.00097	0.25944	9.66795	15.6445	2.10937
							1.09845	0.001057	0.257406		15.2929	
							1.07098	-0.00504	0.249267		15.1172	
							1.04121					
							1.02061					
							0.993137					
							0.979401					
92336	2	42	42	400	174	222.891	0.963375	0.001057	0.243164	8.26171	14.5898	1.75781
							0.951928	0.003092	0.24113	7.3828	14.414	1.05469
							0.933613	0.005126	0.24113		14.2383	
							0.931324	0.003092	0.24113		13.8867	
							0.919877					
							0.90843					
							0.917587					
							0.926745					
92337				440	174.5	223.594	0.926745	0.005126	0.24113	7.55858	13.8867	0.703124
							0.935903	0.007161	0.243164	7.91014	13.8867	0
							0.940481	0.005126	0.245198		13.8867	
							0.94735	0.01123	0.245198		13.8867	
							0.958796					
							0.965664					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECONDS	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.979401					
							0.993137					
92338				480	176	223.945	0.997715	0.015299	0.245198	8.08593	13.8867	-0.35156
							0.995426	0.015299	0.243164	7.73436	13.8867	-0.70312
							0.988558	0.015299	0.239095		13.8867	
							0.98169	0.013264	0.23706		13.7109	
							0.974822					
							0.965664					
							0.956507					
							0.940481					
92339				512	176.5	223.945	0.929034	0.013264	0.235026	7.20702	13.7109	-0.70312
							0.924456	0.015299	0.235026	6.85546	13.3594	-0.35156
							0.924456	0.01123	0.230957		13.1836	
							0.919877	0.009195	0.230957		13.0078	
							0.922166					
							0.917587					
							0.915298					
							0.90614					
92340	2	42	46	548	177	223.945	0.901562	0.007161	0.230957	6.5039	12.832	-0.35156
							0.90614	0.01123	0.230957	6.5039	12.6562	-0.35156
							0.901562	0.01123	0.230957		12.6562	
							0.903851	0.01123	0.232991		12.6562	
							0.90843					
							0.90614					
							0.913009					
							0.919877					
92341				584	178	223.945	0.926745	0.013264	0.232991	6.67968	12.6562	-0.35156
							0.935903	0.01123	0.232991	6.85546	12.6562	-0.35156
							0.938192	0.009195	0.235026		12.6562	
							0.94506	0.013264	0.23706		12.832	
							0.94735					
							0.949639					
							0.958796					
							0.961086					
92342				616	178.5	223.945	0.967954	0.01123	0.23706	7.20702	12.832	-0.70312
							0.972533	0.009195	0.239095	7.55858	13.0078	-0.70312
							0.974822	0.009195	0.24113		13.0078	
							0.986269	0.009195	0.243164		13.1836	
							0.993137					
							1.00229					
							1.01145					
							1.01603					
92343				652	179	223.594	1.01832	0.007161	0.24113	7.91014	13.1836	-0.70312
							1.01832	0.005126	0.24113	7.73436	13.1836	-0.35156
							1.00916	0.009195	0.239095		13.1836	
							1.00458	0.007161	0.235026		13.1836	
							1.00001					
							0.995426					
							0.986269					
							0.972533					
92344	2	42	50	688	178.5	223.594	0.958796	0.007161	0.235026	7.20702	13.1836	-0.35156
							0.954217	0.005126	0.235026	7.20702	13.0078	0

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.958796	0.003092	0.235026		13.0078	
							0.965664	0.003092	0.235026		13.0078	
							0.967954					
							0.972533					
							0.970243					
							0.963375					
92345				720	179.5	223.242	0.970243	0.003092	0.235026	7.20702	13.0078	0
							0.98169	0.003092	0.235026	7.3828	13.0078	0
							0.986269	0.003092	0.23706		13.0078	
							0.990848	0.003092	0.235026		13.0078	
							0.993137					
							0.997715					
							0.995426					
							0.990848					
92346				756	179.5	223.242	0.979401	0.005126	0.23706	7.3828	13.0078	-0.35156
							0.979401	0.009195	0.239095	7.20702	13.0078	-0.70312
							0.993137	0.01123	0.23706		13.1836	
							0.986269	0.01123	0.239095		13.1836	
							0.98169					
							0.983979					
							0.993137					
							1.00458					
92347				792	180	223.242	0.997715	0.009195	0.235026	7.20702	13.1836	-0.70312
							0.983979	0.001057	0.235026	7.3828	13.1836	-0.70312
							0.972533	0.003092	0.235026		13.1836	
							0.972533	0.009195	0.235026		13.1836	
							0.98169					
							0.986269					
							0.988558					
							0.990848					
92348	2	42	54	832	180	222.891	1.00001	0.01123	0.235026	7.3828	13.1836	-0.35156
							0.988558	0.007161	0.235026	7.20702	13.1836	-0.35156
							0.983979	0.009195	0.235026		13.3594	
							0.986269	0.01123	0.235026		13.3594	
							0.988558					
							0.983979					
							0.983979					
							0.988558					
92349				868	181	222.891	0.983979	0.007161	0.230957	7.20702	13.3594	0
							0.98169	0.003092	0.232991	7.20702	13.1836	0
							0.972533	-0.00301	0.232991		13.1836	
							0.970243	0.003092	0.230957		13.1836	
							0.98169					
							0.983979					
							0.979401					
							0.979401					
92350				904	180.5	222.539	0.967954	-0.00301	0.228922	6.85546	13.0078	-0.35156
							0.965664	0.005126	0.228922	6.5039	13.0078	-0.70312
							0.956507	0.007161	0.228922		12.832	
							0.94277	0.009195	0.230957		12.832	
							0.933613					
							0.938192					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.940481					
							0.951928					
92351				940	181.5	222.539	0.951928	0.013264	0.228922	6.85546	12.832	-1.40625
							0.958796	0.009195	0.232991	7.03124	12.832	-1.40625
							0.954217	0.01123	0.232991		13.0078	
							0.974822	0.01123	0.235026		13.1836	
							0.997715					
							0.993137					
							0.988558					
							1.00458					
92352	2	42	58	976	181	222.539	1.00001	0.013264	0.23706	7.20702	13.1836	-1.40625
							0.990848	0.01123	0.232991	7.20702	13.3594	-1.75781
							0.995426	0.007161	0.232991		13.3594	
							0.986269	0.009195	0.23706		13.5351	
							0.988558					
							0.990848					
							0.990848					
							1.00458					
92353				1016	181.5	222.188	1.0229	0.009195	0.239095	7.73436	13.5351	-2.10937
							1.03435	0.007161	0.232991	7.55858	13.7109	-2.10937
							1.02977	0.007161	0.235026		13.7109	
							1.0229	0.01123	0.235026		13.7109	
							1.0229					
							1.02977					
							1.03892					
							1.01145					
92354				1052	181.5	221.836	0.993137	0.01123	0.232991	7.03124	13.7109	-2.46093
							0.997715	0.007161	0.235026	7.20702	13.7109	-3.16406
							0.995426	0.003092	0.232991		13.7109	
							0.993137	0.007161	0.232991		13.7109	
							0.997715					
							0.997715					
							1.01145					
							1.02519					
92355				1096	183	221.484	1.02061	0.009195	0.235026	7.3828	13.8867	-3.86718
							1.01374	0.013264	0.232991	7.20702	13.8867	-3.86718
							1.01374	0.009195	0.230957		13.8867	
							1.00916	0.013264	0.232991		13.8867	
							0.997715					
							1.00687					
							1.00458					
							1.00001					
92356	2	43	2	1136	183	221.133	0.997715	0.015299	0.230957	7.03124	13.8867	-3.86718
							1.00001	0.015299	0.230957	7.03124	13.8867	-3.86718
							0.995426	0.007161	0.230957		14.0625	
							1.00229	0.005126	0.230957		14.0625	
							1.00916					
							1.00001					
							1.00687					
							1.01374					
92357				1180	184	220.43	1.00687	0.007161	0.230957	7.03124	14.0625	-3.86718
							1.01145	0.01123	0.230957	7.03124	14.0625	-3.86718

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.01374	0.007161	0.228922		14.0625	
							1.01145	0.001057	0.228922		14.2383	
							1.01374					
							1.01374					
							1.00916					
							1.00687					
92358				1220	184	220.078	1.00916	0.005126	0.228922	7.03124	14.2383	-4.21874
							1.01374	0.005126	0.226888	7.03124	14.2383	-5.27343
							1.01603	0.005126	0.220784		14.2383	
							1.00916	0.007161	0.21875		14.2383	
							1.00916					
							1.00458					
							1.00001					
							0.990848					
92359				1268	184	219.375	0.972533	0.01123	0.216715	6.67968	14.0625	-6.32812
							0.979401	0.015299	0.214681	6.85546	14.0625	-6.67968
							0.972533	0.025471	0.214681		14.0625	
							0.972533	0.021403	0.214681		14.0625	
							0.986269					
							0.98169					
							0.974822					
							0.977111					
92360	2	43	6	1312	184	219.023	0.977111	0.023437	0.212646	6.67968	14.0625	-6.67968
							0.974822	0.017333	0.210612	6.85546	14.0625	-6.67968
							0.979401	0.017333	0.210612		14.0625	
							0.988558	0.015299	0.210612		14.0625	
							0.988558					
							0.986269					
							0.988558					
							0.995426					
92361				1352	183	218.32	0.970243	0.01123	0.210612	6.67968	14.0625	-7.3828
							0.974822	0.009195	0.210612	6.5039	13.8867	-8.43749
							0.967954	0.009195	0.208577		13.8867	
							0.961086	0.017333	0.208577		13.8867	
							0.949639					
							0.94735					
							0.94506					
							0.94506					
92362				1396	184	216.914	0.935903	0.019368	0.210612	6.32812	13.8867	-10.8984
							0.940481	0.015299	0.210612	6.5039	13.7109	-12.3047
							0.954217	0.019368	0.212646		13.7109	
							0.967954	0.027506	0.216715		13.8867	
							0.967954					
							0.970243					
							0.977111					
							0.997715					
92363				1440	184	215.859	1.01145	0.021403	0.216715	7.20702	13.8867	-12.6562
							1.0229	0.01123	0.216715	7.20702	13.8867	-13.3594
							1.02748	0.015299	0.21875		14.0625	
							1.0435	0.015299	0.214681		14.0625	
							1.03206					
							1.01145					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.993137					
							0.983979					
92364	2	43	10	1484	183.5	213.75	0.990848	0.015299	0.216715	7.03124	14.0625	-13.7109
							1.00001	0.015299	0.21875	7.55858	14.0625	-14.7656
							1.00687	0.007161	0.220784		14.2383	
							1.01374	0.009195	0.220784		14.2383	
							1.01832					
							1.02519					
							1.02519					
							1.02061					
92365				1528	183	212.344	1.01145	0.017333	0.224853	7.55858	14.414	-15.4687
							1.01145	0.013264	0.222819	7.55858	14.414	-16.1719
							1.02061	0.013264	0.224853		14.5898	
							1.01603	0.01123	0.230957		14.7656	
							1.01832					
							1.03206					
							1.06182					
							1.08471					
92366				1576	183.5	210.234	1.09387	0.013264	0.232991	8.43749	14.9414	-16.1719
							1.09387	0.015299	0.235026	8.96483	15.2929	-16.1719
							1.1099	0.007161	0.232991		15.4687	
							1.10761	0.007161	0.222819		15.4687	
							1.11676					
							1.11447					
							1.08929					
							1.0664					
92367				1624	183	208.477	1.04808	0.013264	0.224853	8.26171	15.4687	-16.1719
							1.02519	0.019368	0.222819	7.91014	15.4687	-16.1719
							1.00687	0.019368	0.220784		15.2929	
							0.993137	0.017333	0.216715		14.9414	
							0.988558					
							0.977111					
							0.970243					
							0.956507					
92368	2	43	14	1668	182.5	207.07	0.949639	0.013264	0.214681	7.3828	14.7656	-16.1719
							0.94277	0.009195	0.212646	7.03124	14.414	-16.1719
							0.933613	0.009195	0.210612		14.2383	
							0.929034	0.009195	0.210612		14.0625	
							0.924456					
							0.919877					
							0.917587					
							0.915298					
92369				1708	183	205.312	0.910719	0.007161	0.210612	6.85546	13.8867	-16.875
							0.90614	0.009195	0.210612	6.67968	13.7109	-17.9297
							0.903851	0.01123	0.210612		13.5351	
							0.903851	0.013264	0.210612		13.3594	
							0.903851					
							0.901562					
							0.903851					
							0.903851					
92370				1748	183.5	203.906	0.901562	0.013264	0.210612	6.67968	13.3594	-18.2812
							0.903851	0.013264	0.210612	6.67968	13.0078	-19.3359

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.901562	0.015299	0.210612		13.0078	
							0.90614	0.017333	0.210612		12.832	
							0.903851					
							0.901562					
							0.903851					
							0.901562					
92371				1784	184.5	202.148	0.903851	0.017333	0.210612	6.67968	12.6562	-19.6875
							0.901562	0.017333	0.210612	6.67968	12.4805	-20.039
							0.901562	0.017333	0.210612		12.3047	
							0.899272	0.017333	0.208577		12.1289	
							0.899272					
							0.899272					
							0.896983					
							0.899272					
92372	2	43	18	1816	185.5	200.742	0.892404	0.019368	0.208577	6.5039	11.9531	-20.039
							0.890115	0.019368	0.208577	6.5039	11.7773	-20.3906
							0.890115	0.015299	0.206543		11.4258	
							0.890115	0.017333	0.208577		11.4258	
							0.892404					
							0.890115					
							0.887825					
							0.883247					
92373				1844	186.5	198.984	0.885536	0.015299	0.206543	6.32812	11.0742	-20.7422
							0.887825	0.015299	0.208577	6.5039	10.8984	-20.7422
							0.890115	0.013264	0.210612		10.7226	
							0.896983	0.009195	0.210612		10.7226	
							0.903851					
							0.913009					
							0.926745					
							0.935903					
92374				1868	187.5	196.875	0.940481	0.013264	0.212646	6.85546	10.5469	-21.0937
							0.94506	0.013264	0.212646	7.20702	10.5469	-21.4453
							0.949639	0.013264	0.214681		10.3711	
							0.954217	0.013264	0.216715		10.3711	
							0.958796					
							0.965664					
							0.972533					
							0.977111					
92375				1892	188.5	194.766	0.979401	0.015299	0.216715	7.3828	10.3711	-21.7968
							0.974822	0.015299	0.216715	7.3828	10.1953	-21.7968
							0.977111	0.015299	0.216715		10.1953	
							0.98169	0.015299	0.214681		10.0195	
							0.979401					
							0.979401					
							0.977111					
							0.977111					
92376	2	43	22	1912	190	193.008	0.972533	0.015299	0.216715	7.3828	9.84374	-21.7968
							0.977111	0.015299	0.216715	7.3828	9.84374	-21.4453
							0.979401	0.013264	0.216715		9.66795	
							0.979401	0.013264	0.216715		9.66795	
							0.986269					
							0.988558					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.986269					
							0.983979					
92377				1932	191.5	190.898	0.979401	0.015299	0.214681	7.3828	9.49217	-21.4453
							0.98169	0.013264	0.216715	7.3828	9.49217	-21.0937
							0.986269	0.01123	0.216715		9.49217	
							0.983979	0.01123	0.216715		9.49217	
							0.990848					
							0.993137					
							0.995426					
							0.997715					
92378				1948	193	189.141	1.00001	0.01123	0.216715	7.55858	9.31639	-20.7422
							1.00229	0.01123	0.216715	7.3828	9.31639	-20.3906
							1.00001	0.01123	0.216715		9.31639	
							1.00001	0.01123	0.216715		9.14061	
							0.997715					
							0.995426					
							1.00001					
							1.00001					
92379				1964	194.5	187.031	1.00229	0.009195	0.214681	7.3828	9.14061	-20.3906
							1.00001	0.009195	0.214681	7.3828	9.14061	-20.3906
							0.997715	0.009195	0.216715		8.96483	
							0.995426	0.01123	0.216715		8.96483	
							0.993137					
							0.995426					
							1.00001					
							1.00687					
92380	2	43	26	1980	196.5	185.273	1.01374	0.01123	0.220784	7.55858	8.96483	-20.3906
							1.02061	0.01123	0.220784	7.91014	9.14061	-20.3906
							1.02748	0.01123	0.224853		9.14061	
							1.04121	0.009195	0.228922		9.49217	
							1.05266					
							1.06869					
							1.08471					
							1.09387					
92381				2000	198.5	183.164	1.10532	0.01123	0.230957	8.43749	9.66795	-20.7422
							1.11447	0.015299	0.232991	8.96483	9.84374	-21.0937
							1.11905	0.017333	0.235026		10.0195	
							1.12821	0.017333	0.232991		10.1953	
							1.1305					
							1.13279					
							1.12592					
							1.11676					
92382				2020	200.5	181.406	1.11218	0.019368	0.232991	8.78905	10.1953	-21.0937
							1.10303	0.017333	0.230957	8.61327	10.1953	-21.0937
							1.10074	0.017333	0.228922		10.1953	
							1.08929	0.017333	0.228922		10.1953	
							1.08242					
							1.07784					
							1.07098					
							1.06411					
92383				2040	202	179.297	1.06182	0.017333	0.226888	8.43749	10.1953	-20.7422
							1.05724	0.015299	0.226888	8.43749	10.1953	-20.7422

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.05495	0.01123	0.228922		10.1953	
							1.05724	0.007161	0.230957		10.1953	
							1.05724					
							1.05037					
							1.05037					
							1.05495					
92384	2	43	30	2064	203.5	177.539	1.05953	0.007161	0.230957	8.43749	10.1953	-21.0937
							1.06411	0.015299	0.232991	8.61327	10.3711	-21.0937
							1.07327	0.013264	0.235026		10.3711	
							1.08242	0.015299	0.23706		10.7226	
							1.08242					
							1.08471					
							1.09387					
							1.10074					
92385				2084	205	175.43	1.10532	0.013264	0.23706	8.96483	10.7226	-21.4453
							1.1099	0.013264	0.23706	8.96483	10.7226	-21.4453
							1.11218	0.015299	0.23706		10.8984	
							1.11218	0.015299	0.23706		11.0742	
							1.11218					
							1.11218					
							1.11218					
							1.11676					
92386				2112	206	173.672	1.11447	0.013264	0.23706	8.96483	11.0742	-21.4453
							1.11676	0.013264	0.23706	8.78905	11.0742	-21.4453
							1.11676	0.015299	0.23706		11.25	
							1.11676	0.017333	0.235026		11.25	
							1.11676					
							1.11447					
							1.11447					
							1.11218					
92387				2136	207.5	171.562	1.11218	0.015299	0.235026	8.61327	11.25	-21.0937
							1.11447	0.015299	0.23706	8.61327	11.4258	-21.0937
							1.11447	0.015299	0.235026		11.4258	
							1.11676	0.015299	0.232991		11.4258	
							1.12134					
							1.12134					
							1.12134					
							1.11676					
92388	2	43	34	2168	208.5	169.805	1.1099	0.015299	0.230957	8.61327	11.6015	-20.7422
							1.09845	0.015299	0.228922	8.26171	11.4258	-20.7422
							1.08929	0.013264	0.224853		11.4258	
							1.08242	0.01123	0.220784		11.0742	
							1.07784					
							1.06869					
							1.05495					
							1.03663					
92389				2196	209	168.047	1.01603	0.01123	0.216715	7.55858	10.8984	-20.7422
							1.00001	0.01123	0.214681	7.03124	10.8984	-20.7422
							0.983979	0.01123	0.214681		10.5469	
							0.977111	0.009195	0.212646		10.3711	
							0.967954					
							0.967954					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.972533					
							0.965664					
92390				2224	210.5	166.992	0.963375	0.01123	0.214681	6.67968	10.1953	-20.7422
							0.974822	0.015299	0.216715	7.03124	10.1953	-20.7422
							0.990848	0.015299	0.21875		10.3711	
							1.01145	0.015299	0.220784		10.5469	
							1.02748					
							1.04121					
							1.05495					
							1.06869					
92391				2252	212	164.883	1.08242	0.015299	0.222819	7.55858	10.7226	-20.7422
							1.08929	0.015299	0.226888	7.91014	10.7226	-20.3906
							1.09616	0.015299	0.226888		11.0742	
							1.10074	0.017333	0.226888		11.0742	
							1.1099					
							1.11447					
							1.11447					
							1.1099					
92392	2	43	38	2284	213.5	163.125	1.1099	0.017333	0.224853	7.91014	11.25	-20.3906
							1.1099	0.017333	0.224853	7.73436	11.25	-20.039
							1.10532	0.017333	0.222819		11.25	
							1.10532	0.015299	0.220784		11.25	
							1.10074					
							1.09845					
							1.08929					
							1.08242					
92393				2320	214.5	161.367	1.08013	0.017333	0.220784	7.55858	11.25	-20.039
							1.08929	0.015299	0.220784	7.20702	11.4258	-19.6875
							1.08929	0.017333	0.21875		11.4258	
							1.08471	0.021403	0.21875		11.4258	
							1.07555					
							1.0664					
							1.07098					
							1.07784					
92394				2352	215.5	159.609	1.08471	0.013264	0.21875	7.3828	11.4258	-19.3359
							1.09158	0.009195	0.21875	7.55858	11.6015	-18.6328
							1.10532	0.01123	0.220784		11.6015	
							1.11218	0.01123	0.21875		11.7773	
							1.11218					
							1.09845					
							1.09158					
							1.08471					
92395				2392	215.5	157.5	1.08471	0.013264	0.21875	7.3828	11.7773	-18.6328
							1.09158	0.015299	0.21875	7.3828	11.9531	-17.9297
							1.09387	0.013264	0.220784		11.9531	
							1.08929	0.007161	0.220784		12.1289	
							1.08471					
							1.09616					
							1.12134					
							1.13737					
92396	2	43	42	2432	216	155.742	1.12821	0.001057	0.220784	7.73436	12.3047	-17.5781
							1.12363	0.003092	0.220784	7.55858	12.3047	-17.5781

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.12363	0.003092	0.220784		12.4805	
							1.11447	0.003092	0.21875		12.4805	
							1.1099					
							1.10761					
							1.10303					
							1.09845					
92397				2472	216.5	154.336	1.09387	0.005126	0.216715	7.3828	12.6562	-17.2265
							1.09387	0.013264	0.216715	7.20702	12.832	-16.1719
							1.08929	0.017333	0.216715		12.832	
							1.08471	0.013264	0.21875		12.832	
							1.07555					
							1.07784					
							1.09158					
							1.10303					
92398				2520	216.5	152.93	1.10761	0.005126	0.21875	7.3828	13.1836	-15.1172
							1.12134	0.005126	0.222819	7.91014	13.3594	-14.414
							1.1305	0.005126	0.222819		13.5351	
							1.14195	0.003092	0.222819		13.7109	
							1.15797					
							1.15797					
							1.16484					
							1.16713					
92399				2572	217	151.523	1.16026	0.003092	0.222819	8.08593	13.8867	-14.414
							1.14195	0.009195	0.21875	7.73436	14.0625	-14.414
							1.1305	0.007161	0.216715		14.0625	
							1.12134	0.007161	0.214681		14.0625	
							1.10303					
							1.10303					
							1.09616					
							1.087					
92400	2	43	46	2624	216.5	150.469	1.10074	0.015299	0.214681	7.55858	14.2383	-14.414
							1.10303	0.009195	0.212646	7.03124	14.2383	-14.414
							1.08929	0.01123	0.210612		14.2383	
							1.06182	0.01123	0.206543		14.0625	
							1.05037					
							1.0435					
							1.03663					
							1.02748					
92401				2676	216.5	149.766	1.01145	0.01123	0.204508	6.5039	14.0625	-14.414
							0.993137	0.017333	0.204508	6.5039	13.8867	-14.0625
							0.993137	0.015299	0.204508		13.8867	
							0.997715	0.017333	0.204508		13.8867	
							1.00458					
							1.00687					
							0.995426					
							0.98169					
92402				2728	216	148.711	0.98169	0.017333	0.202474	6.15233	13.8867	-13.7109
							0.983979	0.015299	0.202474	6.32812	13.8867	-13.3594
							0.983979	0.013264	0.204508		13.8867	
							0.988558	0.01123	0.204508		13.8867	
							0.995426					
							1.00001					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.997715					
							0.997715					
92403				2784	216.5	147.656	1.00001	0.009195	0.202474	6.32812	13.8867	-13.0078
							1.00001	0.005126	0.204508	6.32812	13.8867	-13.0078
							0.997715	0.003092	0.204508		13.8867	
							0.997715	0.005126	0.204508		13.8867	
							1.00687					
							1.01145					
							1.01145					
							1.00687					
92404	2	43	50	2840	217	146.602	1.01145	0.007161	0.204508	6.5039	14.0625	-13.0078
							1.01603	0.009195	0.204508	6.67968	14.0625	-13.0078
							1.01832	0.01123	0.204508		14.0625	
							1.01374	0.009195	0.204508		14.0625	
							1.01603					
							1.01832					
							1.01832					
							1.02061					
92405				2892	217	145.547	1.01832	0.007161	0.204508	6.67968	14.0625	-12.3047
							1.01374	0.003092	0.202474	6.32812	14.0625	-11.6015
							1.00916	0.005126	0.202474		14.0625	
							1.00458	0.007161	0.200439		13.8867	
							1.00001					
							0.98169					
							0.977111					
							0.983979					
92406				2948	216.5	144.844	0.98169	0.005126	0.202474	6.15233	13.8867	-10.1953
							0.990848	0.007161	0.202474	6.32812	13.8867	-9.14061
							1.00458	0.005126	0.202474		14.0625	
							1.00916	0.003092	0.202474		14.0625	
							1.00687					
							1.00229					
							0.997715					
							0.997715					
92407				3004	216.5	144.141	1.00916	0.003092	0.204508	6.32812	14.2383	-8.43749
							1.01832	0.007161	0.206543	6.85546	14.414	-8.08593
							1.02519	0.005126	0.208577		14.414	
							1.03435	0.003092	0.208577		14.5898	
							1.05037					
							1.05724					
							1.05266					
							1.05266					
92408	2	43	54	3064	216	143.438	1.04579	0.005126	0.208577	6.85546	14.7656	-8.08593
							1.04121	0.005126	0.208577	6.85546	14.7656	-8.08593
							1.02977	0.007161	0.210612		14.9414	
							1.03206	0.013264	0.212646		15.1172	
							1.03892					
							1.05266					
							1.06869					
							1.07555					
92409				3124	216	142.734	1.07784	0.01123	0.212646	7.20702	15.2929	-7.73436
							1.087	0.009195	0.214681	7.3828	15.6445	-7.3828

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.09387	0.007161	0.216715		15.8203	
							1.09845	0.009195	0.216715		15.9961	
							1.09616					
							1.10303					
							1.10303					
							1.09616					
92410				3188	214.5	142.383	1.10074	0.009195	0.214681	7.55858	16.1719	-7.3828
							1.10761	0.009195	0.214681	7.55858	16.1719	-7.03124
							1.09158	0.009195	0.210612		16.3476	
							1.087	0.01123	0.206543		16.3476	
							1.08471					
							1.0664					
							1.03892					
							1.02519					
92411				3252	214	141.68	1.01603	0.009195	0.206543	6.85546	16.1719	-7.03124
							1.00687	0.009195	0.206543	6.5039	16.1719	-7.03124
							0.997715	0.007161	0.204508		16.1719	
							0.986269	0.005126	0.204508		16.1719	
							0.98169					
							0.98169					
							0.98169					
							0.993137					
92412	2	43	58	3320	213.5	141.328	1.00458	0.007161	0.208577	6.67968	16.3476	-6.67968
							1.01832	0.007161	0.210612	7.20702	16.3476	-6.67968
							1.04121	-0.00301	0.214681		16.875	
							1.05495	0.001057	0.21875		17.2265	
							1.0664					
							1.07555					
							1.09616					
							1.10761					
92413				3392	212	140.625	1.11218	0.005126	0.222819	7.91014	17.5781	-6.67968
							1.11905	0.013264	0.224853	8.26171	17.7539	-6.67968
							1.12363	0.017333	0.224853		17.9297	
							1.12592	0.013264	0.222819		18.2812	
							1.12821					
							1.12821					
							1.1099					
							1.10303					
92414				3468	209.5	140.273	1.1099	0.001057	0.21875	7.91014	18.457	-6.67968
							1.11676	-0.02742	0.220784	8.43749	18.6328	-6.67968
							1.10303	-0.00097	0.224853		18.8086	
							1.09616	0.007161	0.228922		18.9843	
							1.11447					
							1.11676					
							1.09158					
							1.1099					
92415				3544	209.5	139.922	1.12592	0.003092	0.226888	8.78905	19.1601	-7.03124
							1.12134	0.019368	0.226888	8.26171	19.3359	-6.67968
							1.1099	0.009195	0.21875		19.3359	
							1.10074	0.003092	0.220784		19.3359	
							1.07784					
							1.05266					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.04121					
							1.04121					
92416	2	44	2	3624	207	139.922	1.00687	0.013264	0.216715	7.91014	19.3359	-5.62499
							1.0229	0.005126	0.216715	8.08593	19.1601	-3.86718
							1.04121	0.003092	0.224853		19.3359	
							1.03435	0.009195	0.222819		19.5117	
							1.05037					
							1.06869					
							1.06411					
							1.06182					
92417				3712	206	139.57	1.05724	0.01123	0.222819	7.91014	19.6875	-2.8125
							1.05266	0.013264	0.224853	8.26171	20.039	-1.75781
							1.05495	0.01123	0.228922		20.2148	
							1.05266	0.017333	0.228922		20.5664	
							1.0664					
							1.08013					
							1.08929					
							1.10303					
92418				3796	204.5	139.57	1.10761	0.01123	0.232991	8.96483	20.7422	-1.05469
							1.11447	0.009195	0.230957	8.96483	20.9179	-0.35156
							1.12134	0.001057	0.226888		20.9179	
							1.09616	0.005126	0.222819		20.9179	
							1.09158					
							1.08242					
							1.06182					
							1.03892					
92419				3880	203	139.57	1.00916	-0.00301	0.214681	8.26171	20.5664	0
							0.977111	-0.01114	0.202474	6.67968	20.3906	0.351562
							0.933613	-0.00504	0.202474		20.039	
							0.899272	0.001057	0.204508		19.6875	
							0.864932					
							0.853485					
							0.862642					
							0.860353					
92420	2	44	6	3964	201	139.57	0.874089	0.003092	0.206543	6.5039	19.5117	0.351562
							0.896983	-0.00097	0.208577	7.20702	19.5117	0.351562
							0.90614	-0.00911	0.208577		19.5117	
							0.90614	-0.01725	0.210612		19.6875	
							0.915298					
							0.922166					
							0.90614					
							0.90843					
92421				4056	199	139.57	0.913009	-0.01521	0.210612	7.03124	19.8633	0.351562
							0.922166	-0.00504	0.214681	7.03124	20.039	0.703124
							0.929034	0.007161	0.214681		20.2148	
							0.933613	0.015299	0.222819		20.3906	
							0.924456					
							0.90843					
							0.917587					
							0.94506					
92422				4136	196.5	140.273	0.963375	0.009195	0.224853	7.91014	20.5664	1.40625
							0.974822	-0.00301	0.226888	8.78905	21.0937	2.8125

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITU ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.974822	-0.00911	0.230957		21.2695	
							0.993137	-0.00301	0.235026		21.6211	
							1.02061					
							1.03435					
							1.03663					
							1.03892					
92423				4220	194.5	140.625	1.05266	0.001057	0.23706	9.49217	21.7968	3.86718
							1.05495	-0.00911	0.235026	9.66795	21.9726	5.27343
							1.05266	-0.01521	0.232991		22.1484	
							1.0435	-0.02132	0.226888		22.1484	
							1.05724					
							1.05495					
							1.02977					
							1.00458					
92424	2	44	10	4308	195	141.328	0.995426	-0.01521	0.220784	9.14061	21.9726	5.62499
							0.977111	-0.00708	0.224853	8.43749	21.4453	5.27343
							0.967954	-0.01725	0.216715		21.0937	
							0.963375	-0.01521	0.208577		20.9179	
							0.94735					
							0.880957					
							0.823723					
							0.79625					
92425				4388	192	142.383	0.814565	-0.01928	0.208577	7.55858	20.2148	6.32812
							0.842038	-0.02742	0.206543	6.85546	19.8633	7.03124
							0.83517	-0.01521	0.200439		19.5117	
							0.837459	-0.00504	0.204508		19.1601	
							0.821434					
							0.79854					
							0.757331					
							0.743595					
92426				4460	190	143.438	0.732148	0.013264	0.208577	6.32812	18.9843	6.67968
							0.734437	-0.01318	0.202474	6.85546	18.457	6.32812
							0.752752	-0.02132	0.204508		18.2812	
							0.791671	-0.01114	0.210612		18.2812	
							0.800829					
							0.803118					
							0.826012					
							0.821434					
92427				4532	190	144.844	0.821434	-0.00708	0.212646	7.3828	18.1054	5.62499
							0.858064	-0.00097	0.212646	7.55858	18.1054	5.62499
							0.858064	0.009195	0.212646		18.1054	
							0.846617	0.017333	0.214681		18.1054	
							0.851195					
							0.869511					
							0.8718					
							0.864932					
92428	2	44	14	4600	188.5	146.25	0.864932	0.015299	0.216715	7.73436	18.1054	5.62499
							0.855774	0.013264	0.214681	7.73436	17.7539	7.03124
							0.842038	0.009195	0.212646		17.4023	
							0.839748	0.009195	0.212646		17.4023	
							0.83517					
							0.837459					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.837459					
							0.839748					
92429				4660	188	146.953	0.848906	0.009195	0.214681	7.73436	17.0508	8.08593
							0.858064	0.009195	0.214681	7.73436	17.0508	9.14061
							0.853485	0.009195	0.212646		16.875	
							0.844327	0.009195	0.214681		16.6992	
							0.848906					
							0.853485					
							0.855774					
							0.855774					
92430				4720	187.5	148.008	0.846617	0.009195	0.214681	7.73436	16.6992	9.84374
							0.846617	0.005126	0.214681	7.91014	16.5234	10.8984
							0.858064	0.005126	0.214681		16.3476	
							0.864932	0.003092	0.214681		16.1719	
							0.864932					
							0.855774					
							0.848906					
							0.844327					
92431				4772	187	148.711	0.837459	-0.00097	0.214681	7.73436	15.8203	11.9531
							0.83288	-0.00097	0.214681	7.73436	15.6445	12.3047
							0.83517	-0.00097	0.214681		15.4687	
							0.83288	-0.00301	0.216715		15.4687	
							0.837459					
							0.848906					
							0.853485					
							0.862642					
92432	2	44	18	4824	186.5	149.414	0.878668	-0.00301	0.21875	8.08593	15.4687	12.6562
							0.890115	-0.00097	0.222819	8.96483	15.6445	12.6562
							0.901562	-0.00097	0.228922		15.6445	
							0.917587	0.001057	0.228922		15.8203	
							0.929034					
							0.94277					
							0.956507					
							0.956507					
92433				4876	186	150.82	0.951928	0.003092	0.228922	9.14061	15.9961	12.3047
							0.94506	0.005126	0.230957	9.49217	15.9961	11.9531
							0.949639	0.001057	0.230957		15.9961	
							0.951928	0.001057	0.230957		15.9961	
							0.94506					
							0.94277					
							0.940481					
							0.935903					
92434				4920	185.5	151.875	0.935903	0.003092	0.228922	9.31639	15.8203	11.6015
							0.933613	0.009195	0.230957	9.31639	15.8203	11.9531
							0.926745	0.003092	0.230957		15.8203	
							0.931324	-0.00097	0.228922		15.8203	
							0.938192					
							0.94277					
							0.94735					
							0.956507					
92435				4968	185.5	152.93	0.956507	-0.00301	0.228922	9.49217	15.8203	13.0078
							0.956507	-0.00097	0.226888	9.31639	15.6445	13.7109

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.958796	-0.00301	0.222819		15.4687	
							0.94735	-0.00504	0.21875		15.1172	
							0.933613					
							0.917587					
							0.903851					
							0.876379					
92436	2	44	22	5008	185	153.633	0.858064	-0.00504	0.214681	8.61327	14.9414	13.7109
							0.846617	0.001057	0.214681	7.91014	14.414	13.7109
							0.83517	-0.00301	0.212646		14.0625	
							0.823723	-0.00301	0.210612		13.3594	
							0.816854					
							0.805408					
							0.800829					
							0.79854					
92437				5044	184.5	154.688	0.793961	-0.00504	0.210612	7.55858	13.1836	13.7109
							0.793961	-0.00708	0.212646	7.55858	13.0078	13.7109
							0.79854	-0.00504	0.214681		13.0078	
							0.807697	-0.00301	0.220784		13.0078	
							0.814565					
							0.826012					
							0.844327					
							0.869511					
92438				5076	185.5	155.742	0.890115	-0.00301	0.224853	8.61327	13.0078	14.0625
							0.90843	-0.00708	0.226888	9.31639	13.1836	14.414
							0.924456	-0.00301	0.232991		13.3594	
							0.938192	-0.00097	0.23706		13.5351	
							0.951928					
							0.967954					
							0.983979					
							0.993137					
92439				5112	186	157.5	1.00687	-0.00301	0.23706	10.0195	13.7109	15.4687
							1.00687	-0.00708	0.239095	10.1953	13.7109	16.5234
							1.00687	-0.00504	0.239095		13.7109	
							1.01374	-0.00708	0.239095		13.7109	
							1.01145					
							1.00687					
							1.00916					
							1.01145					
92440	2	44	26	5144	186.5	158.906	1.00687	-0.00708	0.23706	10.3711	13.7109	16.875
							1.00229	-0.00504	0.235026	10.0195	13.7109	16.875
							1.00001	-0.00708	0.235026		13.7109	
							1.00001	-0.00911	0.232991		13.5351	
							0.990848					
							0.988558					
							0.98169					
							0.970243					
92441				5172	186	160.664	0.963375	-0.01114	0.230957	9.84374	13.3594	16.875
							0.967954	-0.00504	0.232991	9.84374	13.3594	16.875
							0.965664	-0.00301	0.232991		13.1836	
							0.972533	-0.00097	0.232991		13.0078	
							0.977111					
							0.974822					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							0.970243					
							0.970243					
92442				5204	186.5	162.422	0.972533	-0.00097	0.230957	9.66795	13.0078	16.5234
							0.961086	-0.00504	0.228922	9.31639	12.832	16.1719
							0.954217	-0.00504	0.228922		12.832	
							0.94506	-0.00301	0.230957		12.6562	
							0.940481					
							0.94735					
							0.951928					
							0.961086					
92443				5232	187	164.18	0.963375	0.001057	0.232991	9.66795	12.6562	16.1719
							0.967954	0.007161	0.232991	10.0195	12.6562	16.1719
							0.98169	0.005126	0.23706		12.6562	
							0.986269	0.005126	0.239095		12.832	
							0.986269					
							1.00916					
							1.0229					
							1.02061					
92444	2	44	30	5260	187.5	165.938	1.02748	-0.00097	0.24113	10.3711	13.0078	16.1719
							1.0435	-0.00097	0.239095	10.3711	13.0078	16.1719
							1.05037	-0.00301	0.24113		13.1836	
							1.03892	-0.00911	0.239095		13.1836	
							1.03663					
							1.04121					
							1.03663					
							1.03435					
92445				5288	188.5	167.695	1.02977	-0.00097	0.23706	10.3711	13.1836	16.1719
							1.03206	0.007161	0.239095	10.3711	13.1836	16.5234
							1.03663	0.007161	0.239095		13.0078	
							1.03435	-0.00301	0.232991		13.0078	
							1.03663					
							1.02519					
							1.01603					
							1.01145					
92446				5320	189	169.102	0.990848	-0.00708	0.228922	9.84374	12.832	17.2265
							0.993137	-0.00504	0.230957	9.66795	12.6562	17.9297
							0.988558	-0.00301	0.228922		12.6562	
							0.979401	-0.00504	0.226888		12.4805	
							0.988558					
							0.979401					
							0.970243					
							0.970243					
92447				5344	189.5	170.859	0.972533	-0.00708	0.228922	9.31639	12.4805	18.2812
							0.979401	-0.00708	0.228922	9.49217	12.3047	20.039
							0.988558	-0.00708	0.228922		12.3047	
							0.995426	-0.00708	0.226888		12.1289	
							0.993137					
							0.995426					
							0.993137					
							0.993137					
92448	2	44	34	5372	191	172.266	1.00001	-0.00911	0.228922	9.49217	12.1289	21.4453
							1.00229	-0.00911	0.226888	9.14061	12.1289	22.8515

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.01145	-0.01725	0.224853		11.9531	
							0.993137	-0.01521	0.224853		11.9531	
							0.979401					
							0.988558					
							0.990848					
							0.983979					
92449				5396	192	174.727	0.990848	-0.01521	0.224853	9.31639	11.7773	23.5547
							0.988558	-0.01521	0.224853	9.31639	11.6015	24.2578
							0.993137	-0.01928	0.224853		11.6015	
							0.997715	-0.01725	0.222819		11.4258	
							0.993137					
							0.988558					
							0.993137					
							0.988558					
92450				5420	193.5	176.484	0.974822	-0.01521	0.220784	9.14061	11.25	24.6093
							0.963375	-0.02132	0.220784	8.96483	11.0742	26.0156
							0.963375	-0.01928	0.220784		11.0742	
							0.963375	-0.01928	0.220784		10.8984	
							0.958796					
							0.963375					
							0.972533					
							0.974822					
92451				5436	195	179.648	0.979401	-0.02335	0.220784	8.96483	10.7226	27.7734
							0.98169	-0.02539	0.220784	8.96483	10.3711	31.6406
							0.988558	-0.02539	0.220784		10.1953	
							1.00001	-0.02945	0.220784		10.1953	
							0.997715					
							0.995426					
							1.00229					
							1.00229					
92452	2	44	38	5452	196.5	182.812	1.00001	-0.03149	0.21875	8.96483	9.84374	35.1562
							0.997715	-0.03352	0.21875	8.78905	9.66795	38.6718
							0.997715	-0.03556	0.21875		9.49217	
							1.00001	-0.03556	0.21875		9.14061	
							1.00001					
							1.00001					
							1.00229					
							1.00916					
92453				5460	198.5	186.328	1.00687	-0.03352	0.21875	8.78905	8.78905	40.0781
							1.00916	-0.03352	0.21875	8.96483	8.26171	42.539
							1.01374	-0.02742	0.222819		8.08593	
							1.0229	-0.01928	0.220784		7.91014	
							1.04121					
							1.06411					
							1.07098					
							1.06411					
92454				5464	200.5	190.547	1.06411	-0.02335	0.222819	8.96483	7.3828	43.2421
							1.0664	-0.01928	0.226888	9.14061	7.03124	42.1874
							1.05953	-0.01114	0.228922		6.85546	
							1.06411	-0.00911	0.232991		6.67968	
							1.08013					
							1.08929					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUD ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.09845					
							1.12134					
92455				5468	202.5	194.766	1.13508	-0.01318	0.239095	9.66795	6.5039	41.8359
							1.15339	-0.00504	0.243164	10.3711	6.32812	43.5937
							1.17629	-0.00097	0.249267		6.32812	
							1.1946	-0.00301	0.253337		6.15233	
							1.21521					
							1.23352					
							1.25413					
							1.26557					
92456	2	44	42	5460	205.5	200.742	1.2816	-0.00301	0.255371	10.8984	5.97655	46.4062
							1.29305	-0.00911	0.253337	10.8984	5.80077	49.5702
							1.29534	-0.00911	0.253337		5.62499	
							1.3022	-0.01114	0.249267		5.44921	
							1.31594					
							1.31594					
							1.3022					
							1.29534					
92457				5452	207.5	205.312	1.27931	-0.01318	0.245198	10.5469	5.09765	51.6796
							1.27015	-0.01521	0.243164	10.3711	4.57031	52.3827
							1.27473	-0.01114	0.245198		4.39453	
							1.27702	-0.00911	0.24113		4.21874	
							1.27702					
							1.28847					
							1.27931					
							1.26328					
92458				5432	209.5	210.586	1.25184	-0.00911	0.239095	10.1953	3.51562	53.0859
							1.24497	-0.00708	0.23706	9.66795	3.16406	53.4374
							1.24955	-0.00911	0.235026		2.63671	
							1.24497	-0.00097	0.23706		2.28515	
							1.23352					
							1.2381					
							1.25184					
							1.26099					
92459				5408	212	215.156	1.26099	0.001057	0.23706	9.66795	1.75781	55.1952
							1.26328	0.001057	0.239095	9.49217	1.05469	56.2499
							1.25413	-0.00301	0.245198		0.878905	
							1.23352	-0.00097	0.255371		0.527343	
							1.2175					
							1.27015					
							1.34799					
							1.40751					
92460	2	44	46	5380	215	222.188	1.46017	-0.00301	0.269613	10.7226	0.527343	58.0077
							1.48306	-0.01114	0.277751	11.9531	0.351562	60.1171
							1.50367	-0.00301	0.289958		0	
							1.52656	0.001057	0.296061		-0.17578	
							1.54488					
							1.55861					
							1.58609					
							1.60898					
92461				5332	218.5	229.219	1.64332	-0.00097	0.298096	12.4805	-0.52734	63.6327
							1.65706	-0.00708	0.291992	12.4805	-1.05469	65.3905

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND:	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.65935	-0.00708	0.283854		-1.58203	
							1.63874	-0.00301	0.271647		-2.8125	
							1.60669					
							1.58838					
							1.56548					
							1.5403					
92462				5276	222	235.898	1.53114	-0.00301	0.269613	11.4258	-3.51562	68.9062
							1.52885	0.009195	0.269613	11.0742	-4.04296	71.3671
							1.53343	0.001057	0.265544		-5.09765	
							1.54488	-0.00911	0.269613		-5.62499	
							1.52198					
							1.51283					
							1.52656					
							1.54946					
92463				5204	225.5	242.578	1.57922	-0.00504	0.279785	10.8984	-6.15233	73.1249
							1.6044	-0.01318	0.289958	12.1289	-6.85546	74.1796
							1.6479	-0.01318	0.298096		-7.3828	
							1.70284	-0.01114	0.296061		-8.61327	
							1.74405					
							1.7761					
							1.78984					
							1.77839					
92464	2	44	50	5096	230.5	251.367	1.76237	-0.00911	0.28182	12.3047	-9.49217	77.6952
							1.73261	-0.00911	0.25944	10.7226	-9.84374	80.5077
							1.68224	-0.00504	0.239095		-11.7773	
							1.63187	-0.00301	0.222819		-12.6562	
							1.58151					
							1.52198					
							1.46246					
							1.40751					
92465				4972	236.5	255.586	1.36402	-0.00097	0.208577	8.43749	-13.7109	83.3202
							1.31594	0.003092	0.198405	6.5039	-15.2929	84.7264
							1.27931	0.009195	0.192301		-16.3476	
							1.25871	0.013264	0.190267		-18.457	
							1.24726					
							1.24039					
							1.24039					
							1.24726					
92466				4816	244.5	260.508	1.25184	0.015299	0.188232	6.15233	-19.3359	87.1874
							1.25871	0.017333	0.188232	5.80077	-20.7422	89.2967
							1.26328	0.017333	0.184163		-22.6757	
							1.27473	0.021403	0.180094		-23.7304	
							1.28618					
							1.29534					
							1.29762					
							1.27931					
92467				4628	254	265.078	1.27702	0.025471	0.17806	5.44921	-25.1367	91.4061
							1.27473	0.017333	0.173991	4.57031	-26.0156	92.8124
							1.26099	0.025471	0.165853		-27.0703	
							1.24726	0.02954	0.161784		-28.8281	
							1.22894					
							1.22665					

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.20605					
							1.18544					
92468	2	44	54	4388	264.5	270	1.174	0.03361	0.157715	3.86718	-29.707	95.2733
							1.14424	0.027506	0.151611	3.33984	-30.2343	96.6796
							1.14653	0.021403	0.145508		-31.1132	
							1.14881	0.021403	0.141439		-31.8164	
							1.14195					
							1.1511					
							1.15339					
							1.14195					
92469				4124	275.5	273.516	1.12821	0.019368	0.13737	2.98828	-33.0468	98.0858
							1.11676	0.019368	0.133301	2.10937	-33.9257	99.8436
							1.08929	0.025471	0.129232		-34.8046	
							1.06182	0.031575	0.127197		-36.5624	
							1.04121					
							1.01145					
							0.990848					
							0.979401					
92470				3820	289.5	277.031	0.965664	0.039713	0.123128	1.23047	-36.914	103.008
							0.958796	0.041747	0.119059	0.703124	-37.7929	105.469
							0.94735	0.047851	0.112956		-39.5507	
							0.954217	0.062093	0.104818		-40.2538	
							0.967954					
							0.983979					
							0.972533					
							0.915298					
92471				3508	306.5	279.844	0.826012	0.047851	0.104818	0	-41.3085	107.578
							0.718411	0.041747	0.112956	-2.63671	-41.6601	110.039
							0.560444	0.027506	0.108887		-42.0117	
							0.445975	0.047851	0.094645		-43.0663	
							0.365847					
							0.31777					
							0.352111					
							0.372715					
92472	2	44	58	3068	317.5	281.602	0.489473	0.009195	0.060059	-2.28515	-43.2421	111.094
							0.633704	-0.02742	0.053955	0.527343	-43.9452	98.0858
							0.752752	-0.0437	0.060059		-45.1757	
							0.855774	-0.03149	0.086507		-45.5273	
							0.997715					
							1.14195					
							1.2816					
							1.39607					
92473				2640	334	290.391	1.50596	-0.02335	0.100749	2.98828	-45.7031	78.7499
							1.52656	0.025471	0.092611	3.16406	-45.8788	60.4687
							1.54259	0.062093	0.102783		-45.8788	
							1.57006	0.098714	0.104818		-45.8788	
							1.58609					
							1.61585					
							1.65706					
							1.67079					
92474				2216	352	298.477	1.67079	0.121094	0.094645	2.8125	-45.7031	54.1405
							1.64561	0.123128	0.072266	2.28515	-45.3515	49.5702

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES	GMT SECONDS (SECOND	ALTITUDE (29 92) (FEET)	COMPUTE AIRSPD (KNOTS)	MAGNETI HEADING EFIS (DEG)	VERT ACCEL (G's)	LATERAL ACCEL (G's)	LONGITUI ACCEL (G's)	AOA (DEG)	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)
							1.67766	0.117025	0.045817		-44.9999	
							1.72116	0.100749	0.021403		-44.6484	
							1.68682					
							1.70056					
							1.68911					
							1.68911					
92475				1748	368.5	302.695	1.74176	0.098714	-0.00911	2.28515	-44.121	48.164
							1.79213	0.0743	-0.02132	3.33984	-43.4179	37.9687
							1.82189	0.055989	-0.03149		-42.7148	
							1.89057	0.049886	-0.02336		-41.4843	
							1.93178					
							1.94552					
							1.9501					
							1.97757					
92476	2	45	2	1320	382.5	306.914	2.08059	0.064127	-0.02336	3.51562	-40.6054	30.2343
							2.16759	0.094645	-0.03556	3.33984	-39.0234	22.8515
							2.25687	0.108887	-0.0498		-38.3203	
							2.25916	0.09261	-0.06608		-37.9687	
							2.23398					
							2.21338					
							2.14698					
							2.11722					
92477				904	395	309.023	2.09891	0.070231	-0.08236	2.63671	-36.914	23.9062
							2.07372	0.03361	-0.08032	3.51562	-36.2109	18.2812
							2.09662	0.049886	-0.06201		-35.332	
							2.21338	0.080403	-0.06405		-33.75	
							2.30953					
							2.41942					
							2.45605					
							2.43316					
92478				524	410	311.133	2.54534	0.106852	-0.0498	3.51562	-32.6953	14.0625
							2.60257	0.147542	-0.02336	4.92187	-30.5859	14.414
							2.72849	0.149577	0.017334		-29.8828	
							2.99405	0.131266	0.031575		-29.0039	
							3.30312					
							3.48169					
							3.69232					
							3.81594					
92479				180	416	315.703	3.96246	0.131266	0.023437	6.85546	-25.4882	19.3359
							3.8892	0.082438	-0.01929	5.44921	-24.4336	24.6093
							3.70147	0.076334	-0.05794		-23.7304	
							3.51832	0.117025	-0.07625		-23.2031	
							3.28023					
							3.05358					
							2.93224					
							2.76741					
92480												

Flash Air B737-300 Accident
Preliminary Data Created: January 20 2004
MCA

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ALT FLAPS (1-ARMED)	LE FLAP 1 EXTEND (0-EXTEND)	LE FLAP 1 INTRANSIT (0-INTRNS)	LE FLAP 2 EXTEND (0-EXTEND)	LE FLAP 2 INTRANSIT (0-INTRNS)	LE FLAP 3 EXTEND (0-EXTEND)	LE FLAP 3 INTRANSIT (0-INTRNS)	LE FLAP 4 EXTEND (0-EXTEND)	LE FLAP 4 INTRANSIT (0-INTRNS)	TE FLAP POSN FCC L L (DEG)	TE FLAP POSN FCC R (DEG)	TOO LOW FLAP (1-TRUE)	GEAR DN R (0-DOWN)	L GEAR DN (0-DOWN)	NOSE GEAR DN (0-DOWN)	LE SLAT 1 FULL EXTEND (0-FULEXT)	LE SLAT 1 INTRANSIT (0-INTRNS)	LE SLAT 1 MID EXTEND (0-MIDEXT)	LE SLAT 2 FULL EXTEND (0-FULEXT)	LE SLAT 2 INTRANSIT (0-INTRNS)	LE SLAT 2 MID EXTEND (0-MIDEXT)	LE SLAT 3 FULL EXTEND (0-FULEXT)	LE SLAT 3 INTRANSIT (0-INTRNS)	LE SLAT 3 MID EXTEND (0-MIDEXT)	LE SLAT 4 FULL EXTEND (0-FULLEXT)	LE SLAT 4 INTRANSIT (0-INTRNS)	LE SLAT 4 MID EXTEND (0-MIDEXT)	LE SLAT 5 FULL EXTEND (0-FULLEXT)	LE SLAT 5 INTRANSIT (0-INTRNS)	LE SLAT 5 MID EXTEND (0-MIDEXT)	LE SLAT 6 FULL EXTEND (0-FULLEXT)	LE SLAT 6 INTRANSIT (0-INTRNS)	LE SLAT 6 MID EXTEND (0-MIDEXT)
91864	2	34	50	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91865				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91866				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91867				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91868	2	34	54	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91869				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91870				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91871				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91872	2	34	58	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91873				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91874				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91875				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91876	2	35	2	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91877				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91878				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91879				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91880	2	35	6	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91881				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91882				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91883				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91884	2	35	10	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91885				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91886				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91887				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91888	2	35	14	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91889				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91890				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91891				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91892	2	35	18	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91893				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91894				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91895				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91896	2	35	22	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91897				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91898				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91899				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91900	2	35	26	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91901				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91902				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91903				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91904	2	35	30	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91905				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91906				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91907				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91908	2	35	34	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91909				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91910				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91911				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91912	2	35	38	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91913				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91914				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91915				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91916	2	35	42	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91917				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91918				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91919				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91920	2	35	46	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91921				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91922				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91923				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91924	2	35	50	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91925				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91926				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91927				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91928	2	35	54	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91929				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91930				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91931				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91932	2	35	58	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91933				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91934				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91935				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91936	2	36	2	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91937				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91938				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91939				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91940	2	36	6	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91941				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91942				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91943				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91944	2	36	10	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91945				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91946				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91947				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91948	2	36	14	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91949				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91950				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91951				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91952	2	36	18	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91953				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91954				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91955				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91956	2	36	22	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91957				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91958				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91959				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91960	2	36	26	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91961				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91962				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91963				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91964	2	36	30	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91965				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91966				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91967				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91968	2	36	34	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91969				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91970				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91971				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91972	2	36	38	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91973				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91974				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91975				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91976	2	36	42	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91977				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91978				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91979				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91980	2	36	46	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91981				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91982				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91983				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91984	2	36	50	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91985				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91986				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91987				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91988	2	36	54	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91989				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91990				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91991				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91992	2	36	58	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91993				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91994				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91995				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91996	2	37	2	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91997				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91998				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
91999				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92000	2	37	6	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92001				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92002				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92003				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92004	2	37	10	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92005				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92006				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92007				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92008	2	37	14	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ALT FLAPS (1-ARMED)	LE FLAP 1 EXTEND (0-EXTEND)	LE FLAP 1 INTRANSIT (0-INTRNS)	LE FLAP 2 EXTEND (0-EXTEND)	LE FLAP 2 INTRANSIT (0-INTRNS)	LE FLAP 3 EXTEND (0-EXTEND)	LE FLAP 3 INTRANSIT (0-INTRNS)	LE FLAP 4 EXTEND (0-EXTEND)	LE FLAP 4 INTRANSIT (0-INTRNS)	TE FLAP POSN FCC L L (DEG)	TE FLAP POSN FCC R (DEG)	TOO LOW FLAP (1-TRUE)	GEAR DN R (0-DOWN)	L GEAR DN (0-DOWN)	NOSE GEAR DN (0-DOWN)	LE SLAT 1 FULL EXTEND (0-FULEXT)	LE SLAT 1 INTRANSIT (0-INTRNS)	LE SLAT 1 MID EXTEND (0-MIDEXT)	LE SLAT 2 FULL EXTEND (0-FULEXT)	LE SLAT 2 INTRANSIT (0-INTRNS)	LE SLAT 2 MID EXTEND (0-MIDEXT)	LE SLAT 3 FULL EXTEND (0-FULEXT)	LE SLAT 3 INTRANSIT (0-INTRNS)	LE SLAT 3 MID EXTEND (0-MIDEXT)	LE SLAT 4 FULL EXTEND (0-FULLEXT)	LE SLAT 4 INTRANSIT (0-INTRNS)	LE SLAT 4 MID EXTEND (0-MIDEXT)	LE SLAT 5 FULL EXTEND (0-FULLEXT)	LE SLAT 5 INTRANSIT (0-INTRNS)	LE SLAT 5 MID EXTEND (0-MIDEXT)	LE SLAT 6 FULL EXTEND (0-FULLEXT)	LE SLAT 6 INTRANSIT (0-INTRNS)	LE SLAT 6 MID EXTEND (0-MIDEXT)
92009				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92010				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92011				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92012	2	37	18	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92013				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92014				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92015				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92016	2	37	22	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92017				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92018				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92019				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92020	2	37	26	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92021				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92022				216	45	.	.	.	.	.	.	.	.	.	0		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92023				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92024	2	37	30	216	45	.	.	.	.	.	.	.	.	.		0	.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92025				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92026				216	45	.	.	.	.	.	.	.	.	.	0.263672		.	DOWN			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92027				216	45	.	.	.	.	.	.	.	.	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92028	2	37	34	216	45	.	.	INTRNS	.	INTRNS	.	.	.	INTRNS		0.966797	.	DOWN			.	.	MIDEXT	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.	.	.	.	.	.	.
92029				216	45	.	.	INTRNS	.	INTRNS	.	INTRNS	.	INTRNS			.		DOWN	DOWN	.	INTRNS	MIDEXT	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.
92030				216	45	.	.	INTRNS	.	INTRNS	.	INTRNS	.	INTRNS	0.966797		.	DOWN			.	INTRNS	MIDEXT	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.
92031				216	45	.	EXTEND	.	.	INTRNS	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	INTRNS	MIDEXT	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.
92032	2	37	38	216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		1.05469	.	DOWN			.	.	MIDEXT	.	INTRNS	.	.	.	.	.	.	MIDEXT	.	INTRNS	.	.	.	MIDEXT
92033				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92034				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	1.31836		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92035				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92036	2	37	42	216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		1.49414	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92037				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92038				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	1.75781		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92039				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92040	2	37	46	216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		1.93359	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92041				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92042				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	1.93359		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92043				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92044	2	37	50	216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		2.90039	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92045				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92046				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92047				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92048	2	37	54	216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92049				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92050				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92051				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92052	2	37	58	216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92053				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92054				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92055				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92056	2	38	2	216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92057				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92058				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92059				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92060	2	38	6	216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92061				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92062				212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92063				216	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92064	2	38	10	212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92065				212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92066				212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92067				212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92068	2	38	14	212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92069				212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92070				212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92071				212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92072	2	38	18	212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92073				212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92074				212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92075				212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92076	2	38	22	212	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92077				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92078				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92079				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92080	2	38	26	208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92081				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92082				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92083				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92084	2	38	30	208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92085				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92086				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92087				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92088	2	38	34	208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92089				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92090				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92091				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92092	2	38	38	208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92093				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92094				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92095				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92096	2	38	42	208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92097				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92098				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92099				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92100	2	38	46	208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92101				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92102				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92103				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92104	2	38	50	204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92105				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92106				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92107				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92108	2	38	54	204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92109				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92110				208	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92111				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92112	2	38	58	204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92113				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92114				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92115				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92116	2	39	2	204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92117				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92118				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92119				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92120	2	39	6	204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92121				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92122				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92123				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92124	2	39	10	204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92125				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92126				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92127				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92128	2	39	14	204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92129				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92130				200	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92131				204	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92132	2	39	18	200	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92133				200	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92134				200	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92135				200	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92136	2	39	22	200	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92137				200	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92138				200	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92139				200	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92140	2	39	26	200	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92141				200	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92142				200	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92143				196	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92144	2	39	30	196	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92145				196	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92146				196	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92147				196	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92148	2	39	34	196	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92149				196	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92150				196	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92151				196	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92152	2	39	38	196	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92153				196	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92154				196	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92155				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92156	2	39	42	192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92157				196	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92158				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92159				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ALT FLAPS (1-ARMED)	LE FLAP 1 EXTEND (0-EXTEND)	LE FLAP 1 INTRANSIT (0-INTRNS)	LE FLAP 2 EXTEND (0-EXTEND)	LE FLAP 2 INTRANSIT (0-INTRNS)	LE FLAP 3 EXTEND (0-EXTEND)	LE FLAP 3 INTRANSIT (0-INTRNS)	LE FLAP 4 EXTEND (0-EXTEND)	LE FLAP 4 INTRANSIT (0-INTRNS)	TE FLAP POSN FCC L L (DEG)	TE FLAP POSN FCC R (DEG)	TOO LOW FLAP (1-TRUE)	GEAR DN R (0-DOWN)	L GEAR DN (0-DOWN)	NOSE GEAR DN (0-DOWN)	LE SLAT 1 FULL EXTEND (0-FULEXT)	LE SLAT 1 INTRANSIT (0-INTRNS)	LE SLAT 1 MID EXTEND (0-MIDEXT)	LE SLAT 2 FULL EXTEND (0-FULEXT)	LE SLAT 2 INTRANSIT (0-INTRNS)	LE SLAT 2 MID EXTEND (0-MIDEXT)	LE SLAT 3 FULL EXTEND (0-FULEXT)	LE SLAT 3 INTRANSIT (0-INTRNS)	LE SLAT 3 MID EXTEND (0-MIDEXT)	LE SLAT 4 FULL EXTEND (0-FULLEXT)	LE SLAT 4 INTRANSIT (0-INTRNS)	LE SLAT 4 MID EXTEND (0-MIDEXT)	LE SLAT 5 FULL EXTEND (0-FULLEXT)	LE SLAT 5 INTRANSIT (0-INTRNS)	LE SLAT 5 MID EXTEND (0-MIDEXT)	LE SLAT 6 FULL EXTEND (0-FULLEXT)	LE SLAT 6 INTRANSIT (0-INTRNS)	LE SLAT 6 MID EXTEND (0-MIDEXT)
92160	2	39	46	192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92161				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92162				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92163				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92164	2	39	50	192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92165				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92166				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92167				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92168	2	39	54	192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92169				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92170				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92171				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92172	2	39	58	192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92173				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92174				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92175				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92176	2	40	2	192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92177				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92178				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92179				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92180	2	40	6	192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92181				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92182				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92183				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92184	2	40	10	192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92185				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92186				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92187				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92188	2	40	14	188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92189				192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92190				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92191				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92192	2	40	18	188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92193				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92194				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92195				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92196	2	40	22	188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92197				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92198				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92199				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92200	2	40	26	188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92201				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92202				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92203				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92204	2	40	30	188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92205				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92206				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92207				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92208	2	40	34	188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92209				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92210				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92211				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92212	2	40	38	188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92213				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92214				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92215				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92216	2	40	42	188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92217				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92218				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92219				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92220	2	40	46	188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92221				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92222				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92223				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92224	2	40	50	188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92225				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92226				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92227				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92228	2	40	54	184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92229				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92230				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92231				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92232	2	40	58	184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92233				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92234				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92235				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92236	2	41	2	184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92237				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92238				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92239				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92240	2	41	6	184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92241				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92242				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92243				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92244	2	41	10	184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92245				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92246				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92247				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92248	2	41	14	184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92249				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92250				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92251				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92252	2	41	18	184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92253				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92254				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92255				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92256	2	41	22	184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92257				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92258				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92259				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92260	2	41	26	180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92261				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92262				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92263				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92264	2	41	30	180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92265				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92266				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92267				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92268	2	41	34	180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92269				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92270				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92271				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92272	2	41	38	180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92273				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92274				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92275				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92276	2	41	42	180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92277				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92278				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92279				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92280	2	41	46	180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92281				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92282				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92283				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92284	2	41	50	180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92285				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92286				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92287				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92288	2	41	54	180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92289				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92290				180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92291				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92292	2	41	58	180	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92293				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92294				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92295				184	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92296	2	42	2	188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92297				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92298				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92299				188	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92300	2	42	6	192	45	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92301				192	45.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92302				192	49.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92303				196	56	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92304	2	42	10	196	61	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92305				196	65	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92306				196	70	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92307				200	75.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92308	2	42	14	200	78.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92309				200	83.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92310				200	89	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ALT FLAPS (1-ARMED)	LE FLAP 1 EXTEND (0-EXTEND)	LE FLAP 1 INTRANSIT (0-INTRNS)	LE FLAP 2 EXTEND (0-EXTEND)	LE FLAP 2 INTRANSIT (0-INTRNS)	LE FLAP 3 EXTEND (0-EXTEND)	LE FLAP 3 INTRANSIT (0-INTRNS)	LE FLAP 4 EXTEND (0-EXTEND)	LE FLAP 4 INTRANSIT (0-INTRNS)	TE FLAP POSN FCC L L (DEG)	TE FLAP POSN FCC R (DEG)	TOO LOW FLAP (1-TRUE)	GEAR DN R (0-DOWN)	L GEAR DN (0-DOWN)	NOSE GEAR DN (0-DOWN)	LE SLAT 1 FULL EXTEND (0-FULEXT)	LE SLAT 1 INTRANSIT (0-INTRNS)	LE SLAT 1 MID EXTEND (0-MIDEXT)	LE SLAT 2 FULL EXTEND (0-FULEXT)	LE SLAT 2 INTRANSIT (0-INTRNS)	LE SLAT 2 MID EXTEND (0-MIDEXT)	LE SLAT 3 FULL EXTEND (0-FULEXT)	LE SLAT 3 INTRANSIT (0-INTRNS)	LE SLAT 3 MID EXTEND (0-MIDEXT)	LE SLAT 4 FULL EXTEND (0-FULLEXT)	LE SLAT 4 INTRANSIT (0-INTRNS)	LE SLAT 4 MID EXTEND (0-MIDEXT)	LE SLAT 5 FULL EXTEND (0-FULLEXT)	LE SLAT 5 INTRANSIT (0-INTRNS)	LE SLAT 5 MID EXTEND (0-MIDEXT)	LE SLAT 6 FULL EXTEND (0-FULLEXT)	LE SLAT 6 INTRANSIT (0-INTRNS)	LE SLAT 6 MID EXTEND (0-MIDEXT)
92311				200	93	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92312	2	42	18	200	97.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92313				204	101	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92314				204	106.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92315				204	109.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92316	2	42	22	204	115.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92317				204	119.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92318				204	123.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92319				208	127.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92320	2	42	26	208	131.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92321				208	135.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92322				208	139	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92323				204	142.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92324	2	42	30	204	146	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92325				196	150	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92326				192	152	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92327				192	155.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92328	2	42	34	196	159	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92329				208	162	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		DOWN	DOWN	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92330				220	165.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	DOWN			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92331				240	167.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92332	2	42	38	268	169.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92333				300	171.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92334				328	172	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92335				364	173	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92336	2	42	42	400	174	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92337				440	174.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92338				480	176	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92339				512	176.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92340	2	42	46	548	177	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92341				584	178	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92342				616	178.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92343				652	179	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92344	2	42	50	688	178.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92345				720	179.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92346				756	179.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92347				792	180	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92348	2	42	54	832	180	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92349				868	181	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92350				904	180.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92351				940	181.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92352	2	42	58	976	181	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92353				1016	181.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92354				1052	181.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92355				1096	183	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92356	2	43	2	1136	183	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92357				1180	184	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92358				1220	184	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92359				1268	184	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92360	2	43	6	1312	184	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.92187	.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92361				1352	183	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92362				1396	184	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	4.92187		.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92363				1440	184	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92364	2	43	10	1484	183.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		4.04297	.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92365				1528	183	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92366				1576	183.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	2.28516		.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92367				1624	183	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92368	2	43	14	1668	182.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		1.93359	.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92369				1708	183	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92370				1748	183.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	1.8457		.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92371				1784	184.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92372	2	43	18	1816	185.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		1.58203	.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92373				1844	186.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92374				1868	187.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	1.40625		.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92375				1892	188.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92376	2	43	22	1912	190	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		1.14258	.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92377				1932	191.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92378				1948	193	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.	0.966797		.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92379				1964	194.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92380	2	43	26	1980	196.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.		0.966797	.	UP			.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92381				2000	198.5	.	EXTEND	.	EXTEND	.	EXTEND	.	EXTEND	.			.		UP	UP	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92382				2020	200.5	.	.	.	EXTEND	.	EXTEND	.	EXTEND	.	0.791015		.	UP			.	.	MIDEXT	.	INTRNS	.	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT	.	.	MIDEXT
92383				2040	202	.	.	INTRNS	.	INTRNS	.	INTRNS	.	INTRNS			.		UP	UP	.	INTRNS	MIDEXT	.	INTRNS	.	.	INTRNS	MIDEXT	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.
92384	2	43	30	2064	203.5	.	.	INTRNS	.	INTRNS	.	INTRNS	.	INTRNS		0.08789	.	UP			.	INTRNS	MIDEXT	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.
92385				2084	205	.	.	INTRNS	.	INTRNS	.	INTRNS	.	INTRNS			.		UP	UP	.	INTRNS	MIDEXT	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.	.	INTRNS	.
92386				2112	206	.	.	INTRNS	.	INTRNS	.	.	.	INTRNS	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92387				2136	207.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92388	2	43	34	2168	208.5	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92389				2196	209	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92390				2224	210.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92391				2252	212	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92392	2	43	38	2284	213.5	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92393				2320	214.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92394				2352	215.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92395				2392	215.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92396	2	43	42	2432	216	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92397				2472	216.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92398				2520	216.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92399				2572	217	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92400	2	43	46	2624	216.5	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92401				2676	216.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92402				2728	216	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92403				2784	216.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92404	2	43	50	2840	217	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92405				2892	217	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92406				2948	216.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92407				3004	216.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92408	2	43	54	3064	216	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92409				3124	216	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92410				3188	214.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92411				3252	214	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92412	2	43	58	3320	213.5	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92413				3392	212	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92414				3468	209.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92415				3544	209.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92416	2	44	2	3624	207	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92417				3712	206	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92418				3796	204.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92419				3880	203	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92420	2	44	6	3964	201	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92421				4056	199	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92422				4136	196.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92423				4220	194.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92424	2	44	10	4308	195	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92425				4388	192	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92426				4460	190	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92427				4532	190	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92428	2	44	14	4600	188.5	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92429				4660	188	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92430				4720	187.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92431				4772	187	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92432	2	44	18	4824	186.5	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92433				4876	186	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92434				4920	185.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92435				4968	185.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92436	2	44	22	5008	185	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92437				5044	184.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92438				5076	185.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92439				5112	186	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92440	2	44	26	5144	186.5	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92441				5172	186	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92442				5204	186.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92443				5232	187	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92444	2	44	30	5260	187.5	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92445				5288	188.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92446				5320	189	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92447				5344	189.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92448	2	44	34	5372	191	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92449				5396	192	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92450				5420	193.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92451				5436	195	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92452	2	44	38	5452	196.5	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92453				5460	198.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92454				5464	200.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92455				5468	202.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92456	2	44	42	5460	205.5	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92457				5452	207.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92458				5432	209.5	.	.	.	.	.	.	.	.	.	0		.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92459				5408	212	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92460	2	44	46	5380	215	.	.	.	.	.	.	.	.	.		0	.	UP			.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92461				5332	218.5	.	.	.	.	.	.	.	.	.			.		UP	UP	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ALT FLAPS (1-ARMED)	LE FLAP 1 EXTEND (0-EXTEND)	LE FLAP 1 INTRANSIT (0-INTRNS)	LE FLAP 2 EXTEND (0-EXTEND)	LE FLAP 2 INTRANSIT (0-INTRNS)	LE FLAP 3 EXTEND (0-EXTEND)	LE FLAP 3 INTRANSIT (0-INTRNS)	LE FLAP 4 EXTEND (0-EXTEND)	LE FLAP 4 INTRANSIT (0-INTRNS)	TE FLAP POSN FCC L L (DEG)	TE FLAP POSN FCC R (DEG)	TOO LOW FLAP (1-TRUE)	GEAR DN R (0-DOWN)	L GEAR DN (0-DOWN)	NOSE GEAR DN (0-DOWN)
92462				5276	222	.	.	.	.	.	.	.	.	.	0		.	UP		
92463				5204	225.5	.	.	.	.	.	.	.	.	.			.		UP	UP
92464	2	44	50	5096	230.5	.	.	.	.	.	.	.	.	.		0	.	UP		
92465				4972	236.5	.	.	.	.	.	.	.	.	.			.		UP	UP
92466				4816	244.5	.	.	.	.	.	.	.	.	.	0		.	UP		
92467				4628	254	.	.	.	.	.	.	.	.	.			.		UP	UP
92468	2	44	54	4388	264.5	.	.	.	.	.	.	.	.	.		0	.	UP		
92469				4124	275.5	.	.	.	.	.	.	.	.	.			.		UP	UP
92470				3820	289.5	.	.	.	.	.	.	.	.	.	0		.	UP		
92471				3508	306.5	.	.	.	.	.	.	.	.	.			.		UP	UP
92472	2	44	58	3068	317.5	.	.	.	.	.	.	.	.	.		0	.	UP		
92473				2640	334	.	.	.	.	.	.	.	.	.			.		UP	UP
92474				2216	352	.	.	.	.	.	.	.	.	.	0		.	UP		
92475				1748	368.5	.	.	.	.	.	.	.	.	.			.		UP	UP
92476	2	45	2	1320	382.5	.	.	.	.	.	.	.	.	.		0	.	UP		
92477				904	395	.	.	.	.	.	.	.	.	.			.		UP	UP
92478				524	410	.	.	.	.	.	.	.	.	.	0		.	UP		
92479				180	416	.	.	.	.	.	.	.	.	.			.		UP	UP
92480																				

Time (seconds)	LE SLAT 1 FULL EXTEND (0-FULEXT)	LE SLAT 1 INTRANSIT (0-INTRNS)	LE SLAT 1 MID EXTEND (0-MIDEXT)	LE SLAT 2 FULL EXTEND (0-FULEXT)	LE SLAT 2 INTRANSIT (0-INTRNS)	LE SLAT 2 MID EXTEND (0-MIDEXT)	LE SLAT 3 FULL EXTEND (0-FULEXT)	LE SLAT 3 INTRANSIT (0-INTRNS)	LE SLAT 3 MID EXTEND (0-MIDEXT)	LE SLAT 4 FULL EXTEND (0-FULLEXT)	LE SLAT 4 INTRANSIT (0-INTRNS)	LE SLAT 4 MID EXTEND (0-MIDEXT)	LE SLAT 5 FULL EXTEND (0-FULLEXT)	LE SLAT 5 INTRANSIT (0-INTRNS)	LE SLAT 5 MID EXTEND (0-MIDEXT)	LE SLAT 6 FULL EXTEND (0-FULLEXT)	LE SLAT 6 INTRANSIT (0-INTRNS)	LE SLAT 6 MID EXTEND (0-MIDEXT)
92462	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92463	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92464	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92465	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92466	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92467	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92468	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92469	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92470	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92471	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92472	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92473	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92474	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92475	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92476	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92477	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92478	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92479	.	.	MIDEXT	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
92480																		

Flash Air B737-300 Accident
Preliminary Data Created: January 20 2004
MCA

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	OIL PRES L (PSI)	OIL PRES R (PSI)	HYD OIL PRES A (PSI)	HYD OIL PRES B (PSI)	EVENT MARKER (RESV) (0-EVENT 1-.)	RADIO HEIGHT EFIS (FEET)	SINK RATE (0-. 1-TRUE)	DONT SINK (0-. 1-TRUE)	PULL UP (0-. 1-TRUE)	TERRAIN PULL UP (0-FALSE 1-TRUE)	TERRAIN (0-. 1-TRUE)	TOO LOW TERRAIN (0-. 1-TRUE)	TOO LOW GEAR (0-. 1-TRUE)	TOO LOW FLAP (0-. 1-TRUE)	G/S DEV EFIS (DDM)	G/S ENGA FCC (0-. 1-ENGA)	G/S GPWS (0-. 1-TRUE)	MINIMUMS (0-. 1-TRUE)	WINDSHEAR (0-FALSE 1-TRUE)	WINDSHEAR CAUTN (0-FALSE 1-TRUE)
91864	2	34	50	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91865				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91866				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91867				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91868	2	34	54	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91869				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91870				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91871				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91872	2	34	58	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91873				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91874				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91875				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91876	2	35	2	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91877				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91878				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91879				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91880	2	35	6	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91881				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91882				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91883				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91884	2	35	10	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91885				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91886				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91887				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91888	2	35	14	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91889				216	45		2	3272		.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91890				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91891				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91892	2	35	18	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91893				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91894				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91895				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91896	2	35	22	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91897				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91898				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91899				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91900	2	35	26	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91901				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91902				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91903				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91904	2	35	30	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91905				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91906				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91907				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91908	2	35	34	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91909				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91910				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91911				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91912	2	35	38	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91913				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91914				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91915				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91916	2	35	42	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91917				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91918				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91919				216	45	2			3272	.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91920	2	35	46	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91921				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91922				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91923				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91924	2	35	50	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91925				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91926				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91927				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91928	2	35	54	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91929				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91930				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91931				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91932	2	35	58	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91933				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91934				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91935				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91936	2	36	2	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91937				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91938				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91939				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91940	2	36	6	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91941				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91942				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91943				216	45	2				.	-5	.	.	.	FALSE	.	.	.	.	-0.21171	.	.	.	FALSE	FALSE
91944	2	36	10	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24062	.	.	.	FALSE	FALSE
91945				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91946				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91947				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91948	2	36	14	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91949				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91950				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91951				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91952	2	36	18	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	OIL PRES L	OIL PRES R	HYD OIL PRES A	HYD OIL PRES B	EVENT MARKER (RESV)	RADIO HEIGHT EFIS	SINK RATE	DONT SINK	PULL UP	TERRAIN PULL UP	TERRAIN	TOO LOW TERRAIN	TOO LOW GEAR	TOO LOW FLAP	G/S DEV EFIS	G/S ENGA FCC	G/S GPWS	MINIMUMS	WINDSHEAR	WINDSHEAR CAUTN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	(PSI)	(PSI)	(PSI)	(PSI)	(0-EVENT 1-.)	(FEET)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-FALSE 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(DDM)	(0-. 1-ENGA)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-FALSE 1-TRUE)	(0-FALSE 1-TRUE)
91953				216	45		2	3272		.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91954				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91955				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91956	2	36	22	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91957				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91958				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91959				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91960	2	36	26	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91961				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91962				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91963				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91964	2	36	30	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91965				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91966				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91967				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91968	2	36	34	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91969				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91970				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91971				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91972	2	36	38	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91973				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91974				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91975				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91976	2	36	42	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91977				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91978				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91979				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91980	2	36	46	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91981				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91982				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91983				216	45	2			3272	.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91984	2	36	50	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91985				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91986				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91987				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91988	2	36	54	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91989				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91990				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91991				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91992	2	36	58	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91993				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91994				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91995				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91996	2	37	2	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91997				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91998				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
91999				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92000	2	37	6	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92001				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92002				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92003				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92004	2	37	10	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92005				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92006				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92007				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92008	2	37	14	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92009				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92010				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92011				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92012	2	37	18	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92013				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92014				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92015				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92016	2	37	22	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92017				216	45		2	3272		.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92018				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92019				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92020	2	37	26	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92021				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92022				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92023				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92024	2	37	30	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92025				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92026				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92027				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92028	2	37	34	216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92029				216	45		2			.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92030				216	45					.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92031				216	45	2				.	-4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92032	2	37	38	216	45					.	-3	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92033				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92034				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92035				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92036	2	37	42	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92037				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92038				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92039				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92040	2	37	46	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92041				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92042				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92043				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92044	2	37	50	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92045				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92046				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92047				216	45	2			3124	.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	OIL PRES L	OIL PRES R	HYD OIL PRES A	HYD OIL PRES B	EVENT MARKER (RESV)	RADIO HEIGHT EFIS	SINK RATE	DONT SINK	PULL UP	TERRAIN PULL UP	TERRAIN	TOO LOW TERRAIN	TOO LOW GEAR	TOO LOW FLAP	G/S DEV EFIS	G/S ENGA FCC	G/S GPWS	MINIMUMS	WINDSHEAR	WINDSHEAR CAUTN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	(PSI)	(PSI)	(PSI)	(PSI)	(0-EVENT 1-.)	(FEET)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-FALSE 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(DDM)	(0-. 1-ENGA)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-FALSE 1-TRUE)	(0-FALSE 1-TRUE)
92048	2	37	54	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92049				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92050				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92051				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92052	2	37	58	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92053				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92054				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92055				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92056	2	38	2	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92057				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92058				216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92059				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92060	2	38	6	216	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92061				216	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92062				212	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92063				216	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92064	2	38	10	212	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92065				212	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92066				212	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92067				212	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92068	2	38	14	212	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92069				212	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92070				212	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92071				212	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92072	2	38	18	212	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92073				212	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92074				212	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92075				212	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92076	2	38	22	212	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92077				208	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92078				208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92079				208	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92080	2	38	26	208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92081				208	45		2	3272		.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92082				208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92083				208	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92084	2	38	30	208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92085				208	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92086				208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92087				208	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92088	2	38	34	208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92089				208	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92090				208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92091				208	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92092	2	38	38	208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92093				208	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92094				208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92095				208	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92096	2	38	42	208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92097				208	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92098				208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92099				208	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92100	2	38	46	208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92101				208	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92102				208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92103				204	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92104	2	38	50	204	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92105				204	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92106				204	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92107				204	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92108	2	38	54	204	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92109				204	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92110				208	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92111				204	45	2			3248	.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92112	2	38	58	204	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92113				204	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92114				204	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92115				204	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92116	2	39	2	204	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92117				204	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92118				204	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92119				204	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92120	2	39	6	204	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92121				204	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92122				204	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92123				204	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92124	2	39	10	204	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92125				204	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92126				204	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92127				204	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92128	2	39	14	204	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92129				204	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92130				200	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92131				204	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92132	2	39	18	200	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92133				200	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92134				200	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92135				200	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92136	2	39	22	200	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92137				200	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92138				200	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92139				200	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92140	2	39	26	200	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92141				200	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92142				200	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	OIL PRES L	OIL PRES R	HYD OIL PRES A	HYD OIL PRES B	EVENT MARKER (RESV)	RADIO HEIGHT EFIS	SINK RATE	DONT SINK	PULL UP	TERRAIN PULL UP	TERRAIN	TOO LOW TERRAIN	TOO LOW GEAR	TOO LOW FLAP	G/S DEV EFIS	G/S ENGA FCC	G/S GPWS	MINIMUMS	WINDSHEAR	WINDSHEAR CAUTN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	(PSI)	(PSI)	(PSI)	(PSI)	(0-EVENT 1-.)	(FEET)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-FALSE 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(DDM)	(0-. 1-ENGA)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-FALSE 1-TRUE)	(0-FALSE 1-TRUE)
92143				196	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92144	2	39	30	196	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92145				196	45		2	3272		.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92146				196	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92147				196	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92148	2	39	34	196	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92149				196	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92150				196	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92151				196	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92152	2	39	38	196	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92153				196	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92154				196	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92155				192	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92156	2	39	42	192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92157				196	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92158				192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92159				192	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92160	2	39	46	192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92161				192	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92162				192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92163				192	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92164	2	39	50	192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92165				192	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92166				192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92167				192	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92168	2	39	54	192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92169				192	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92170				192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92171				192	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92172	2	39	58	192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92173				192	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92174				192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92175				192	45	2			3248	.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92176	2	40	2	192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92177				192	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92178				192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92179				192	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92180	2	40	6	192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92181				188	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92182				192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92183				192	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92184	2	40	10	192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92185				188	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92186				192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92187				192	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92188	2	40	14	188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92189				192	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92190				188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92191				188	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92192	2	40	18	188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92193				188	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92194				188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92195				188	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92196	2	40	22	188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92197				188	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92198				188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92199				188	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92200	2	40	26	188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92201				188	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92202				188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92203				188	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92204	2	40	30	188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92205				188	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92206				188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92207				188	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92208	2	40	34	188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92209				188	45		2	3272		.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92210				188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92211				188	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92212	2	40	38	188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92213				188	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92214				188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92215				184	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92216	2	40	42	188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92217				188	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92218				188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92219				188	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92220	2	40	46	188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92221				188	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92222				184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92223				188	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92224	2	40	50	188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92225				184	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92226				184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92227				184	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92228	2	40	54	184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92229				184	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92230				184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92231				184	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92232	2	40	58	184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92233				184	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92234				184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92235				184	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92236	2	41	2	184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92237				184	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	OIL PRES L	OIL PRES R	HYD OIL PRES A	HYD OIL PRES B	EVENT MARKER (RESV)	RADIO HEIGHT EFIS	SINK RATE	DONT SINK	PULL UP	TERRAIN PULL UP	TERRAIN	TOO LOW TERRAIN	TOO LOW GEAR	TOO LOW FLAP	G/S DEV EFIS	G/S ENGA FCC	G/S GPWS	MINIMUMS	WINDSHEAR	WINDSHEAR CAUTN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	(PSI)	(PSI)	(PSI)	(PSI)	(0-EVENT 1-.)	(FEET)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-FALSE 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(DDM)	(0-. 1-ENGA)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-FALSE 1-TRUE)	(0-FALSE 1-TRUE)
92238				184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92239				184	45	2			3248	.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92240	2	41	6	184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92241				184	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92242				184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92243				184	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92244	2	41	10	184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92245				184	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92246				184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92247				184	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92248	2	41	14	184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92249				184	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92250				184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92251				184	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92252	2	41	18	184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92253				184	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92254				184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92255				184	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92256	2	41	22	184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92257				184	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92258				184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92259				180	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92260	2	41	26	180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92261				180	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92262				180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92263				180	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92264	2	41	30	180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92265				180	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92266				180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92267				180	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92268	2	41	34	180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92269				180	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92270				180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92271				180	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92272	2	41	38	180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92273				180	45		2	3272		.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92274				180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92275				180	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92276	2	41	42	180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92277				180	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92278				180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92279				180	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92280	2	41	46	180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92281				180	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92282				180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92283				180	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92284	2	41	50	180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92285				180	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92286				180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92287				180	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92288	2	41	54	180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92289				180	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92290				180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92291				184	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92292	2	41	58	180	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92293				184	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92294				184	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92295				184	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92296	2	42	2	188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92297				188	45		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92298				188	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92299				188	45	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92300	2	42	6	192	45					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92301				192	45.5		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92302				192	49.5					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92303				196	56	2			3248	.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92304	2	42	10	196	61					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92305				196	65		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92306				196	70					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92307				200	75.5	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92308	2	42	14	200	78.5					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92309				200	83.5		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92310				200	89					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92311				200	93	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92312	2	42	18	200	97.5					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92313				204	101		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92314				204	106.5					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92315				204	109.5	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92316	2	42	22	204	115.5					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92317				204	119.5		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92318				204	123.5					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92319				208	127.5	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92320	2	42	26	208	131.5					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92321				208	135.5		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92322				208	139					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92323				204	142.5	2				.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92324	2	42	30	204	146					.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92325				196	150		2			.	-2	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92326				192	152					.	0	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92327				192	155.5	2				.	0	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92328	2	42	34	196	159					.	4	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92329				208	162		2			.	8	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92330				220	165.5					.	15	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92331				240	167.5	2				.	24	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92332	2	42	38	268	169.5					.	42	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	OIL PRES L	OIL PRES R	HYD OIL PRES A	HYD OIL PRES B	EVENT MARKER (RESV)	RADIO HEIGHT EFIS	SINK RATE	DONT SINK	PULL UP	TERRAIN PULL UP	TERRAIN	TOO LOW TERRAIN	TOO LOW GEAR	TOO LOW FLAP	G/S DEV EFIS	G/S ENGA FCC	G/S GPWS	MINIMUMS	WINDSHEAR	WINDSHEAR CAUTN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	(PSI)	(PSI)	(PSI)	(PSI)	(0-EVENT 1-.)	(FEET)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-FALSE 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(DDM)	(0-. 1-ENGA)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-FALSE 1-TRUE)	(0-FALSE 1-TRUE)
92333				300	171.5		2			.	64	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92334				328	172					.	97	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92335				364	173	2				.	138	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92336	2	42	42	400	174					.	175	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92337				440	174.5		2	3248		.	218	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92338				480	176					.	255	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92339				512	176.5	2				.	298	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92340	2	42	46	548	177					.	333	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92341				584	178		2			.	371	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92342				616	178.5					.	403	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92343				652	179	2				.	443	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92344	2	42	50	688	178.5					.	473	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92345				720	179.5		2			.	515	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92346				756	179.5					.	552	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92347				792	180	2				.	594	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92348	2	42	54	832	180					.	632	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92349				868	181		2			.	677	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92350				904	180.5					.	719	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92351				940	181.5	2				.	757	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92352	2	42	58	976	181					.	790	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92353				1016	181.5		2			.	838	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92354				1052	181.5					.	877	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92355				1096	183	2				.	933	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92356	2	43	2	1136	183					.	974	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92357				1180	184		2			.	1027	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92358				1220	184					.	1058	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92359				1268	184	2				.	1102	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92360	2	43	6	1312	184					.	1150	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92361				1352	183		2			.	1209	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92362				1396	184					.	1275	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92363				1440	184	2				.	1308	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92364	2	43	10	1484	183.5					.	1359	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92365				1528	183		2			.	1406	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92366				1576	183.5					.	1466	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92367				1624	183	2			3200	.	1522	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92368	2	43	14	1668	182.5					.	1556	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92369				1708	183		2			.	1615	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92370				1748	183.5					.	1648	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92371				1784	184.5	2				.	1694	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92372	2	43	18	1816	185.5					.	1701	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92373				1844	186.5		2			.	1709	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92374				1868	187.5					.	1751	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92375				1892	188.5	2				.	1776	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92376	2	43	22	1912	190					.	1841	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92377				1932	191.5		2			.	1838	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92378				1948	193					.	1866	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92379				1964	194.5	2				.	1880	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92380	2	43	26	1980	196.5					.	1902	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92381				2000	198.5		2			.	1930	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92382				2020	200.5					.	1940	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92383				2040	202	2				.	1960	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92384	2	43	30	2064	203.5					.	1966	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92385				2084	205		2			.	1987	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92386				2112	206					.	2004	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92387				2136	207.5	2				.	2045	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92388	2	43	34	2168	208.5					.	2088	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92389				2196	209		2			.	2133	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92390				2224	210.5					.	2132	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92391				2252	212	2				.	2205	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92392	2	43	38	2284	213.5					.	2259	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92393				2320	214.5		2			.	2322	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92394				2352	215.5					.	2378	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92395				2392	215.5	2				.	2419	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92396	2	43	42	2432	216					.	2432	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92397				2472	216.5		2			.	2480	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92398				2520	216.5					.	2508	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92399				2572	217	2				.	2561	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92400	2	43	46	2624	216.5					.	2590	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92401				2676	216.5		2	3300		.	2628	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92402				2728	216					.	2629	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92403				2784	216.5	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92404	2	43	50	2840	217					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92405				2892	217		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92406				2948	216.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92407				3004	216.5	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92408	2	43	54	3064	216					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92409				3124	216		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92410				3188	214.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92411				3252	214	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92412	2	43	58	3320	213.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92413				3392	212		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92414				3468	209.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92415				3544	209.5	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92416	2	44	2	3624	207					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92417				3712	206		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92418				3796	204.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92419				3880	203	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92420	2	44	6	3964	201					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92421				4056	199		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92422				4136	196.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92423				4220	194.5	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92424	2	44	10	4308	195					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92425				4388	192		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92426				4460	190					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92427				4532	190	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	OIL PRES L	OIL PRES R	HYD OIL PRES A	HYD OIL PRES B	EVENT MARKER (RESV)	RADIO HEIGHT EFIS	SINK RATE	DONT SINK	PULL UP	TERRAIN PULL UP	TERRAIN	TOO LOW TERRAIN	TOO LOW GEAR	TOO LOW FLAP	G/S DEV EFIS	G/S ENGA FCC	G/S GPWS	MINIMUMS	WINDSHEAR	WINDSHEAR CAUTN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	(PSI)	(PSI)	(PSI)	(PSI)	(0-EVENT 1-.)	(FEET)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-FALSE 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-. 1-TRUE)	(DDM)	(0-. 1-ENGA)	(0-. 1-TRUE)	(0-. 1-TRUE)	(0-FALSE 1-TRUE)	(0-FALSE 1-TRUE)
92428	2	44	14	4600	188.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92429				4660	188		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92430				4720	187.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92431				4772	187	2			3248	.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92432	2	44	18	4824	186.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92433				4876	186		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92434				4920	185.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92435				4968	185.5	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92436	2	44	22	5008	185					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92437				5044	184.5		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92438				5076	185.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92439				5112	186	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92440	2	44	26	5144	186.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92441				5172	186		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92442				5204	186.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92443				5232	187	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92444	2	44	30	5260	187.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92445				5288	188.5		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92446				5320	189					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92447				5344	189.5	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92448	2	44	34	5372	191					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92449				5396	192		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92450				5420	193.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92451				5436	195	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92452	2	44	38	5452	196.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92453				5460	198.5		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92454				5464	200.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92455				5468	202.5	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92456	2	44	42	5460	205.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92457				5452	207.5		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92458				5432	209.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92459				5408	212	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92460	2	44	46	5380	215					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92461				5332	218.5		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92462				5276	222					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92463				5204	225.5	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92464	2	44	50	5096	230.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92465				4972	236.5		2	3300		.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92466				4816	244.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92467				4628	254	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92468	2	44	54	4388	264.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92469				4124	275.5		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92470				3820	289.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92471				3508	306.5	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92472	2	44	58	3068	317.5					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92473				2640	334		2			.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92474				2216	352					.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92475				1748	368.5	2				.	2630	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92476	2	45	2	1320	382.5					.	1530	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92477				904	395		2			.	1234	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92478				524	410					.	791	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE
92479				180	416	2				.	421	.	.	.	FALSE	.	.	.	.	-0.24218	.	.	.	FALSE	FALSE

Flash Air B737-300 Accident
Preliminary Data Created: January 20 2004
MCA

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	N1 L (%RPM)	N1 R (%RPM)	N2 L (%RPM)	N2 R (%RPM)	FUEL FLOW L (PPH)	FUEL FLOW R (PPH)	ENG 1 T/R L SLV DEPLOYED (0-DEPLOY 1-.)	ENG 1 T/R L SLV NOT STWD (0-UNLOCK 1-.)	ENG 1 T/R R SLV DEPLOYED (0-DEPLOY 1-.)	ENG 1 T/R R SLV NOT STWD (0-UNLOCK 1-.)	ENG 2 T/R L SLV DEPLOYED (0-DEPLOY 1-.)	ENG 2 T/R L SLV NOT STWD (0-UNLOCK 1-.)	ENG 2 T/R R SLV DEPLOYED (0-DEPLOY 1-.)	ENG 2 T/R R SLV NOT STWD (0-UNLOCK 1-.)	ENG 1 FIRE (0-. 1-FIRE)	ENG 2 FIRE (0-. 1-FIRE)	APU FIRE (0-. 1-FIRE)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)	ENG OIL QUANT L (PINTS)	ENG OIL QUANT R (PINTS)	OIL PRES L (PSI)	OIL PRES R (PSI)
91864	2	34	50	216	45	0	13.625		44.5			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91865				216	45	15.875	14.125				752	.	.	.	.	.	.	.	.	.	.	.	2.63671					2
91866				216	45	0	14.75	0				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91867				216	45	15.875	15.5			0		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91868	2	34	54	216	45	0	16.125		49.125			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91869				216	45	15.875	16.875				832	.	.	.	.	.	.	.	.	.	.	.	2.63671					2
91870				216	45	0	17.625	0				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91871				216	45	15.875	18.25			0		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91872	2	34	58	216	45	0	18.875		54.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91873				216	45	15.875	19.5				912	.	.	.	.	.	.	.	.	.	.	.	2.63671					2
91874				216	45	0	20.5	0				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91875				216	45	15.875	21.375			0		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91876	2	35	2	216	45	0	22		59.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91877				216	45	15.875	21.625				768	.	.	.	.	.	.	.	.	.	.	.	2.63671					2
91878				216	45	0	21.25	0				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91879				216	45	15.875	21.375			0		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91880	2	35	6	216	45	0	21.375		59.5			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91881				216	45	15.875	21.25				736	.	.	.	.	.	.	.	.	.	.	.	2.63671		28.75			2
91882				216	45	0	21.25	0				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91883				216	45	15.875	21.25			0		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91884	2	35	10	216	45	0	21.25		59.5			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91885				216	45	15.875	21.25				736	.	.	.	.	.	.	.	.	.	.	.	2.63671			24.5		2
91886				216	45	0	21.125	0				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91887				216	45	15.875	21			0		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91888	2	35	14	216	45	0	21		59.375			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91889				216	45	15.875	21				736	.	.	.	.	.	.	.	.	.	.	.	2.63671					2
91890				216	45	0	21	7.375				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91891				216	45	15.875	21.125			0		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91892	2	35	18	216	45	0	21.125		59.375			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91893				216	45	15.875	21.125				736	.	.	.	.	.	.	.	.	.	.	.	2.63671					2
91894				216	45	0	21.125	13.25				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91895				216	45	15.875	21.125			0		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91896	2	35	22	216	45	0	21.125		59.375			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91897				216	45	15.875	21				736	.	.	.	.	.	.	.	.	.	.	.	2.63671					2
91898				216	45	0	21.125	17.75				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91899				216	45	15.875	21.125			0		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91900	2	35	26	216	45	0	21.125		59.375			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91901				216	45	15.875	21.125				736	.	.	.	.	.	.	.	.	.	.	.	2.63671					2
91902				216	45	0	21.125	20.75				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91903				216	45	15.875	21			0		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91904	2	35	30	216	45	0	21		59.375			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91905				216	45	15.875	21				736	.	.	.	.	.	.	.	.	.	.	.	2.63671					2
91906				216	45	0	21	22.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91907				216	45	15.875	21			48		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91908	2	35	34	216	45	0	21		59.375			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91909				216	45	15.875	21				720	.	.	.	.	.	.	.	.	.	.	.	2.63671					2
91910				216	45	0	21	27.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91911				216	45	15.875	21			448		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91912	2	35	38	216	45	0	21		59.375			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91913				216	45	15.875	21				720	.	.	.	.	.	.	.	.	.	.	.	2.63671					2
91914				216	45	0	20.875	33				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91915				216	45	15.875	20.875			560		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91916	2	35	42	216	45	0	20.875		59.375			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91917				216	45	15.875	21				736	.	.	.	.	.	.	.	.	.	.	.	2.63671					2
91918				216	45	0	21	37.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91919				216	45	15.875	21			640		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91920	2	35	46	216	45	0	21		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91921				216	45	15.875	21				720	.	.	.	.	.	.	.	.	.	.	.	2.63671					2
91922				216	45	0	21	42.625				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91923				216	45	15.875	21			704		.	.	.	.	.	.	.	.	.	.	.	2.63671				2	
91924	2	35	50	216	45	0	21.125		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91925				216	45	15.875	21				720	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91926				216	45	0	21	46.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91927				216	45	15.875	21			768		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91928	2	35	54	216	45	0	21		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91929				216	45	15.875	21				720	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91930				216	45	0	21	50.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91931				216	45	15.875	21			832		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91932	2	35	58	216	45	0	21		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91933				216	45	15.875	21				720	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91934				216	45	0	21	55.25				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91935				216	45	15.875	21.125			896		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91936	2	36	2	216	45	0	21.125		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91937				216	45	15.875	21.125				720	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91938				216	45	0	21.25	60.375				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91939				216	45	15.875	21.25			832		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91940	2	36	6	216	45	0	21.125		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91941				216	45	15.875	21.125				720	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91942				216	45	0	21.125	60.125				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91943				216	45	15.875	21.125			768		.	.	.	.	.	.	.	.	.	.	.	2.28515				2	
91944	2	36	10	216	45	0	21.125		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91945				216	45	15.875	21.125				752	.	.	.	.	.	.	.	.	.	.	.	2.46093		24.75			2
91946				216	45	0	20.875	60				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91947				216	45	15.875	20.875			832		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91948	2	36	14	216	45	0	20.75		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91949				216	45	15.875	20.75				816	.	.	.	.	.	.	.	.	.	.	.	2.46093			24.25		2
91950				216	45	0	20.875	59.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91951				216	45	15.875	20.875			832		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91952	2	36	18	216	45	0	20.875		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91953				216	45	15.875	20.875				816	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91954				216	45	0	20.75	60				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91955				216	45	15.875	20.875			800		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91956	2	36	22	216	45	0	20.875		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91957				216	45	15.875	20.875				816	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91958				216	45	0	20.875	59.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91959				216	45	15.875	20.875			848		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	N1 L	N1 R	N2 L	N2 R	FUEL FLOW L	FUEL FLOW R	ENG 1 T/R L SLV DEPLOYED	ENG 1 T/R L SLV NOT STWD	ENG 1 T/R R SLV DEPLOYED	ENG 1 T/R R SLV NOT STWD	ENG 2 T/R L SLV DEPLOYED	ENG 2 T/R L SLV NOT STWD	ENG 2 T/R R SLV DEPLOYED	ENG 2 T/R R SLV NOT STWD	ENG 1 FIRE	ENG 2 FIRE	APU FIRE	THR LEVER ANGLE L	THR LEVER ANGLE R	ENG OIL QUANT L	ENG OIL QUANT R	OIL PRES L	OIL PRES R
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	(%RPM)	(%RPM)	(%RPM)	(%RPM)	(PPH)	(PPH)	(0-DEPLOY 1-.)	(0-UNLOCK 1-.)	(0-DEPLOY 1-.)	(0-UNLOCK 1-.)	(0-DEPLOY 1-.)	(0-UNLOCK 1-.)	(0-DEPLOY 1-.)	(0-UNLOCK 1-.)	(0-. 1-FIRE)	(0-. 1-FIRE)	(0-. 1-FIRE)	(DEG)	(DEG)	(PINTS)	(PINTS)	(PSI)	(PSI)
91960	2	36	26	216	45	0	21		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91961				216	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91962				216	45	0	20.875	59.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91963				216	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91964	2	36	30	216	45	0	21		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91965				216	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91966				216	45	0	20.875	59.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91967				216	45	15.875	20.875			800		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91968	2	36	34	216	45	0	20.875		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91969				216	45	15.875	20.875				816	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91970				216	45	0	20.875	59.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91971				216	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91972	2	36	38	216	45	0	20.875		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91973				216	45	15.875	20.75				800	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91974				216	45	0	20.875	59.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91975				216	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91976	2	36	42	216	45	0	20.875		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91977				216	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91978				216	45	0	20.875	59.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91979				216	45	15.875	20.875			832		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91980	2	36	46	216	45	0	20.875		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91981				216	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91982				216	45	0	20.875	59.75				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91983				216	45	15.875	20.875			832		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91984	2	36	50	216	45	0	20.875		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91985				216	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91986				216	45	0	20.875	59.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91987				216	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91988	2	36	54	216	45	0	20.75		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91989				216	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91990				216	45	0	20.875	59.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91991				216	45	15.875	20.75			816		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91992	2	36	58	216	45	0	20.875		59.125			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91993				216	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91994				216	45	0	20.875	59.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91995				216	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
91996	2	37	2	216	45	0	20.875		59.125			.	.	.	.	.	.	.	.	.	.	.		1.23047				
91997				216	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
91998				216	45	0	20.875	59.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
91999				216	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
92000	2	37	6	216	45	0	20.875		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92001				216	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.46093					2
92002				216	45	0	20.875	59.875				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92003				216	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	2.46093				2	
92004	2	37	10	216	45	0	20.875		59.25			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92005				216	45	15.875	21.5				976	.	.	.	.	.	.	.	.	.	.	.	5.97655					2
92006				216	45	0	22.5	61.375				.	.	.	.	.	.	.	.	.	.	.		5.44921				
92007				216	45	15.875	22.125			880		.	.	.	.	.	.	.	.	.	.	.	5.97655				2	
92008	2	37	14	216	45	0	21.875		60.75			.	.	.	.	.	.	.	.	.	.	.		5.44921				
92009				216	45	15.875	22				864	.	.	.	.	.	.	.	.	.	.	.	6.15233		24.5			2
92010				216	45	0	22.625	62.125				.	.	.	.	.	.	.	.	.	.	.		7.73436				
92011				216	45	15.875	23.875			1088		.	.	.	.	.	.	.	.	.	.	.	10.3711				2	
92012	2	37	18	216	45	0	25.5		65.75			.	.	.	.	.	.	.	.	.	.	.		8.78905				
92013				216	45	15.875	28				1424	.	.	.	.	.	.	.	.	.	.	.	11.9531			24.25		2
92014				216	45	0	31.5	69.375				.	.	.	.	.	.	.	.	.	.	.		9.84374				
92015				216	45	15.875	34.5			1488		.	.	.	.	.	.	.	.	.	.	.	14.414				2	
92016	2	37	22	216	45	0	39.125		79.625			.	.	.	.	.	.	.	.	.	.	.		12.4805				
92017				216	45	15.875	40.375				1744	.	.	.	.	.	.	.	.	.	.	.	15.2929					2
92018				216	45	0	40	81.375				.	.	.	.	.	.	.	.	.	.	.		12.4805				
92019				216	45	15.875	39.875			2464		.	.	.	.	.	.	.	.	.	.	.	15.4687				2	
92020	2	37	26	216	45	0	38.375		78.875			.	.	.	.	.	.	.	.	.	.	.		11.25				
92021				216	45	15.875	34.875				1136	.	.	.	.	.	.	.	.	.	.	.	12.3047					2
92022				216	45	0	31.875	80.375				.	.	.	.	.	.	.	.	.	.	.		8.96483				
92023				216	45	15.875	29.875			1712		.	.	.	.	.	.	.	.	.	.	.	12.1289				2	
92024	2	37	30	216	45	0	30.375		71.25			.	.	.	.	.	.	.	.	.	.	.		8.96483				
92025				216	45	15.875	30.625				1120	.	.	.	.	.	.	.	.	.	.	.	12.1289					2
92026				216	45	0	30.5	80				.	.	.	.	.	.	.	.	.	.	.		8.96483				
92027				216	45	15.875	28.75			1312		.	.	.	.	.	.	.	.	.	.	.	10.1953				2	
92028	2	37	34	216	45	0	26.75		66.875			.	.	.	.	.	.	.	.	.	.	.		7.20702				
92029				216	45	15.875	25.25				832	.	.	.	.	.	.	.	.	.	.	.	10.0195					2
92030				216	45	0	25	74.125				.	.	.	.	.	.	.	.	.	.	.		6.5039				
92031				216	45	15.875	23.625			928		.	.	.	.	.	.	.	.	.	.	.	8.61327				2	
92032	2	37	38	216	45	0	22.375		61.5			.	.	.	.	.	.	.	.	.	.	.		5.80077				
92033				216	45	15.875	22.25				816	.	.	.	.	.	.	.	.	.	.	.	8.43749					2
92034				216	45	0	22.75	69.875				.	.	.	.	.	.	.	.	.	.	.		5.80077				
92035				216	45	15.875	22.625			1056		.	.	.	.	.	.	.	.	.	.	.	8.43749				2	
92036	2	37	42	216	45	0	22.375		61.625			.	.	.	.	.	.	.	.	.	.	.		5.80077				
92037				216	45	15.875	22.5				864	.	.	.	.	.	.	.	.	.	.	.	8.43749					2
92038				216	45	0	22.5	69.875				.	.	.	.	.	.	.	.	.	.	.		5.80077				
92039				216	45	15.875	22.5			1072		.	.	.	.	.	.	.	.	.	.	.	8.43749				2	
92040	2	37	46	216	45	0	22.625		61.75			.	.	.	.	.	.	.	.	.	.	.		5.80077				
92041				216	45	15.875	22.625				864	.	.	.	.	.	.	.	.	.	.	.	8.43749					2
92042				216	45	0	22.5	68.875				.	.	.	.	.	.	.	.	.	.	.		5.80077				
92043				216	45	15.875	22.5			896		.	.	.	.	.	.	.	.	.	.	.	7.91014				2	
92044	2	37	50	216	45	0	22.75		61.75			.	.	.	.	.	.	.	.	.	.	.		5.80077				
92045				216	45	15.875	22.75				864	.	.	.	.	.	.	.	.	.	.	.	7.3828					2
92046				216	45	0	22.75	66.375				.	.	.	.	.	.	.	.	.	.	.		5.80077				
92047				216	45	15.875	22.75			928		.	.	.	.	.	.	.	.	.	.	.	7.3828				2	
92048	2	37	54	216	45	0	22.625		61.75			.	.	.	.	.	.	.	.	.	.	.		5.80077				
92049				216	45	15.875	22.5				848	.	.	.	.	.	.	.	.	.	.	.	7.3828					2
92050				216	45	0	22.625	66.125				.	.	.	.	.	.	.	.	.	.	.		5.80077				
92051				216	45	15.875	22.5			944		.	.	.	.	.	.	.	.	.	.	.	7.3828				2	
92052	2	37	58	216	45	0	22.5		61.75			.	.	.	.	.	.	.	.	.	.	.		5.80077				
92053				216	45	15.875	22.5				848	.	.	.	.	.	.	.	.	.	.	.	7.3828					2
92054				216	45	0	22.375	66.25				.	.	.	.	.	.	.	.	.	.	.		5.80077				
92055				216	45	15.875	22.375			944		.	.	.	.	.	.	.	.	.	.	.	7.3828				2	
92056	2	38	2	216	45	0	22.375		61.75			.	.	.	.	.	.	.	.	.	.	.		5.80077				
92057				216	45	15.875	22.375				864	.	.	.	.	.	.	.	.	.	.	.	7.3828					2
92058				216	45	0	22.375	66.125				.	.	.	.	.	.	.	.	.	.	.		5.80077				
92059				216	45	15.875	22.25			928		.	.	.	.	.	.	.	.	.	.	.	7.3828				2	
92060	2	38	6	216	45	0	22.25		61.625			.	.	.	.	.	.	.	.	.	.	.		5.62499				

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	N1 L (%RPM)	N1 R (%RPM)	N2 L (%RPM)	N2 R (%RPM)	FUEL FLOW L (PPH)	FUEL FLOW R (PPH)	ENG 1 T/R L SLV DEPLOYED (0-DEPLOY 1-.)	ENG 1 T/R L SLV NOT STWD (0-UNLOCK 1-.)	ENG 1 T/R R SLV DEPLOYED (0-DEPLOY 1-.)	ENG 1 T/R R SLV NOT STWD (0-UNLOCK 1-.)	ENG 2 T/R L SLV DEPLOYED (0-DEPLOY 1-.)	ENG 2 T/R L SLV NOT STWD (0-UNLOCK 1-.)	ENG 2 T/R R SLV DEPLOYED (0-DEPLOY 1-.)	ENG 2 T/R R SLV NOT STWD (0-UNLOCK 1-.)	ENG 1 FIRE (0-. 1-FIRE)	ENG 2 FIRE (0-. 1-FIRE)	APU FIRE (0-. 1-FIRE)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)	ENG OIL QUANT L (PINTS)	ENG OIL QUANT R (PINTS)	OIL PRES L (PSI)	OIL PRES R (PSI)
92061				216	45	15.875	22.25				832	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92062				212	45	0	22.25	65				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92063				216	45	15.875	22.25			912		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92064	2	38	10	212	45	0	22.25		61.5			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92065				212	45	15.875	22.25				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92066				212	45	0	22.25	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92067				212	45	15.875	22.25			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92068	2	38	14	212	45	0	22.25		61.5			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92069				212	45	15.875	22.25				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92070				212	45	0	22.25	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92071				212	45	15.875	22.25			912		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92072	2	38	18	212	45	0	22.25		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92073				212	45	15.875	22.375				848	.	.	.	.	.	.	.	.	.	.	.	7.03124		23.5			2
92074				212	45	0	22.25	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92075				212	45	15.875	22.375			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92076	2	38	22	212	45	0	22.375		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92077				208	45	15.875	22.375				864	.	.	.	.	.	.	.	.	.	.	.	7.03124			23.75		2
92078				208	45	0	22.375	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92079				208	45	15.875	22.25			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92080	2	38	26	208	45	0	22.25		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92081				208	45	15.875	22.25				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92082				208	45	0	22.25	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92083				208	45	15.875	22.25			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92084	2	38	30	208	45	0	22.125		61.5			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92085				208	45	15.875	22				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92086				208	45	0	22	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92087				208	45	15.875	22			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92088	2	38	34	208	45	0	22		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92089				208	45	15.875	22				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92090				208	45	0	22	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92091				208	45	15.875	22.125			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92092	2	38	38	208	45	0	22.25		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92093				208	45	15.875	22.25				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92094				208	45	0	22.25	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92095				208	45	15.875	22.25			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92096	2	38	42	208	45	0	22.25		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92097				208	45	15.875	22.25				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92098				208	45	0	22.25	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92099				208	45	15.875	22.25			912		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92100	2	38	46	208	45	0	22.25		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92101				208	45	15.875	22.25				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92102				208	45	0	22.375	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92103				204	45	15.875	22.375			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92104	2	38	50	204	45	0	22.375		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92105				204	45	15.875	22.375				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92106				204	45	0	22.375	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92107				204	45	15.875	22.375			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92108	2	38	54	204	45	0	22.375		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92109				204	45	15.875	22.375				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92110				208	45	0	22.375	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92111				204	45	15.875	22.375			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92112	2	38	58	204	45	0	22.375		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92113				204	45	15.875	22.25				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92114				204	45	0	22.125	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92115				204	45	15.875	22.25			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92116	2	39	2	204	45	0	22.25		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92117				204	45	15.875	22.25				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92118				204	45	0	22.25	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92119				204	45	15.875	22.25			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92120	2	39	6	204	45	0	22.375		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92121				204	45	15.875	22.25				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92122				204	45	0	22.25	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92123				204	45	15.875	22.25			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92124	2	39	10	204	45	0	22.25		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92125				204	45	15.875	22.25				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92126				204	45	0	22.375	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92127				204	45	15.875	22.375			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92128	2	39	14	204	45	0	22.25		61.25			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92129				204	45	15.875	22.25				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92130				200	45	0	22.25	64.875				.	.	.	.	.	.	.	.	.	.	.		5.62499				
92131				204	45	15.875	22.25			928		.	.	.	.	.	.	.	.	.	.	.	7.03124				2	
92132	2	39	18	200	45	0	22.375		61.375			.	.	.	.	.	.	.	.	.	.	.		5.62499				
92133				200	45	15.875	22.25				848	.	.	.	.	.	.	.	.	.	.	.	7.03124					2
92134				200	45	0	22.25	64.625				.	.	.	.	.	.	.	.	.	.	.		5.44921				
92135				200	45	15.875	21.125			704		.	.	.	.	.	.	.	.	.	.	.	3.51562				2	
92136	2	39	22	200	45	0	20.625		58.5			.	.	.	.	.	.	.	.	.	.	.		1.40625				
92137				200	45	15.875	21				832	.	.	.	.	.	.	.	.	.	.	.	2.8125		24.25			2
92138				200	45	0	21.25	59.25				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92139				200	45	15.875	21			832		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92140	2	39	26	200	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92141				200	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125			24		2
92142				200	45	0	21	59.625				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92143				196	45	15.875	21			800		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92144	2	39	30	196	45	0	21		59			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92145				196	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92146				196	45	0	21	59.625				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92147				196	45	15.875	21			800		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92148	2	39	34	196	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92149				196	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92150				196	45	0	21	59.625				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92151				196	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92152	2	39	38	196	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92153				196	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92154				196	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92155				192	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92156	2	39	42	192	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92157				196	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92158				192	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92159				192	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92160	2	39	46	192	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92161				192	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	N1 L (%RPM)	N1 R (%RPM)	N2 L (%RPM)	N2 R (%RPM)	FUEL FLOW L (PPH)	FUEL FLOW R (PPH)	ENG 1 T/R L SLV DEPLOYED (0-DEPLOY 1-.)	ENG 1 T/R L SLV NOT STWD (0-UNLOCK 1-.)	ENG 1 T/R R SLV DEPLOYED (0-DEPLOY 1-.)	ENG 1 T/R R SLV NOT STWD (0-UNLOCK 1-.)	ENG 2 T/R L SLV DEPLOYED (0-DEPLOY 1-.)	ENG 2 T/R L SLV NOT STWD (0-UNLOCK 1-.)	ENG 2 T/R R SLV DEPLOYED (0-DEPLOY 1-.)	ENG 2 T/R R SLV NOT STWD (0-UNLOCK 1-.)	ENG 1 FIRE (0-. 1-FIRE)	ENG 2 FIRE (0-. 1-FIRE)	APU FIRE (0-. 1-FIRE)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)	ENG OIL QUANT L (PINTS)	ENG OIL QUANT R (PINTS)	OIL PRES L (PSI)	OIL PRES R (PSI)
92162				192	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92163				192	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92164	2	39	50	192	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92165				192	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92166				192	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92167				192	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92168	2	39	54	192	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92169				192	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92170				192	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92171				192	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92172	2	39	58	192	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92173				192	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92174				192	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92175				192	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92176	2	40	2	192	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92177				192	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92178				192	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92179				192	45	15.875	21			800		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92180	2	40	6	192	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92181				188	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92182				192	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92183				192	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92184	2	40	10	192	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92185				188	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92186				192	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92187				192	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92188	2	40	14	188	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92189				192	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92190				188	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92191				188	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92192	2	40	18	188	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92193				188	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92194				188	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92195				188	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92196	2	40	22	188	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92197				188	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92198				188	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92199				188	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92200	2	40	26	188	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92201				188	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125		24.25			2
92202				188	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92203				188	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92204	2	40	30	188	45	0	20.875		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92205				188	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125			24		2
92206				188	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92207				188	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92208	2	40	34	188	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92209				188	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92210				188	45	0	21	59.375				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92211				188	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92212	2	40	38	188	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92213				188	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92214				188	45	0	21	59.375				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92215				184	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92216	2	40	42	188	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92217				188	45	15.875	20.875				816	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92218				188	45	0	20.875	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92219				188	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92220	2	40	46	188	45	0	20.875		59			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92221				188	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92222				184	45	0	20.875	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92223				188	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92224	2	40	50	188	45	0	21		59			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92225				184	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92226				184	45	0	20.875	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92227				184	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92228	2	40	54	184	45	0	20.875		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92229				184	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92230				184	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92231				184	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92232	2	40	58	184	45	0	20.875		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92233				184	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92234				184	45	0	20.875	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92235				184	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92236	2	41	2	184	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92237				184	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92238				184	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92239				184	45	15.875	21.125			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92240	2	41	6	184	45	0	21.125		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92241				184	45	15.875	21.125				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92242				184	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92243				184	45	15.875	21			800		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92244	2	41	10	184	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92245				184	45	15.875	21				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92246				184	45	0	21	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92247				184	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92248	2	41	14	184	45	0	21		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92249				184	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92250				184	45	0	20.875	59.375				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92251				184	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92252	2	41	18	184	45	0	20.875		58.875			.	.	.	.	.	.	.	.	.	.	.		1.23047				
92253				184	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.8125					2
92254				184	45	0	20.875	59.5				.	.	.	.	.	.	.	.	.	.	.		1.23047				
92255				184	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	2.8125				2	
92256	2	41	22	184	45	0	20.875		58.875			.	.	.	.	.	.	.	.	.	.	.		1.75781				
92257				184	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	2.98828					2
92258				184	45	0	20.875	59.5				.	.	.	.	.	.	.	.	.	.	.		2.10937				
92259				180	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	2.98828				2	
92260	2	41	26	180	45	0	20.875		58.875			.	.	.	.	.	.	.	.	.	.	.		3.6914				
92261				180	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	5.44921					2
92262				180	45	0	20.875	59.625				.	.	.	.	.	.	.	.	.	.	.		3.86718				

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	N1 L	N1 R	N2 L	N2 R	FUEL FLOW L	FUEL FLOW R	ENG 1 T/R L SLV DEPLOYED	ENG 1 T/R L SLV NOT STWD	ENG 1 T/R R SLV DEPLOYED	ENG 1 T/R R SLV NOT STWD	ENG 2 T/R L SLV DEPLOYED	ENG 2 T/R L SLV NOT STWD	ENG 2 T/R R SLV DEPLOYED	ENG 2 T/R R SLV NOT STWD	ENG 1 FIRE	ENG 2 FIRE	APU FIRE	THR LEVER ANGLE L	THR LEVER ANGLE R	ENG OIL QUANT L	ENG OIL QUANT R	OIL PRES L	OIL PRES R
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	(%RPM)	(%RPM)	(%RPM)	(%RPM)	(PPH)	(PPH)	(0-DEPLOY 1-.)	(0-UNLOCK 1-.)	(0-DEPLOY 1-.)	(0-UNLOCK 1-.)	(0-DEPLOY 1-.)	(0-UNLOCK 1-.)	(0-DEPLOY 1-.)	(0-UNLOCK 1-.)	(0-. 1-FIRE)	(0-. 1-FIRE)	(0-. 1-FIRE)	(DEG)	(DEG)	(PINTS)	(PINTS)	(PSI)	(PSI)
92263				180	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	5.44921				2	
92264	2	41	30	180	45	0	20.875		58.875			.	.	.	.	.	.	.	.	.	.	.		3.86718				
92265				180	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	5.44921		24.25			2
92266				180	45	0	20.875	59.625				.	.	.	.	.	.	.	.	.	.	.		3.86718				
92267				180	45	15.875	20.875			816		.	.	.	.	.	.	.	.	.	.	.	5.44921				2	
92268	2	41	34	180	45	0	20.875		58.875			.	.	.	.	.	.	.	.	.	.	.		3.86718				
92269				180	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	5.44921			24		2
92270				180	45	0	20.75	59.625				.	.	.	.	.	.	.	.	.	.	.		3.86718				
92271				180	45	15.875	20.75			816		.	.	.	.	.	.	.	.	.	.	.	5.44921				2	
92272	2	41	38	180	45	0	20.75		58.875			.	.	.	.	.	.	.	.	.	.	.		3.86718				
92273				180	45	15.875	20.75				800	.	.	.	.	.	.	.	.	.	.	.	5.44921					2
92274				180	45	0	20.75	59.75				.	.	.	.	.	.	.	.	.	.	.		3.86718				
92275				180	45	15.875	20.75			816		.	.	.	.	.	.	.	.	.	.	.	5.44921				2	
92276	2	41	42	180	45	0	20.875		58.875			.	.	.	.	.	.	.	.	.	.	.		3.86718				
92277				180	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	5.44921					2
92278				180	45	0	21	59.75				.	.	.	.	.	.	.	.	.	.	.		3.86718				
92279				180	45	15.875	21			816		.	.	.	.	.	.	.	.	.	.	.	5.44921				2	
92280	2	41	46	180	45	0	20.875		59			.	.	.	.	.	.	.	.	.	.	.		3.86718				
92281				180	45	15.875	20.875				800	.	.	.	.	.	.	.	.	.	.	.	5.44921					2
92282				180	45	0	20.875	59.875				.	.	.	.	.	.	.	.	.	.	.		3.86718				
92283				180	45	15.875	21.375			944		.	.	.	.	.	.	.	.	.	.	.	8.26171				2	
92284	2	41	50	180	45	0	22.5		61			.	.	.	.	.	.	.	.	.	.	.		14.7656				
92285				180	45	15.875	23.625				1184	.	.	.	.	.	.	.	.	.	.	.	20.9179					2
92286				180	45	0	25.25	64.625				.	.	.	.	.	.	.	.	.	.	.		20.3906				
92287				180	45	15.875	27.75			1200		.	.	.	.	.	.	.	.	.	.	.	22.8515				2	
92288	2	41	54	180	45	0	31.25		72			.	.	.	.	.	.	.	.	.	.	.		20.3906				
92289				180	45	15.875	34.625				1824	.	.	.	.	.	.	.	.	.	.	.	24.7851					2
92290				180	45	0	39.875	73				.	.	.	.	.	.	.	.	.	.	.		22.1484				
92291				184	45	15.875	51			1664		.	.	.	.	.	.	.	.	.	.	.	24.7851				2	
92292	2	41	58	180	45	0	63.625		86.625			.	.	.	.	.	.	.	.	.	.	.		22.1484				
92293				184	45	15.875	65				3440	.	.	.	.	.	.	.	.	.	.	.	24.7851					2
92294				184	45	0	63.875	86.125				.	.	.	.	.	.	.	.	.	.	.		22.1484				
92295				184	45	15.875	63.75			3664		.	.	.	.	.	.	.	.	.	.	.	24.7851				2	
92296	2	42	2	188	45	0	63.875		87.5			.	.	.	.	.	.	.	.	.	.	.		22.1484				
92297				188	45	15.875	70.875				4064	.	.	.	.	.	.	.	.	.	.	.	30.7617					2
92298				188	45	0	78.875	93.375				.	.	.	.	.	.	.	.	.	.	.		32.6953				
92299				188	45	15.875	79.5			6192		.	.	.	.	.	.	.	.	.	.	.	37.4414				2	
92300	2	42	6	192	45	0	82.75		93.625			.	.	.	.	.	.	.	.	.	.	.		37.2656				
92301				192	45.5	15.875	83.75				6336	.	.	.	.	.	.	.	.	.	.	.	40.4296					2
92302				192	49.5	0	84.625	95.125				.	.	.	.	.	.	.	.	.	.	.		39.1992				
92303				196	56	15.875	87.25			7696		.	.	.	.	.	.	.	.	.	.	.	45.1757				2	
92304	2	42	10	196	61	0	89.5		96.625			.	.	.	.	.	.	.	.	.	.	.		44.2968				
92305				196	65	15.875	89.875				7936	.	.	.	.	.	.	.	.	.	.	.	46.4062					2
92306				196	70	0	90	97				.	.	.	.	.	.	.	.	.	.	.		45.1757				
92307				200	75.5	15.875	90.5			8272		.	.	.	.	.	.	.	.	.	.	.	46.4062				2	
92308	2	42	14	200	78.5	0	90.625		97.25			.	.	.	.	.	.	.	.	.	.	.		45.7031				
92309				200	83.5	15.875	90.5				8192	.	.	.	.	.	.	.	.	.	.	.	46.4062					2
92310				200	89	0	90.375	96.75				.	.	.	.	.	.	.	.	.	.	.		45.7031				
92311				200	93	15.875	90.375			8144		.	.	.	.	.	.	.	.	.	.	.	46.2304				2	
92312	2	42	18	200	97.5	0	90.375		97.125			.	.	.	.	.	.	.	.	.	.	.		45.7031				
92313				204	101	15.875	90.5				8160	.	.	.	.	.	.	.	.	.	.	.	46.2304					2
92314				204	106.5	0	90.5	96.75				.	.	.	.	.	.	.	.	.	.	.		45.7031				
92315				204	109.5	15.875	90.375			8144		.	.	.	.	.	.	.	.	.	.	.	46.2304				2	
92316	2	42	22	204	115.5	0	90.375		96.875			.	.	.	.	.	.	.	.	.	.	.		45.7031				
92317				204	119.5	15.875	90.25				8112	.	.	.	.	.	.	.	.	.	.	.	46.2304					2
92318				204	123.5	0	90.375	96.75				.	.	.	.	.	.	.	.	.	.	.		45.7031				
92319				208	127.5	15.875	90.5			8112		.	.	.	.	.	.	.	.	.	.	.	46.2304				2	
92320	2	42	26	208	131.5	0	90.5		97			.	.	.	.	.	.	.	.	.	.	.		45.7031				
92321				208	135.5	15.875	90.375				8128	.	.	.	.	.	.	.	.	.	.	.	46.2304					2
92322				208	139	0	90.25	96.75				.	.	.	.	.	.	.	.	.	.	.		45.7031				
92323				204	142.5	15.875	90.375			8160		.	.	.	.	.	.	.	.	.	.	.	46.2304				2	
92324	2	42	30	204	146	0	90.375		97			.	.	.	.	.	.	.	.	.	.	.		45.7031				
92325				196	150	15.875	90.375				8144	.	.	.	.	.	.	.	.	.	.	.	46.2304					2
92326				192	152	0	90.25	96.875				.	.	.	.	.	.	.	.	.	.	.		45.7031				
92327				192	155.5	15.875	90.375			8160		.	.	.	.	.	.	.	.	.	.	.	46.2304				2	
92328	2	42	34	196	159	0	90.375		97			.	.	.	.	.	.	.	.	.	.	.		45.7031				
92329				208	162	15.875	90.375				8176	.	.	.	.	.	.	.	.	.	.	.	46.2304		23			2
92330				220	165.5	0	90.375	96.875				.	.	.	.	.	.	.	.	.	.	.		45.7031				
92331				240	167.5	15.875	90.375			8192		.	.	.	.	.	.	.	.	.	.	.	46.2304				2	
92332	2	42	38	268	169.5	0	90.375		97.125			.	.	.	.	.	.	.	.	.	.	.		45.7031				
92333				300	171.5	15.875	90.5				8160	.	.	.	.	.	.	.	.	.	.	.	46.2304			19.75		2
92334				328	172	0	90.5	97				.	.	.	.	.	.	.	.	.	.	.		45.7031				
92335				364	173	15.875	90.5			8192		.	.	.	.	.	.	.	.	.	.	.	46.2304				2	
92336	2	42	42	400	174	0	90.625		97.25			.	.	.	.	.	.	.	.	.	.	.		45.7031				
92337				440	174.5	15.875	90.75				8160	.	.	.	.	.	.	.	.	.	.	.	46.2304					2
92338				480	176	0	90.625	97.125				.	.	.	.	.	.	.	.	.	.	.		45.7031				
92339				512	176.5	15.875	90.75			8208		.	.	.	.	.	.	.	.	.	.	.	46.2304				2	
92340	2	42	46	548	177	0	90.75		97.375			.	.	.	.	.	.	.	.	.	.	.		45.7031				
92341				584	178	15.875	90.75				8160	.	.	.	.	.	.	.	.	.	.	.	46.2304					2
92342				616	178.5	0	90.75	97.25				.	.	.	.	.	.	.	.	.	.	.		45.7031				
92343				652	179	15.875	90.75			8192		.	.	.	.	.	.	.	.	.	.	.	46.2304				2	
92344	2	42	50	688	178.5	0	90.875		97.375			.	.	.	.	.	.	.	.	.	.	.		45.7031				
92345				720	179.5	15.875	90.875				8128	.	.	.	.	.	.	.	.	.	.	.	46.2304					2
92346				756	179.5	0	90.875	97.25				.	.	.	.	.	.	.	.	.	.	.		45.7031				
92347				792	180	15.875	90.875			8176		.	.	.	.	.	.	.	.	.	.	.	46.2304				2	
92348	2	42	54	832	180	0	90.875		97.5			.	.	.	.	.	.	.	.	.	.	.		45.7031				
92349				868	181	15.875	90.875				8128	.	.	.	.	.	.	.	.	.	.	.	46.2304					2
92350				904	180.5	0	91	97.375				.	.	.	.	.	.	.	.	.	.	.		45.7031				
92351				940	181.5	15.875	90.875			8160		.	.	.	.	.	.	.	.	.	.	.	46.2304				2	
92352	2	42	58	976	181	0	91		97.5			.	.	.	.	.	.	.	.	.	.	.		45.7031				
92353				1016	181.5	15.875	91				8096	.	.	.	.	.	.	.	.	.	.	.	46.2304					2
92354				1052	181.5	0	91	97.375				.	.	.	.	.	.	.	.	.	.	.		45.7031				
92355				1096	183	15.875	91			8128		.	.	.	.	.	.	.	.	.	.	.	46.2304				2	
92356	2	43	2	1136	183	0	91		97.5			.	.	.	.	.	.	.	.	.	.	.		45.7031				
92357				1180	184	15.875	91				8064	.	.	.	.	.	.	.	.	.	.	.	46.2304					2
92358				1220	184	0	91	97.25				.	.	.	.	.	.	.	.	.	.	.		45.5273				
92359				1268	184	15.875	90			7888		.	.	.	.	.	.	.	.	.	.	.	44.8242				2	
92360	2	43	6	1312	184	0	89.125		96.875			.	.	.	.	.	.	.	.	.	.	.		43.7695				
92361				1352	183	15.875	89.125				7568	.	.	.	.	.	.	.	.	.	.	.	44.2968					2
92362				1396	184	0	89.125	96.5				.	.	.	.	.	.	.	.	.	.	.		43.5937				
92363				1440	184	15.875	89.125			7568		.	.	.	.	.	.	.	.	.	.	.	44.121				2	

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	N1 L (%RPM)	N1 R (%RPM)	N2 L (%RPM)	N2 R (%RPM)	FUEL FLOW L (PPH)	FUEL FLOW R (PPH)	ENG 1 T/R L SLV DEPLOYED (0-DEPLOY 1-.)	ENG 1 T/R L SLV NOT STWD (0-UNLOCK 1-.)	ENG 1 T/R R SLV DEPLOYED (0-DEPLOY 1-.)	ENG 1 T/R R SLV NOT STWD (0-UNLOCK 1-.)	ENG 2 T/R L SLV DEPLOYED (0-DEPLOY 1-.)	ENG 2 T/R L SLV NOT STWD (0-UNLOCK 1-.)	ENG 2 T/R R SLV DEPLOYED (0-DEPLOY 1-.)	ENG 2 T/R R SLV NOT STWD (0-UNLOCK 1-.)	ENG 1 FIRE (0-. 1-FIRE)	ENG 2 FIRE (0-. 1-FIRE)	APU FIRE (0-. 1-FIRE)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)	ENG OIL QUANT L (PINTS)	ENG OIL QUANT R (PINTS)	OIL PRES L (PSI)	OIL PRES R (PSI)
92364	2	43	10	1484	183.5	0	89.125		96.75			.	.	.	.	.	.	.	.	.	.	.		43.5937				
92365				1528	183	15.875	89.25				7504	.	.	.	.	.	.	.	.	.	.	.	43.9452					2
92366				1576	183.5	0	89.125	96.375				.	.	.	.	.	.	.	.	.	.	.		43.5937				
92367				1624	183	15.875	89.25			7472		.	.	.	.	.	.	.	.	.	.	.	43.9452				2	
92368	2	43	14	1668	182.5	0	89.125		96.75			.	.	.	.	.	.	.	.	.	.	.		43.4179				
92369				1708	183	15.875	89.125				7456	.	.	.	.	.	.	.	.	.	.	.	43.9452					2
92370				1748	183.5	0	89.125	96.375				.	.	.	.	.	.	.	.	.	.	.		43.4179				
92371				1784	184.5	15.875	89			7440		.	.	.	.	.	.	.	.	.	.	.	43.9452				2	
92372	2	43	18	1816	185.5	0	89		96.75			.	.	.	.	.	.	.	.	.	.	.		43.4179				
92373				1844	186.5	15.875	89				7376	.	.	.	.	.	.	.	.	.	.	.	43.9452					2
92374				1868	187.5	0	89	96.5				.	.	.	.	.	.	.	.	.	.	.		43.2421				
92375				1892	188.5	15.875	89			7424		.	.	.	.	.	.	.	.	.	.	.	43.9452				2	
92376	2	43	22	1912	190	0	89		96.75			.	.	.	.	.	.	.	.	.	.	.		43.2421				
92377				1932	191.5	15.875	89				7360	.	.	.	.	.	.	.	.	.	.	.	43.9452					2
92378				1948	193	0	89	96.5				.	.	.	.	.	.	.	.	.	.	.		43.2421				
92379				1964	194.5	15.875	89			7392		.	.	.	.	.	.	.	.	.	.	.	43.9452				2	
92380	2	43	26	1980	196.5	0	89		96.75			.	.	.	.	.	.	.	.	.	.	.		43.4179				
92381				2000	198.5	15.875	89				7376	.	.	.	.	.	.	.	.	.	.	.	43.9452					2
92382				2020	200.5	0	89.125	96.5				.	.	.	.	.	.	.	.	.	.	.		43.4179				
92383				2040	202	15.875	89.125			7392		.	.	.	.	.	.	.	.	.	.	.	43.9452				2	
92384	2	43	30	2064	203.5	0	89.125		96.75			.	.	.	.	.	.	.	.	.	.	.		43.4179				
92385				2084	205	15.875	89.125				7376	.	.	.	.	.	.	.	.	.	.	.	43.9452					2
92386				2112	206	0	89.125	96.5				.	.	.	.	.	.	.	.	.	.	.		43.5937				
92387				2136	207.5	15.875	89			7408		.	.	.	.	.	.	.	.	.	.	.	43.9452				2	
92388	2	43	34	2168	208.5	0	89.125		96.75			.	.	.	.	.	.	.	.	.	.	.		43.5937				
92389				2196	209	15.875	89.125				7360	.	.	.	.	.	.	.	.	.	.	.	43.9452					2
92390				2224	210.5	0	89.125	96.375				.	.	.	.	.	.	.	.	.	.	.		43.5937				
92391				2252	212	15.875	89.125			7392		.	.	.	.	.	.	.	.	.	.	.	43.9452				2	
92392	2	43	38	2284	213.5	0	89.125		96.75			.	.	.	.	.	.	.	.	.	.	.		43.5937				
92393				2320	214.5	15.875	89.125				7360	.	.	.	.	.	.	.	.	.	.	.	43.9452		23			2
92394				2352	215.5	0	89.125	96.375				.	.	.	.	.	.	.	.	.	.	.		43.4179				
92395				2392	215.5	15.875	89.25			7360		.	.	.	.	.	.	.	.	.	.	.	43.9452				2	
92396	2	43	42	2432	216	0	89.125		96.75			.	.	.	.	.	.	.	.	.	.	.		43.4179				
92397				2472	216.5	15.875	89.125				7296	.	.	.	.	.	.	.	.	.	.	.	43.9452			20.25		2
92398				2520	216.5	0	89.125	96.375				.	.	.	.	.	.	.	.	.	.	.		43.2421				
92399				2572	217	15.875	89.125			7328		.	.	.	.	.	.	.	.	.	.	.	43.9452				2	
92400	2	43	46	2624	216.5	0	89		96.625			.	.	.	.	.	.	.	.	.	.	.		43.2421				
92401				2676	216.5	15.875	89				7248	.	.	.	.	.	.	.	.	.	.	.	43.9452					2
92402				2728	216	0	89.125	96.375				.	.	.	.	.	.	.	.	.	.	.		43.2421				
92403				2784	216.5	15.875	89.125			7264		.	.	.	.	.	.	.	.	.	.	.	43.7695				2	
92404	2	43	50	2840	217	0	89.125		96.625			.	.	.	.	.	.	.	.	.	.	.		43.2421				
92405				2892	217	15.875	89.125				7184	.	.	.	.	.	.	.	.	.	.	.	43.7695					2
92406				2948	216.5	0	89.125	96.25				.	.	.	.	.	.	.	.	.	.	.		43.2421				
92407				3004	216.5	15.875	89.125			7216		.	.	.	.	.	.	.	.	.	.	.	43.5937				2	
92408	2	43	54	3064	216	0	89.125		96.625			.	.	.	.	.	.	.	.	.	.	.		43.2421				
92409				3124	216	15.875	89.125				7168	.	.	.	.	.	.	.	.	.	.	.	43.5937					2
92410				3188	214.5	0	89.125	96.25				.	.	.	.	.	.	.	.	.	.	.		43.2421				
92411				3252	214	15.875	89.125			7168		.	.	.	.	.	.	.	.	.	.	.	43.5937				2	
92412	2	43	58	3320	213.5	0	89.25		96.625			.	.	.	.	.	.	.	.	.	.	.		43.2421				
92413				3392	212	15.875	89.125				7120	.	.	.	.	.	.	.	.	.	.	.	43.5937					2
92414				3468	209.5	0	89.125	96.25				.	.	.	.	.	.	.	.	.	.	.		43.2421				
92415				3544	209.5	15.875	89.25			7136		.	.	.	.	.	.	.	.	.	.	.	43.5937				2	
92416	2	44	2	3624	207	0	89.25		96.75			.	.	.	.	.	.	.	.	.	.	.		43.2421				
92417				3712	206	15.875	89.375				7088	.	.	.	.	.	.	.	.	.	.	.	43.5937					2
92418				3796	204.5	0	89.375	96.375				.	.	.	.	.	.	.	.	.	.	.		43.2421				
92419				3880	203	15.875	89.375			7072		.	.	.	.	.	.	.	.	.	.	.	43.5937				2	
92420	2	44	6	3964	201	0	89.375		96.625			.	.	.	.	.	.	.	.	.	.	.		43.2421				
92421				4056	199	15.875	89.25				7008	.	.	.	.	.	.	.	.	.	.	.	43.5937					2
92422				4136	196.5	0	89.25	96.375				.	.	.	.	.	.	.	.	.	.	.		43.2421				
92423				4220	194.5	15.875	89.375			7040		.	.	.	.	.	.	.	.	.	.	.	43.5937				2	
92424	2	44	10	4308	195	0	89.5		96.75			.	.	.	.	.	.	.	.	.	.	.		43.0663				
92425				4388	192	15.875	89.25				6928	.	.	.	.	.	.	.	.	.	.	.	43.4179					2
92426				4460	190	0	89.375	96.25				.	.	.	.	.	.	.	.	.	.	.		43.0663				
92427				4532	190	15.875	89.375			6912		.	.	.	.	.	.	.	.	.	.	.	43.4179				2	
92428	2	44	14	4600	188.5	0	89.25		96.625			.	.	.	.	.	.	.	.	.	.	.		43.0663				
92429				4660	188	15.875	89.375				6864	.	.	.	.	.	.	.	.	.	.	.	43.4179					2
92430				4720	187.5	0	89.375	96.375				.	.	.	.	.	.	.	.	.	.	.		42.8906				
92431				4772	187	15.875	89.375			6896		.	.	.	.	.	.	.	.	.	.	.	43.4179				2	
92432	2	44	18	4824	186.5	0	89.375		96.625			.	.	.	.	.	.	.	.	.	.	.		42.8906				
92433				4876	186	15.875	89.375				6816	.	.	.	.	.	.	.	.	.	.	.	43.4179					2
92434				4920	185.5	0	89.375	96.375				.	.	.	.	.	.	.	.	.	.	.		42.8906				
92435				4968	185.5	15.875	89.25			6896		.	.	.	.	.	.	.	.	.	.	.	43.5937				2	
92436	2	44	22	5008	185	0	89.375		96.625			.	.	.	.	.	.	.	.	.	.	.		42.7148				
92437				5044	184.5	15.875	89.375				6768	.	.	.	.	.	.	.	.	.	.	.	43.5937					2
92438				5076	185.5	0	89.375	96.25				.	.	.	.	.	.	.	.	.	.	.		42.7148				
92439				5112	186	15.875	89.375			6880		.	.	.	.	.	.	.	.	.	.	.	43.5937				2	
92440	2	44	26	5144	186.5	0	89.375		96.625			.	.	.	.	.	.	.	.	.	.	.		42.7148				
92441				5172	186	15.875	89.375				6736	.	.	.	.	.	.	.	.	.	.	.	43.5937					2
92442				5204	186.5	0	89.375	96.25				.	.	.	.	.	.	.	.	.	.	.		42.7148				
92443				5232	187	15.875	89.375			6848		.	.	.	.	.	.	.	.	.	.	.	43.5937				2	
92444	2	44	30	5260	187.5	0	89.375		96.625			.	.	.	.	.	.	.	.	.	.	.		42.7148				
92445				5288	188.5	15.875	89.375				6720	.	.	.	.	.	.	.	.	.	.	.	43.4179					2
92446				5320	189	0	89.375	96.125				.	.	.	.	.	.	.	.	.	.	.		42.7148				
92447				5344	189.5	15.875	89.375			6848		.	.	.	.	.	.	.	.	.	.	.	43.4179				2	
92448	2	44	34	5372	191	0	89.5		96.5			.	.	.	.	.	.	.	.	.	.	.		42.7148				
92449				5396	192	15.875	89.5				6752	.	.	.	.	.	.	.	.	.	.	.	43.4179					2
92450				5420	193.5	0	89.375	96.125				.	.	.	.	.	.	.	.	.	.	.		42.7148				
92451				5436	195	15.875	89.375			6816		.	.	.	.	.	.	.	.	.	.	.	43.4179				2	
92452	2	44	38	5452	196.5	0	89.375		96.375			.	.	.	.	.	.	.	.	.	.	.		42.7148				
92453				5460	198.5	15.875	89.375				6736	.	.	.	.	.	.	.	.	.	.	.	43.4179					2
92454				5464	200.5	0	89.375	96				.	.	.	.	.	.	.	.	.	.	.		42.7148				
92455				5468	202.5	15.875	89.375			6848		.	.	.	.	.	.	.	.	.	.	.	43.4179				2	
92456	2	44	42	5460	205.5	0	89.375		96.375			.	.	.	.	.	.	.	.	.	.	.		42.7148				
92457				5452	207.5	15.875	89.375				6752	.	.	.	.	.	.	.	.	.	.	.	43.4179		22.75			2
92458				5432	209.5	0	89.375	96				.	.	.	.	.	.	.	.	.	.	.		42.7148				
92459				5408	212	15.875	89.25			6848		.	.	.	.	.	.	.	.	.	.	.	43.4179				2	
92460	2	44	46	5380	215	0	89.25		96.25			.	.	.	.	.	.	.	.	.	.	.		42.7148				
92461				5332	218.5	15.875	89.25				6784	.	.	.	.	.	.	.	.	.	.	.	43.4179			21.75		2
92462				5276	222	0	89.125	96				.	.	.	.	.	.	.	.	.	.	.		42.7148				
92463				5204	225.5	15.875	89.125			6912		.	.	.	.	.	.	.	.	.	.	.	43.4179				2	
92464	2	44	50	5096	230.5	0	89.125		96.25			.	.	.	.	.	.	.	.	.	.	.		42.7148				

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	N1 L (%RPM)	N1 R (%RPM)	N2 L (%RPM)	N2 R (%RPM)	FUEL FLOW L (PPH)	FUEL FLOW R (PPH)	ENG 1 T/R L SLV DEPLOYED (0-DEPLOY 1-.)	ENG 1 T/R L SLV NOT STWD (0-UNLOCK 1-.)	ENG 1 T/R R SLV DEPLOYED (0-DEPLOY 1-.)	ENG 1 T/R R SLV NOT STWD (0-UNLOCK 1-.)	ENG 2 T/R L SLV DEPLOYED (0-DEPLOY 1-.)	ENG 2 T/R L SLV NOT STWD (0-UNLOCK 1-.)	ENG 2 T/R R SLV DEPLOYED (0-DEPLOY 1-.)	ENG 2 T/R R SLV NOT STWD (0-UNLOCK 1-.)	ENG 1 FIRE (0-. 1-FIRE)	ENG 2 FIRE (0-. 1-FIRE)	APU FIRE (0-. 1-FIRE)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)	ENG OIL QUANT L (PINTS)	ENG OIL QUANT R (PINTS)	OIL PRES L (PSI)	OIL PRES R (PSI)
92465				4972	236.5	15.875	89				6816	.	.	.	.	.	.	.	.	.	.	.	43.5937					2
92466				4816	244.5	0	89	96				.	.	.	.	.	.	.	.	.	.	.		42.7148				
92467				4628	254	15.875	89.625			7040		.	.	.	.	.	.	.	.	.	.	.	43.7695				2	
92468	2	44	54	4388	264.5	0	89.875		96.75			.	.	.	.	.	.	.	.	.	.	.		44.121				
92469				4124	275.5	15.875	90				7200	.	.	.	.	.	.	.	.	.	.	.	43.9452					2
92470				3820	289.5	0	89.875	96.125				.	.	.	.	.	.	.	.	.	.	.		44.121				
92471				3508	306.5	15.875	89.875			7280		.	.	.	.	.	.	.	.	.	.	.	44.2968				2	
92472	2	44	58	3068	317.5	0	89.625		96.75			.	.	.	.	.	.	.	.	.	.	.		43.9452				
92473				2640	334	15.875	89.125				7456	.	.	.	.	.	.	.	.	.	.	.	44.6484					2
92474				2216	352	0	87.5	95.875				.	.	.	.	.	.	.	.	.	.	.		43.9452				
92475				1748	368.5	15.875	77.125			6160		.	.	.	.	.	.	.	.	.	.	.	31.289				2	
92476	2	45	2	1320	382.5	0	63.375		90.5			.	.	.	.	.	.	.	.	.	.	.		19.3359				
92477				904	395	15.875	55.75				3168	.	.	.	.	.	.	.	.	.	.	.	2.28515					2
92478				524	410	0	51.5	86.25				.	.	.	.	.	.	.	.	.	.	.		2.98828				
92479				180	416	15.875	48.375			2128		.	.	.	.	.	.	.	.	.	.	.	5.27343				2	

Flash Air B737-300 Accident
Preliminary Data Created: January 23 2004
MCA

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
91864	2	34	50	216	45	.	.	.	.	.	.
91865				216	45	.	.	.	.	.	.
91866				216	45	.	.	.	.	.	.
91867				216	45	.	.	.	.	.	.
91868	2	34	54	216	45	.	.	.	.	.	.
91869				216	45	.	.	.	.	.	.
91870				216	45	.	.	.	.	.	.
91871				216	45	.	.	.	.	.	.
91872	2	34	58	216	45	.	.	.	.	.	.
91873				216	45	.	.	.	.	.	.
91874				216	45	.	.	.	.	.	.
91875				216	45	.	.	.	.	.	.
91876	2	35	2	216	45	.	.	.	.	.	.
91877				216	45	.	.	.	.	.	.
91878				216	45	.	.	.	.	.	.
91879				216	45	.	.	.	.	.	.
91880	2	35	6	216	45	.	.	.	.	.	.
91881				216	45	.	.	.	.	.	.
91882				216	45	.	.	.	.	.	.
91883				216	45	.	.	.	.	.	.
91884	2	35	10	216	45	.	.	.	.	.	.
91885				216	45	.	.	.	.	.	.
91886				216	45	.	.	.	.	.	.
91887				216	45	.	.	.	.	.	.
91888	2	35	14	216	45	.	.	.	.	.	.
91889				216	45	.	.	.	.	.	.
91890				216	45	.	.	.	.	.	.
91891				216	45	.	.	.	.	.	.
91892	2	35	18	216	45	.	.	.	.	.	.
91893				216	45	.	.	.	.	.	.
91894				216	45	.	.	.	.	.	.
91895				216	45	.	.	.	.	.	.
91896	2	35	22	216	45	.	.	.	.	.	.
91897				216	45	.	.	.	.	.	.
91898				216	45	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
91899				216	45	.	.	.	.	.	.
91900	2	35	26	216	45	.	.	.	.	.	.
91901				216	45	.	.	.	.	.	.
91902				216	45	.	.	.	.	.	.
91903				216	45	.	.	.	.	.	.
91904	2	35	30	216	45	.	.	.	.	.	.
91905				216	45	.	.	.	.	.	.
91906				216	45	.	.	.	.	.	.
91907				216	45	.	.	.	.	.	.
91908	2	35	34	216	45	.	.	.	.	.	.
91909				216	45	.	.	.	.	.	.
91910				216	45	.	.	.	.	.	.
91911				216	45	.	.	.	.	.	.
91912	2	35	38	216	45	.	.	.	.	.	.
91913				216	45	.	.	.	.	.	.
91914				216	45	.	.	.	.	.	.
91915				216	45	.	.	.	.	.	.
91916	2	35	42	216	45	.	.	.	.	.	.
91917				216	45	.	.	.	.	.	.
91918				216	45	.	.	.	.	.	.
91919				216	45	.	.	.	.	.	.
91920	2	35	46	216	45	.	.	.	.	.	.
91921				216	45	.	.	.	.	.	.
91922				216	45	.	.	.	.	.	.
91923				216	45	.	.	.	.	.	.
91924	2	35	50	216	45	.	.	.	.	.	.
91925				216	45	.	.	.	.	.	.
91926				216	45	.	.	.	.	.	.
91927				216	45	.	.	.	.	.	.
91928	2	35	54	216	45	.	.	.	.	.	.
91929				216	45	.	.	.	.	.	.
91930				216	45	.	.	.	.	.	.
91931				216	45	.	.	.	.	.	.
91932	2	35	58	216	45	.	.	.	.	.	.
91933				216	45	.	.	.	.	.	.
91934				216	45	.	.	.	.	.	.
91935				216	45	.	.	.	.	.	.
91936	2	36	2	216	45	.	.	.	.	.	.
91937				216	45	.	.	.	.	.	.
91938				216	45	.	.	.	.	.	.
91939				216	45	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
91940	2	36	6	216	45	.	.	.	.	.	.
91941				216	45	.	.	.	.	.	.
91942				216	45	.	.	.	.	.	.
91943				216	45	.	.	.	.	.	.
91944	2	36	10	216	45	.	.	.	.	.	.
91945				216	45	.	.	.	.	.	.
91946				216	45	.	.	.	.	.	.
91947				216	45	.	.	.	.	.	.
91948	2	36	14	216	45	.	.	.	.	.	.
91949				216	45	.	.	.	.	.	.
91950				216	45	.	.	.	.	.	.
91951				216	45	.	.	.	.	.	.
91952	2	36	18	216	45	.	.	.	.	.	.
91953				216	45	.	.	.	.	.	.
91954				216	45	.	.	.	.	.	.
91955				216	45	.	.	.	.	.	.
91956	2	36	22	216	45	.	.	.	.	.	.
91957				216	45	.	.	.	.	.	.
91958				216	45	.	.	.	.	.	.
91959				216	45	.	.	.	.	.	.
91960	2	36	26	216	45	.	.	.	.	.	.
91961				216	45	.	.	.	.	.	.
91962				216	45	.	.	.	.	.	.
91963				216	45	.	.	.	.	.	.
91964	2	36	30	216	45	.	.	.	.	.	.
91965				216	45	.	.	.	.	.	.
91966				216	45	.	.	.	.	.	.
91967				216	45	.	.	.	.	.	.
91968	2	36	34	216	45	.	.	.	.	.	.
91969				216	45	.	.	.	.	.	.
91970				216	45	.	.	.	.	.	.
91971				216	45	.	.	.	.	.	.
91972	2	36	38	216	45	.	.	.	.	.	.
91973				216	45	.	.	.	.	.	.
91974				216	45	.	.	.	.	.	.
91975				216	45	.	.	.	.	.	.
91976	2	36	42	216	45	.	.	.	KEYED	.	.
91977				216	45	.	.	.	KEYED	.	.
91978				216	45	.	.	.	.	.	.
91979				216	45	.	.	.	.	.	.
91980	2	36	46	216	45	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
91981				216	45	.	.	.	.	.	.
91982				216	45	.	.	.	.	.	.
91983				216	45	.	.	.	.	.	.
91984	2	36	50	216	45	.	.	.	.	.	.
91985				216	45	.	.	.	.	.	.
91986				216	45	.	.	.	.	.	.
91987				216	45	.	.	.	.	.	.
91988	2	36	54	216	45	.	.	.	.	.	.
91989				216	45	.	.	.	.	.	.
91990				216	45	.	.	.	KEYED	.	.
91991				216	45	.	.	.	KEYED	.	.
91992	2	36	58	216	45	.	.	.	KEYED	.	.
91993				216	45	.	.	.	KEYED	.	.
91994				216	45	.	.	.	KEYED	.	.
91995				216	45	.	.	.	.	.	.
91996	2	37	2	216	45	.	.	.	.	.	.
91997				216	45	.	.	.	.	.	.
91998				216	45	.	.	.	.	.	.
91999				216	45	.	.	.	.	.	.
92000	2	37	6	216	45	.	.	.	.	.	.
92001				216	45	.	.	.	.	.	.
92002				216	45	.	.	.	.	.	.
92003				216	45	.	.	.	.	.	.
92004	2	37	10	216	45	.	.	.	.	.	.
92005				216	45	.	.	.	.	.	.
92006				216	45	.	.	.	.	.	.
92007				216	45	.	.	.	.	.	.
92008	2	37	14	216	45	.	.	.	.	.	.
92009				216	45	.	.	.	.	.	.
92010				216	45	.	.	.	.	.	.
92011				216	45	.	.	.	.	.	.
92012	2	37	18	216	45	.	.	.	.	.	.
92013				216	45	.	.	.	.	.	.
92014				216	45	.	.	.	.	.	.
92015				216	45	.	.	.	.	.	.
92016	2	37	22	216	45	.	.	.	.	.	.
92017				216	45	.	.	.	.	.	.
92018				216	45	.	.	.	.	.	.
92019				216	45	.	.	.	.	.	.
92020	2	37	26	216	45	.	.	.	.	.	.
92021				216	45	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
92022				216	45	.	.	.	.	.	.
92023				216	45	.	.	.	.	.	.
92024	2	37	30	216	45	.	.	.	.	.	.
92025				216	45	.	.	.	.	.	.
92026				216	45	.	.	.	.	.	.
92027				216	45	.	.	.	.	.	.
92028	2	37	34	216	45	.	.	.	.	.	.
92029				216	45	.	.	.	.	.	.
92030				216	45	.	.	.	.	.	.
92031				216	45	.	.	.	.	.	.
92032	2	37	38	216	45	.	.	.	.	.	.
92033				216	45	.	.	.	.	.	.
92034				216	45	.	.	.	.	.	.
92035				216	45	.	.	.	.	.	.
92036	2	37	42	216	45	.	.	.	.	.	.
92037				216	45	.	.	.	.	.	.
92038				216	45	.	.	.	.	.	.
92039				216	45	.	.	.	.	.	.
92040	2	37	46	216	45	.	.	.	.	.	.
92041				216	45	.	.	.	.	.	.
92042				216	45	.	.	.	.	.	.
92043				216	45	.	.	.	.	.	.
92044	2	37	50	216	45	.	.	.	.	.	.
92045				216	45	.	.	.	.	.	.
92046				216	45	.	.	.	.	.	.
92047				216	45	.	.	.	.	.	.
92048	2	37	54	216	45	.	.	.	.	.	.
92049				216	45	.	.	.	.	.	.
92050				216	45	.	.	.	.	.	.
92051				216	45	.	.	.	.	.	.
92052	2	37	58	216	45	.	.	.	.	.	.
92053				216	45	.	.	.	.	.	.
92054				216	45	.	.	.	.	.	.
92055				216	45	.	.	.	.	.	.
92056	2	38	2	216	45	.	.	.	.	.	.
92057				216	45	.	.	.	.	.	.
92058				216	45	.	.	.	.	.	.
92059				216	45	.	.	.	.	.	.
92060	2	38	6	216	45	.	.	.	KEYED	.	.
92061				216	45	.	.	.	.	.	.
92062				212	45	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
92063				216	45	.	.	.	.	.	.
92064	2	38	10	212	45	.	.	.	.	.	.
92065				212	45	.	.	.	.	.	.
92066				212	45	.	.	.	.	.	.
92067				212	45	.	.	.	.	.	.
92068	2	38	14	212	45	.	.	.	.	.	.
92069				212	45	.	.	.	.	.	.
92070				212	45	.	.	.	.	.	.
92071				212	45	.	.	.	KEYED	.	.
92072	2	38	18	212	45	.	.	.	KEYED	.	.
92073				212	45	.	.	.	KEYED	.	.
92074				212	45	.	.	.	KEYED	.	.
92075				212	45	.	.	.	KEYED	.	.
92076	2	38	22	212	45	.	.	.	KEYED	.	.
92077				208	45	.	.	.	KEYED	.	.
92078				208	45	.	.	.	KEYED	.	.
92079				208	45	.	.	.	KEYED	.	.
92080	2	38	26	208	45	.	.	.	.	.	.
92081				208	45	.	.	.	.	.	.
92082				208	45	.	.	.	.	.	.
92083				208	45	.	.	.	.	.	.
92084	2	38	30	208	45	.	.	.	.	.	.
92085				208	45	.	.	.	KEYED	.	.
92086				208	45	.	.	.	.	.	.
92087				208	45	.	.	.	.	.	.
92088	2	38	34	208	45	.	.	.	.	.	.
92089				208	45	.	.	.	.	.	.
92090				208	45	.	.	.	KEYED	.	.
92091				208	45	.	.	.	KEYED	.	.
92092	2	38	38	208	45	.	.	.	.	.	.
92093				208	45	.	.	.	.	.	.
92094				208	45	.	.	.	.	.	.
92095				208	45	.	.	.	.	.	.
92096	2	38	42	208	45	.	.	.	.	.	.
92097				208	45	.	.	.	.	.	.
92098				208	45	.	.	.	.	.	.
92099				208	45	.	.	.	.	.	.
92100	2	38	46	208	45	.	.	.	.	.	.
92101				208	45	.	.	.	.	.	.
92102				208	45	.	.	.	.	.	.
92103				204	45	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
92104	2	38	50	204	45	.	.	.	.	.	.
92105				204	45	.	.	.	.	.	.
92106				204	45	.	.	.	.	.	.
92107				204	45	.	.	.	.	.	.
92108	2	38	54	204	45	.	.	.	.	.	.
92109				204	45	.	.	.	.	.	.
92110				208	45	.	.	.	.	.	.
92111				204	45	.	.	.	.	.	.
92112	2	38	58	204	45	.	.	.	.	.	.
92113				204	45	.	.	.	.	.	.
92114				204	45	.	.	.	.	.	.
92115				204	45	.	.	.	.	.	.
92116	2	39	2	204	45	.	.	.	.	.	.
92117				204	45	.	.	.	.	.	.
92118				204	45	.	.	.	.	.	.
92119				204	45	.	.	.	.	.	.
92120	2	39	6	204	45	.	.	.	.	.	.
92121				204	45	.	.	.	.	.	.
92122				204	45	.	.	.	.	.	.
92123				204	45	.	.	.	.	.	.
92124	2	39	10	204	45	.	.	.	.	.	.
92125				204	45	.	.	.	.	.	.
92126				204	45	.	.	.	.	.	.
92127				204	45	.	.	.	.	.	.
92128	2	39	14	204	45	.	.	.	.	.	.
92129				204	45	.	.	.	.	.	.
92130				200	45	.	.	.	.	.	.
92131				204	45	.	.	.	.	.	.
92132	2	39	18	200	45	.	.	.	.	.	.
92133				200	45	.	.	.	.	.	.
92134				200	45	.	.	.	.	.	.
92135				200	45	.	.	.	.	.	.
92136	2	39	22	200	45	.	.	.	.	.	.
92137				200	45	.	.	.	.	.	.
92138				200	45	.	.	.	.	.	.
92139				200	45	.	.	.	.	.	.
92140	2	39	26	200	45	.	.	.	.	.	.
92141				200	45	.	.	.	.	.	.
92142				200	45	.	.	.	.	.	.
92143				196	45	.	.	.	.	.	.
92144	2	39	30	196	45	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
92145				196	45	.	.	.	.	.	.
92146				196	45	.	.	.	.	.	.
92147				196	45	.	.	.	.	.	.
92148	2	39	34	196	45	.	.	.	.	.	.
92149				196	45	.	.	.	.	.	.
92150				196	45	.	.	.	.	.	.
92151				196	45	.	.	.	.	.	.
92152	2	39	38	196	45	.	.	.	.	.	.
92153				196	45	.	.	.	.	.	.
92154				196	45	.	.	.	.	.	.
92155				192	45	.	.	.	.	.	.
92156	2	39	42	192	45	.	.	.	.	.	.
92157				196	45	.	.	.	.	.	.
92158				192	45	.	.	.	.	.	.
92159				192	45	.	.	.	.	.	.
92160	2	39	46	192	45	.	.	.	.	.	.
92161				192	45	.	.	.	.	.	.
92162				192	45	.	.	.	.	.	.
92163				192	45	.	.	.	.	.	.
92164	2	39	50	192	45	.	.	.	.	.	.
92165				192	45	.	.	.	.	.	.
92166				192	45	.	.	.	.	.	.
92167				192	45	.	.	.	.	.	.
92168	2	39	54	192	45	.	.	.	.	.	.
92169				192	45	.	.	.	.	.	.
92170				192	45	.	.	.	.	.	.
92171				192	45	.	.	.	.	.	.
92172	2	39	58	192	45	.	.	.	.	.	.
92173				192	45	.	.	.	.	.	.
92174				192	45	.	.	.	.	.	.
92175				192	45	.	.	.	.	.	.
92176	2	40	2	192	45	.	.	.	.	.	.
92177				192	45	.	.	.	.	.	.
92178				192	45	.	.	.	.	.	.
92179				192	45	.	.	.	.	.	.
92180	2	40	6	192	45	.	.	.	.	.	.
92181				188	45	.	.	.	.	.	.
92182				192	45	.	.	.	.	.	.
92183				192	45	.	.	.	.	.	.
92184	2	40	10	192	45	.	.	.	.	.	.
92185				188	45	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
92186				192	45	.	.	.	.	.	.
92187				192	45	.	.	.	.	.	.
92188	2	40	14	188	45	.	.	.	.	.	.
92189				192	45	.	.	.	.	.	.
92190				188	45	.	.	.	.	.	.
92191				188	45	.	.	.	.	.	.
92192	2	40	18	188	45	.	.	.	.	.	.
92193				188	45	.	.	.	.	.	.
92194				188	45	.	.	.	.	.	.
92195				188	45	.	.	.	.	.	.
92196	2	40	22	188	45	.	.	.	.	.	.
92197				188	45	.	.	.	.	.	.
92198				188	45	.	.	.	.	.	.
92199				188	45	.	.	.	.	.	.
92200	2	40	26	188	45	.	.	.	.	.	.
92201				188	45	.	.	.	.	.	.
92202				188	45	.	.	.	.	.	.
92203				188	45	.	.	.	.	.	.
92204	2	40	30	188	45	.	.	.	.	.	.
92205				188	45	.	.	.	.	.	.
92206				188	45	.	.	.	.	.	.
92207				188	45	.	.	.	.	.	.
92208	2	40	34	188	45	.	.	.	.	.	.
92209				188	45	.	.	.	.	.	.
92210				188	45	.	.	.	.	.	.
92211				188	45	.	.	.	.	.	.
92212	2	40	38	188	45	.	.	.	.	.	.
92213				188	45	.	.	.	.	.	.
92214				188	45	.	.	.	KEYED	.	.
92215				184	45	.	.	.	KEYED	.	.
92216	2	40	42	188	45	.	.	.	.	.	.
92217				188	45	.	.	.	.	.	.
92218				188	45	.	.	.	.	.	.
92219				188	45	.	.	.	.	.	.
92220	2	40	46	188	45	.	.	.	.	.	.
92221				188	45	.	.	.	.	.	.
92222				184	45	.	.	.	.	.	.
92223				188	45	.	.	.	.	.	.
92224	2	40	50	188	45	.	.	.	.	.	.
92225				184	45	.	.	.	.	.	.
92226				184	45	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
92227				184	45	.	.	.	.	.	.
92228	2	40	54	184	45	.	.	.	.	.	.
92229				184	45	.	.	.	.	.	.
92230				184	45	.	.	.	KEYED	.	.
92231				184	45	.	.	.	KEYED	.	.
92232	2	40	58	184	45	.	.	.	KEYED	.	.
92233				184	45	.	.	.	KEYED	.	.
92234				184	45	.	.	.	KEYED	.	.
92235				184	45	.	.	.	KEYED	.	.
92236	2	41	2	184	45	.	.	.	.	.	.
92237				184	45	.	.	.	.	.	.
92238				184	45	.	.	.	.	.	.
92239				184	45	.	.	.	.	.	.
92240	2	41	6	184	45	.	.	.	.	.	.
92241				184	45	.	.	.	.	.	.
92242				184	45	.	.	.	.	.	.
92243				184	45	.	.	.	.	.	.
92244	2	41	10	184	45	.	.	.	.	.	.
92245				184	45	.	.	.	.	.	.
92246				184	45	.	.	.	.	.	.
92247				184	45	.	.	.	.	.	.
92248	2	41	14	184	45	.	.	.	.	.	.
92249				184	45	.	.	.	.	.	.
92250				184	45	.	.	.	.	.	.
92251				184	45	.	.	.	.	.	.
92252	2	41	18	184	45	.	.	.	.	.	.
92253				184	45	.	.	.	.	.	.
92254				184	45	.	.	.	.	.	.
92255				184	45	.	.	.	.	.	.
92256	2	41	22	184	45	.	.	.	.	.	.
92257				184	45	.	.	.	.	.	.
92258				184	45	.	.	.	.	.	.
92259				180	45	.	.	.	.	.	.
92260	2	41	26	180	45	.	.	.	.	.	.
92261				180	45	.	.	.	.	.	.
92262				180	45	.	.	.	.	.	.
92263				180	45	.	.	.	.	.	.
92264	2	41	30	180	45	.	.	.	.	.	.
92265				180	45	.	.	.	.	.	.
92266				180	45	.	.	.	.	.	.
92267				180	45	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
92268	2	41	34	180	45	.	.	.	.	.	.
92269				180	45	.	.	.	.	.	.
92270				180	45	.	.	.	.	.	.
92271				180	45	.	.	.	KEYED	.	.
92272	2	41	38	180	45	.	.	.	KEYED	.	.
92273				180	45	.	.	.	KEYED	.	.
92274				180	45	.	.	.	KEYED	.	.
92275				180	45	.	.	.	.	.	.
92276	2	41	42	180	45	.	.	.	.	.	.
92277				180	45	.	.	.	.	.	.
92278				180	45	.	.	.	.	.	.
92279				180	45	.	.	.	KEYED	.	.
92280	2	41	46	180	45	.	.	.	KEYED	.	.
92281				180	45	.	.	.	.	.	.
92282				180	45	.	.	.	.	.	.
92283				180	45	.	.	.	.	.	.
92284	2	41	50	180	45	.	.	.	.	.	.
92285				180	45	.	.	.	.	.	.
92286				180	45	.	.	.	.	.	.
92287				180	45	.	.	.	.	.	.
92288	2	41	54	180	45	.	.	.	.	.	.
92289				180	45	.	.	.	.	.	.
92290				180	45	.	.	.	.	.	.
92291				184	45	.	.	.	.	.	.
92292	2	41	58	180	45	.	.	.	.	.	.
92293				184	45	.	.	.	.	.	.
92294				184	45	.	.	.	.	.	.
92295				184	45	.	.	.	.	.	.
92296	2	42	2	188	45	.	.	.	.	.	.
92297				188	45	.	.	.	.	.	.
92298				188	45	.	.	.	.	.	.
92299				188	45	.	.	.	.	.	.
92300	2	42	6	192	45	.	.	.	.	.	.
92301				192	45.5	.	.	.	.	.	.
92302				192	49.5	.	.	.	.	.	.
92303				196	56	.	.	.	.	.	.
92304	2	42	10	196	61	.	.	.	.	.	.
92305				196	65	.	.	.	.	.	.
92306				196	70	.	.	.	.	.	.
92307				200	75.5	.	.	.	.	.	.
92308	2	42	14	200	78.5	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
92309				200	83.5	.	.	.	.	.	.
92310				200	89	.	.	.	.	.	.
92311				200	93	.	.	.	.	.	.
92312	2	42	18	200	97.5	.	.	.	.	.	.
92313				204	101	.	.	.	.	.	.
92314				204	106.5	.	.	.	.	.	.
92315				204	109.5	.	.	.	.	.	.
92316	2	42	22	204	115.5	.	.	.	.	.	.
92317				204	119.5	.	.	.	.	.	.
92318				204	123.5	.	.	.	.	.	.
92319				208	127.5	.	.	.	.	.	.
92320	2	42	26	208	131.5	.	.	.	.	.	.
92321				208	135.5	.	.	.	.	.	.
92322				208	139	.	.	.	.	.	.
92323				204	142.5	.	.	.	.	.	.
92324	2	42	30	204	146	.	.	.	.	.	.
92325				196	150	.	.	.	.	.	.
92326				192	152	.	.	.	.	.	.
92327				192	155.5	.	.	.	.	.	.
92328	2	42	34	196	159	.	.	.	.	.	.
92329				208	162	.	.	.	.	.	.
92330				220	165.5	.	.	.	.	.	.
92331				240	167.5	.	.	.	.	.	.
92332	2	42	38	268	169.5	.	.	.	.	.	.
92333				300	171.5	.	.	.	.	.	.
92334				328	172	.	.	.	.	.	.
92335				364	173	.	.	.	.	.	.
92336	2	42	42	400	174	.	.	.	.	.	.
92337				440	174.5	.	.	.	.	.	.
92338				480	176	.	.	.	.	.	.
92339				512	176.5	.	.	.	.	.	.
92340	2	42	46	548	177	.	.	.	.	.	.
92341				584	178	.	.	.	.	.	.
92342				616	178.5	.	.	.	.	.	.
92343				652	179	.	.	.	.	.	.
92344	2	42	50	688	178.5	.	.	.	.	.	.
92345				720	179.5	.	.	.	.	.	.
92346				756	179.5	.	.	.	.	.	.
92347				792	180	.	.	.	.	.	.
92348	2	42	54	832	180	.	.	.	.	.	.
92349				868	181	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
92350				904	180.5	.	.	.	.	.	.
92351				940	181.5	.	.	.	.	.	.
92352	2	42	58	976	181	.	.	.	.	.	.
92353				1016	181.5	.	.	.	.	.	.
92354				1052	181.5	.	.	.	.	.	.
92355				1096	183	.	.	.	.	.	.
92356	2	43	2	1136	183	.	.	.	.	.	.
92357				1180	184	.	.	.	.	.	.
92358				1220	184	.	.	.	.	.	.
92359				1268	184	.	.	.	.	.	.
92360	2	43	6	1312	184	.	.	.	.	.	.
92361				1352	183	.	.	.	.	.	.
92362				1396	184	.	.	.	.	.	.
92363				1440	184	.	.	.	.	.	.
92364	2	43	10	1484	183.5	.	.	.	.	.	.
92365				1528	183	.	.	.	.	.	.
92366				1576	183.5	.	.	.	.	.	.
92367				1624	183	.	.	.	KEYED	.	.
92368	2	43	14	1668	182.5	.	.	.	KEYED	.	.
92369				1708	183	.	.	.	KEYED	.	.
92370				1748	183.5	.	.	.	KEYED	.	.
92371				1784	184.5	.	.	.	KEYED	.	.
92372	2	43	18	1816	185.5	.	.	.	KEYED	.	.
92373				1844	186.5	.	.	.	.	.	.
92374				1868	187.5	.	.	.	.	.	.
92375				1892	188.5	.	.	.	.	.	.
92376	2	43	22	1912	190	.	.	.	.	.	.
92377				1932	191.5	.	.	.	.	.	.
92378				1948	193	.	.	.	.	.	.
92379				1964	194.5	.	.	.	.	.	.
92380	2	43	26	1980	196.5	.	.	.	.	.	.
92381				2000	198.5	.	.	.	.	.	.
92382				2020	200.5	.	.	.	.	.	.
92383				2040	202	.	.	.	.	.	.
92384	2	43	30	2064	203.5	.	.	.	.	.	.
92385				2084	205	.	.	.	.	.	.
92386				2112	206	.	.	.	.	.	.
92387				2136	207.5	.	.	.	.	.	.
92388	2	43	34	2168	208.5	.	.	.	.	.	.
92389				2196	209	.	.	.	.	.	.
92390				2224	210.5	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
92391				2252	212	.	.	.	.	.	.
92392	2	43	38	2284	213.5	.	.	.	.	.	.
92393				2320	214.5	.	.	.	.	.	.
92394				2352	215.5	.	.	.	.	.	.
92395				2392	215.5	.	.	.	.	.	.
92396	2	43	42	2432	216	.	.	.	.	.	.
92397				2472	216.5	.	.	.	.	.	.
92398				2520	216.5	.	.	.	.	.	.
92399				2572	217	.	.	.	.	.	.
92400	2	43	46	2624	216.5	.	.	.	.	.	.
92401				2676	216.5	.	.	.	.	.	.
92402				2728	216	.	.	.	.	.	.
92403				2784	216.5	.	.	.	.	.	.
92404	2	43	50	2840	217	.	.	.	.	.	.
92405				2892	217	.	.	.	.	.	.
92406				2948	216.5	.	.	.	.	.	.
92407				3004	216.5	.	.	.	.	.	.
92408	2	43	54	3064	216	.	.	.	.	.	.
92409				3124	216	.	.	.	.	.	.
92410				3188	214.5	.	.	.	.	.	.
92411				3252	214	.	.	.	.	.	.
92412	2	43	58	3320	213.5	.	.	.	.	.	.
92413				3392	212	.	.	.	.	.	.
92414				3468	209.5	.	.	.	.	.	.
92415				3544	209.5	.	.	.	.	.	.
92416	2	44	2	3624	207	.	.	.	.	.	.
92417				3712	206	.	.	.	.	.	WARN
92418				3796	204.5	.	.	.	.	.	.
92419				3880	203	.	.	.	.	.	.
92420	2	44	6	3964	201	.	.	.	.	.	.
92421				4056	199	.	.	.	.	.	.
92422				4136	196.5	.	.	.	.	.	.
92423				4220	194.5	.	.	.	.	.	.
92424	2	44	10	4308	195	.	.	.	.	.	.
92425				4388	192	.	.	.	.	.	.
92426				4460	190	.	.	.	.	.	.
92427				4532	190	.	.	.	.	.	.
92428	2	44	14	4600	188.5	.	.	.	.	.	.
92429				4660	188	.	.	.	.	.	.
92430				4720	187.5	.	.	.	.	.	.
92431				4772	187	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
92432	2	44	18	4824	186.5	.	.	.	.	.	.
92433				4876	186	.	.	.	.	.	.
92434				4920	185.5	.	.	.	.	.	.
92435				4968	185.5	.	.	.	.	.	.
92436	2	44	22	5008	185	.	.	.	.	.	.
92437				5044	184.5	.	.	.	.	.	.
92438				5076	185.5	.	.	.	.	.	.
92439				5112	186	.	.	.	.	.	.
92440	2	44	26	5144	186.5	.	.	.	.	.	.
92441				5172	186	.	.	.	.	.	.
92442				5204	186.5	.	.	.	.	.	.
92443				5232	187	.	.	.	.	.	.
92444	2	44	30	5260	187.5	.	.	.	.	.	.
92445				5288	188.5	.	.	.	.	.	.
92446				5320	189	.	.	.	.	.	.
92447				5344	189.5	.	.	.	.	.	.
92448	2	44	34	5372	191	.	.	.	.	.	.
92449				5396	192	.	.	.	.	.	.
92450				5420	193.5	.	.	.	.	.	.
92451				5436	195	.	.	.	.	.	.
92452	2	44	38	5452	196.5	.	.	.	.	.	.
92453				5460	198.5	.	.	.	.	.	.
92454				5464	200.5	.	.	.	.	.	.
92455				5468	202.5	.	.	.	.	.	.
92456	2	44	42	5460	205.5	.	.	.	.	.	.
92457				5452	207.5	.	.	.	.	.	.
92458				5432	209.5	.	.	.	.	.	.
92459				5408	212	.	.	.	.	.	.
92460	2	44	46	5380	215	.	.	.	.	.	.
92461				5332	218.5	.	.	.	.	.	.
92462				5276	222	.	.	.	.	.	.
92463				5204	225.5	.	.	.	.	.	.
92464	2	44	50	5096	230.5	.	.	.	.	.	.
92465				4972	236.5	.	.	.	.	.	.
92466				4816	244.5	.	.	.	.	.	.
92467				4628	254	.	.	.	.	.	.
92468	2	44	54	4388	264.5	.	.	.	.	.	.
92469				4124	275.5	.	.	.	.	.	.
92470				3820	289.5	.	.	.	.	.	.
92471				3508	306.5	.	.	.	.	.	.
92472	2	44	58	3068	317.5	.	.	.	.	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	HF L KEYING (0-KEYED 1-.)	HF R KEYING (0-KEYED 1-.)	VHF C KEYING (0-KEYED 1-.)	VHF L KEYING (0-KEYED 1-.)	VHF R KEYING (0-KEYED 1-.)	A/P WARN (0-WARN 1-.)
92473				2640	334	.	.	.	.	.	.
92474				2216	352	.	.	.	.	.	.
92475				1748	368.5	.	.	.	.	.	.
92476	2	45	2	1320	382.5	.	.	.	.	.	.
92477				904	395	.	.	.	.	.	.
92478				524	410	.	.	.	.	.	.
92479				180	416	.	.	.	.	.	.
92480											

Flash Air B737-300 Accident
Preliminary Data Created: January 20 2004
MCA

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETI HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
91864	2	34	50	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	13.625	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
91865				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	14.125	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91866				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	14.75	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91867				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	15.5	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91868	2	34	54	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	16.125	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91869				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	16.875	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91870				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	17.625	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91871				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	18.25	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91872	2	34	58	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	18.875	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91873				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	19.5	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91874				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.5	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91875				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.375	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91876	2	35	2	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	22	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91877				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.625	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
91878				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.25	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91879				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.375	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91880	2	35	6	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.375	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91881				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.25	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91882				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.25	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91883				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.25	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91884	2	35	10	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.25	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91885				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.25	1.7	-0.32326	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91886				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.125	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91887				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	21	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91888	2	35	14	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91889				216	45	-3.82096	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91890				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91891				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.125	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91892	2	35	18	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.125	1.7	-0.24244	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91893				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.125	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											0.17578										
											0.17578										
91894				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.125	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91895				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.125	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91896	2	35	22	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.125	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.23047						-3.59122	34.9172
											0.17578										
											0.17578										
91897				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91898				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.125	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91899				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.125	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91900	2	35	26	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.125	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91901				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.125	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91902				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.125	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91903				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91904	2	35	30	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	21	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91905				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91906				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91907				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91908	2	35	34	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
91909				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91910				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91911				216	45	-3.82096	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91912	2	35	38	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	21	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91913				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91914				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91915				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91916	2	35	42	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91917				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91918				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91919				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91920	2	35	46	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91921				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91922				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91923				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91924	2	35	50	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.125	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											0.17578										
											0.17578										
91925				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91926				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	21	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91927				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91928	2	35	54	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91929				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91930				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91931				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91932	2	35	58	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91933				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91934				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91935				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.125	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.23047						-3.59122	34.9172
											0.17578										
											0.17578										
91936	2	36	2	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.125	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91937				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.125	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91938				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.25	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91939				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.25	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
91940	2	36	6	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.125	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91941				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.125	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91942				216	45	-3.88063	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.125	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91943				216	45	-3.88063	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.125	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91944	2	36	10	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21.125	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.23047						-3.59122	34.9172
											0.17578										
											0.17578										
91945				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	21.125	1.7	-0.24244	-0.27985	-3.59122	34.9172
										9.54769	0.17578	0		1.23047						-3.59122	34.9172
											0.17578										
											0.17578										
91946				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	20.875	1.7	-0.24244	-0.27985	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91947				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91948	2	36	14	216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	20.75	1.7	-0.24244	-0.24489	-3.59122	34.9172
										9.54769	0.17578	0		1.23047						-3.59122	34.9172
											0.17578										
											0.17578										
91949				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.75	1.7	-0.16164	-0.24489	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91950				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.03499	-3.59122	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
91951				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.64084	34.7073
											0.17578										
											0.17578										
91952	2	36	18	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91953				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.23047						-3.59122	34.7073
											0.17578										
											0.17578										
91954				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.75	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.23047						-3.59122	34.7073
											0.17578										
											0.17578										
91955				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											0.17578										
											0.17578										
91956	2	36	22	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91957				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91958				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91959				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91960	2	36	26	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91961				216	45	-3.88063	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91962				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.23047						-3.59122	34.7073
											0.17578										
											0.17578										
91963				216	45	-3.82096	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91964	2	36	30	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	21	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91965				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.32326	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91966				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91967				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91968	2	36	34	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91969				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91970				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
91971				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91972	2	36	38	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91973				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.75	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91974				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.59122	34.7073
											0.17578										
											0.17578										
91975				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.59122	34.7073
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91976	2	36	42	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91977				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	35.1254
											0.17578										
											0.17578										
91978				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91979				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91980	2	36	46	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91981				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91982				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
91983				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91984	2	36	50	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	-0.24244	-0.27985	-3.59122	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
91985				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.24244	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.59122	34.9172
											0.17578										
											0.17578										
91986				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	20.875	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											0.17578										
											0.17578										
91987				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91988	2	36	54	216	45	-3.82096	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.75	1.7	-0.32326	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
91989				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	20.875	1.7	-0.32326	-0.31481	-3.59122	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	35.1254
											0.17578										
											0.17578										
91990				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	20.875	1.7	-0.32326	-0.27985	-3.59122	35.1254
										9.54769	0.17578	0		1.05469						-3.64084	35.1254
											0.17578										
											0.17578										
91991				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	20.75	1.7	-0.32326	-0.27985	-3.64084	35.1254
										9.54769	0.17578	0		1.05469						-3.64084	35.1254
											0.17578										
											0.17578										
91992	2	36	58	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	20.875	1.7	-0.32326	-0.27985	-3.64084	35.1254
										9.54769	0.17578	0		1.05469						-3.64084	35.1254
											0.17578										
											0.17578										
91993				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	20.875	1.7	-0.32326	-0.27985	-3.64084	35.1254
										9.54769	0.17578	0		1.05469						-3.64084	35.1254
											0.17578										
											0.17578										
91994				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	20.875	1.7	-0.32326	-0.27985	-3.59122	35.1254
										9.54769	0.17578	0		1.23047						-3.64084	35.1254
											0.17578										
											0.17578										
91995				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	20.875	1.7	-0.32326	-0.27985	-3.64084	35.1254
										9.54769	0.17578	0		1.23047						-3.59122	34.9172
											0.17578										
											0.17578										
91996	2	37	2	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	20.875	1.7	-0.32326	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
91997				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.32326	-0.34976	-3.59122	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
91998				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	20.875	1.7	0	-0.17494	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
91999				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	20.875	1.7	-0.24244	-0.20992	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
92000	2	37	6	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	20.875	1.7	-0.24244	-0.24489	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
92001				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	20.875	1.7	-0.32326	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
92002				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	20.875	1.7	-0.40409	-0.31481	-3.69037	34.9172
										9.54769	0.17578	0		1.05469						-3.69037	34.9172
											0.17578										
											0.17578										
92003				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	20.875	1.7	-0.40409	-0.41961	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
92004	2	37	10	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	20.875	1.7	-0.48489	-0.34976	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
92005				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	21.5	1.7	-0.40409	-0.34976	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
92006				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	22.5	1.7	-0.40409	-0.34976	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
92007				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	22.125	1.7	-0.40409	-0.34976	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
92008	2	37	14	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	21.875	1.7	-0.40409	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
92009				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	22	1.7	-0.32326	-0.31481	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
92010				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	22.625	1.7	-0.32326	-0.24489	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
92011				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	23.875	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
92012	2	37	18	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	25.5	1.7	-0.32326	-0.24489	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
92013				216	45	-3.82096	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	28	1.7	-0.32326	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
92014				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	31.5	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
92015				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	15.875	34.5	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
92016	2	37	22	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.23047	0	39.125	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
92017				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	40.375	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											0.17578										
											0.17578										
92018				216	45	-3.82096	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	40	1.7	-0.24244	-0.27985	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
92019				216	45	-3.76128	-4.75997	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	15.875	39.875	1.7	-0.40409	-0.24489	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
92020	2	37	26	216	45	-3.82096	-4.82328	0.969642	0.969645	9.54769	0.17578	0	309.375	1.05469	0	38.375	1.7	-0.48489	-0.24489	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
92021				216	45	-3.76128	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.727	1.05469	15.875	34.875	1.7	-0.24244	-0.24489	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
92022				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	309.727	1.05469	0	31.875	1.7	-0.56571	-0.24489	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0.17578										
											0.17578										
92023				216	45	-3.94032	-4.69666	0.969642	0.969645	9.54769	0.17578	0	310.078	1.05469	15.875	29.875	1.7	-1.5349	-0.24489	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
92024	2	37	30	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	311.133	1.23047	0	30.375	1.7	-1.93828	-0.24489	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0.17578										
											0.17578										
92025				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0.17578	0	312.188	1.23047	15.875	30.625	1.7	-2.34132	-0.24489	-3.64084	34.9172
										9.54769	0.17578	0		1.23047						-3.64084	34.9172
											0										
											0										
92026				216	45	-3.88063	-4.63334	0.969642	0.969645	9.54769	0	0	314.648	1.23047	0	30.5	1.7	-3.3066	1.92954	-3.64084	34.9172
										9.54769	0	0		1.05469						-3.64084	34.9172
											0										
											0										
92027				216	45	-3.82096	-4.63334	0.969642	0.969645	9.54769	0	0	317.109	1.05469	15.875	28.75	1.7	19.7637	12.9665	-3.64084	34.9172
										9.54769	0	0		1.23047						-3.64084	34.9172
											0										
											0										
92028	2	37	34	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	0	0	321.328	1.05469	0	26.75	1.7	25.8946	0.767971	-3.64084	34.9172
										9.54769	0.17578	0		1.05469						-3.64084	34.9172
											0										
											0										
92029				216	45	-3.88063	-4.75997	0.969642	0.969645	9.54769	-0.17578	-0.35156	325.195	1.23047	15.875	25.25	1.7	-6.17691	-4.01553	-3.64084	34.9172
										9.54769	-0.17578	-0.35156		1.05469						-3.64084	34.9172
											-0.17578										
											-0.17578										
92030				216	45	-3.94032	-4.63334	0.969642	0.969645	9.54769	-0.17578	-0.35156	331.523	1.23047	0	25	1.7	-26.5765	-12.4389	-3.64084	34.9172
										9.54769	-0.17578	-0.35156		1.23047						-3.64084	34.9172
											-0.35156										
											-0.35156										
92031				216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	-0.35156	0	337.5	1.23047	15.875	23.625	1.7	-16.3136	-0.24489	-3.64084	34.9172
										9.54769	-0.35156	0		1.05469						-3.64084	34.9172
											-0.35156										
											-0.35156										
92032	2	37	38	216	45	-3.88063	-4.69666	0.969642	0.969645	9.54769	-0.35156	0	345.234	1.05469	0	22.375	1.7	-2.90476	-0.17494	-3.64084	34.9172
										9.54769	-0.35156	-0.35156		1.05469						-3.64084	56.5421
											-0.35156										
											-0.17578										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
92033				216	45	-3.52258	-4.5067	-17.9471	18.4694	3.21902	-0.17578	-0.70312	351.211	1.05469	15.875	22.25	1.7	-2.18013	-0.20992	-3.78912	64.3333
										9.54769	-0.17578	-0.70312		1.05469						-3.64084	1.87282
											-0.17578										
											-0.17578										
92034				216	45	-3.88063	-5.70867	10.9874	-21.2343	5.34222	-0.17578	-0.35156	358.945	1.05469	0	22.75	1.7	-1.21196	-0.24489	-3.03913	-1.1254
										10.5907	-0.17578	-0.35156		1.05469						-3.29145	-0.37574
											0										
											0										
92035				216	45	-4.06334	-0.78898	4.30866	1.19328	10.5907	0	0	4.92188	1.05469	15.875	22.625	1.8	-0.08082	-0.24489	-3.69037	19.1577
										10.5907	0	-0.35156		1.05469						-10.9023	17.2165
											0										
											0										
92036	2	37	42	216	45	18.5069	10.7375	0.969642	0.969645	10.5907	0	0	12.3047	1.05469	0	22.375	1.8	0.969673	-0.24489	-14.807	17.8705
										10.5907	0	0		1.05469						1.11645	17.5444
											0										
											0										
92037				216	45	-21.3483	-22.6033	0.969642	0.969645	10.5907	0	0	17.9297	1.05469	15.875	22.5	1.7	1.37345	-0.20992	11.0127	17.5444
										10.5907	0	0.351562		1.05469						-1.27508	17.2165
											0										
											0										
92038				216	45	-1.91434	-4.94987	0.969642	0.969645	10.5907	0	0.351562	23.5547	1.05469	0	22.5	1.7	2.6634	-0.24489	-3.59122	17.2165
										10.5907	0	0.703124		1.05469						-3.59122	17.5444
											0										
											0										
92039				216	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	0	0.703124	28.4766	1.05469	15.875	22.5	1.7	2.26073	-0.20992	-3.59122	17.5444
										10.5907	0	1.05469		1.05469						-3.59122	17.5444
											0										
											-0.17578										
92040	2	37	46	216	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.17578	1.05469	34.1016	1.05469	0	22.625	1.7	3.7078	-0.10497	-3.59122	17.5444
										10.5907	-0.17578	1.05469		1.05469						-3.59122	17.5444
											-0.17578										
											-0.17578										
92041				216	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.17578	1.05469	38.3203	1.05469	15.875	22.625	1.7	2.50239	-0.10497	-3.64084	17.5444
										10.5907	-0.35156	1.05469		1.05469						-3.59122	17.5444
											-0.35156										
											-0.35156										
92042				216	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	1.05469	43.5938	1.05469	0	22.5	1.7	-1.45419	-0.06998	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.05469						-3.59122	17.5444
											-0.52734										
											-0.52734										
92043				216	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	50.625	1.05469	15.875	22.5	1.7	-3.38689	-0.06998	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.05469						-3.59122	17.5444
											-0.52734										
											-0.52734										
92044	2	37	50	216	45	-4	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	56.9531	1.23047	0	22.75	1.7	-3.14593	-0.06998	-3.59122	17.5444
										10.5907	-0.52734	0.351562		1.05469						-3.59122	17.5444
											-0.52734										
											-0.52734										
92045				216	45	-3.94032	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.351562	65.7422	1.23047	15.875	22.75	1.7	-3.3066	-0.06998	-3.59122	17.5444
										10.5907	-0.52734	0		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92046				216	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.35156	0	73.125	1.23047	0	22.75	1.7	-2.42185	-0.06998	-3.64084	17.5444
										10.5907	-0.35156	-0.35156		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92047				216	45	-3.88063	-4.75997	0.969642	0.969645	10.5907	-0.52734	-0.35156	82.9688	1.23047	15.875	22.75	1.7	-0.80809	-0.10497	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92048	2	37	54	216	45	-3.94032	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	90	1.23047	0	22.625	1.7	0	-0.13996	-3.64084	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETI HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											-0.52734										
											-0.52734										
92049				216	45	-3.94032	-4.63334	0.969642	0.969645	10.5907	-0.52734	-0.35156	99.4922	1.23047	15.875	22.5	1.7	0.484903	-0.13996	-3.59122	17.5444
										10.5907	-0.52734	-0.70312		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92050				216	45	-3.94032	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	106.523	1.23047	0	22.625	1.7	1.29271	-0.13996	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92051				216	45	-3.94032	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	115.312	1.23047	15.875	22.5	1.7	2.74388	-0.17494	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92052	2	37	58	216	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	121.641	1.23047	0	22.5	1.7	3.7078	-0.13996	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92053				216	45	-3.94032	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	127.969	1.23047	15.875	22.5	1.7	3.78796	-0.10497	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92054				216	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.52734	-0.35156	131.133	1.23047	0	22.375	1.7	3.78796	-0.13996	-3.59122	17.5444
										10.5907	-0.70312	0		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92055				216	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0	133.594	1.23047	15.875	22.375	1.7	3.78796	-0.20992	-3.59122	17.5444
										10.5907	-0.52734	0		1.23047						-3.59122	17.5444
											-0.52734										
											-0.35156										
92056	2	38	2	216	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.35156	0	134.648	1.23047	0	22.375	1.7	3.46716	-0.27985	-3.59122	17.5444
										10.5907	0	0		1.23047						-3.59122	17.5444
											0										
											0.17578										
92057				216	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	0.17578	-0.35156	135.703	1.23047	15.875	22.375	1.7	3.46716	-0.31481	-3.59122	17.5444
										10.5907	0.17578	-0.35156		1.23047						-3.59122	17.5444
											0										
											0										
92058				216	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	0	-0.35156	135.703	1.23047	0	22.375	1.7	3.46716	-0.31481	-3.59122	17.5444
										10.5907	0	-0.35156		1.23047						-3.59122	17.5444
											-0.17578										
											-0.35156										
92059				216	45	-3.88063	-4.75997	0.969642	0.969645	10.5907	-0.35156	-0.70312	135.352	1.23047	15.875	22.25	1.8	3.38689	-0.34976	-3.59122	17.5444
										10.5907	-0.35156	-0.35156		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92060	2	38	6	216	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	135.352	1.23047	0	22.25	1.7	1.05045	-0.34976	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92061				216	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	135.703	1.23047	15.875	22.25	1.7	-0.24244	-0.38469	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.64084	17.5444
											-0.52734										
											-0.35156										
92062				212	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	136.055	1.23047	0	22.25	1.7	-0.72731	0.244894	-3.59122	17.5444
										10.5907	-0.52734	0		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92063				216	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	136.406	1.23047	15.875	22.25	1.7	-1.21196	-0.34976	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
92064	2	38	10	212	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0	137.109	1.23047	0	22.25	1.7	-0.32326	-0.31481	-3.59122	17.5444
										10.5907	-0.52734	0		1.23047						-3.64084	17.8705
											-0.52734										
											-0.70312										
92065				212	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.8789	0	137.109	1.23047	15.875	22.25	1.7	1.37345	-0.31481	-3.59122	17.8705
										10.5907	-0.8789	0		1.23047						-3.59122	17.8705
											-0.8789										
											-0.8789										
92066				212	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.8789	0	136.406	1.23047	0	22.25	1.7	2.3413	-0.31481	-3.64084	17.8705
										10.5907	-0.8789	0		1.23047						-3.59122	17.5444
											-0.8789										
											-1.05469										
92067				212	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-1.05469	-0.35156	134.297	1.23047	15.875	22.25	1.8	1.6156	-0.41961	-3.59122	17.5444
										10.5907	-0.8789	0		1.23047						-3.59122	17.5444
											-0.8789										
											-1.05469										
92068	2	38	14	212	45	-3.76128	-4.69666	0.969642	0.969645	10.5907	-1.05469	-0.35156	132.891	1.23047	0	22.25	1.7	0.565711	0.66366	-3.59122	17.5444
										10.5907	-0.8789	-0.35156		1.23047						-3.59122	17.5444
											-0.8789										
											-0.8789										
92069				212	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.8789	-0.35156	131.133	1.23047	15.875	22.25	1.7	-0.72731	-0.38469	-3.59122	17.5444
										10.5907	-1.05469	-0.35156		1.23047						-3.64084	17.5444
											-1.05469										
											-1.05469										
92070				212	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-1.05469	-0.35156	129.727	1.23047	0	22.25	1.7	-2.09953	-0.34976	-3.64084	17.5444
										10.5907	-1.05469	-0.35156		1.23047						-3.59122	18.195
											-1.05469										
											-1.05469										
92071				212	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-1.05469	0	129.375	1.23047	15.875	22.25	1.7	-2.5829	-0.34976	-3.59122	18.195
										10.5907	-1.05469	-0.35156		1.23047						-3.59122	18.195
											-1.05469										
											-1.05469										
92072	2	38	18	212	45	-3.82096	-4.69666	0.969642	1.04419	10.5907	-1.23047	-0.35156	129.023	1.23047	0	22.25	1.7	-2.34132	-0.31481	-3.59122	18.195
										10.5907	-1.23047	-0.35156		1.23047						-3.59122	18.195
											-1.05469										
											-1.23047										
92073				212	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-1.23047	-0.35156	128.32	1.23047	15.875	22.375	1.7	-0.32326	-0.27985	-3.59122	18.195
										10.5907	-1.05469	-0.35156		1.23047						-3.64084	18.195
											-1.05469										
											-1.05469										
92074				212	45	-3.82096	-4.69666	0.969642	1.04419	10.5907	-1.05469	-0.35156	127.266	1.23047	0	22.25	1.7	-0.48489	-0.24489	-3.64084	18.195
										10.5907	-1.05469	-0.35156		1.23047						-3.64084	18.195
											-1.05469										
											-1.05469										
92075				212	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-1.05469	-0.35156	126.211	1.23047	15.875	22.375	1.7	0.484903	-0.24489	-3.59122	18.195
										10.5907	-1.05469	0		1.23047						-3.64084	18.195
											-1.23047										
											-1.05469										
92076	2	38	22	212	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-1.05469	-0.35156	124.102	1.23047	0	22.375	1.7	1.77697	-0.24489	-3.64084	18.195
										10.5907	-1.05469	-0.35156		1.23047						-3.64084	18.195
											-1.05469										
											-1.05469										
92077				208	45	-3.94032	-4.57003	0.969642	0.969645	10.5907	-1.05469	-0.35156	121.992	1.23047	15.875	22.375	1.7	3.5474	-0.20992	-3.59122	18.195
										10.5907	-1.05469	0		1.23047						-3.59122	18.195
											-0.8789										
											-0.8789										
92078				208	45	-3.7016	-4.69666	0.969642	0.969645	10.5907	-1.05469	0	117.422	1.23047	0	22.375	1.7	3.5474	-0.24489	-3.59122	18.195
										10.5907	-1.05469	0		1.23047						-3.59122	18.195
											-0.8789										
											-1.05469										
92079				208	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-1.05469	0	111.797	1.23047	15.875	22.25	1.7	3.5474	-0.24489	-3.59122	18.195
										10.5907	-1.05469	0.351562		1.23047						-3.59122	17.5444

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											-1.05469										
											-1.05469										
92080	2	38	26	208	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-1.05469	0.351562	104.062	1.23047	0	22.25	1.7	3.5474	-0.20992	-3.59122	17.5444
										10.5907	-1.23047	0.703124		1.23047						-3.59122	17.5444
											-1.23047										
											-1.05469										
92081				208	45	-3.76128	-4.69666	0.969642	1.04419	10.5907	-1.05469	0.703124	97.0312	1.23047	15.875	22.25	1.7	3.5474	-0.20992	-3.59122	17.5444
										10.5907	-1.05469	0.703124		1.23047						-3.59122	17.5444
											-1.05469										
											-0.8789										
92082				208	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.8789	0.703124	87.1875	1.23047	0	22.25	1.7	3.5474	-0.24489	-3.59122	17.5444
										10.5907	-0.8789	0.351562		1.23047						-3.59122	17.5444
											-0.8789										
											-0.8789										
92083				208	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.8789	0.703124	79.4531	1.23047	15.875	22.25	1.8	3.06557	-0.20992	-3.64084	17.5444
										10.5907	-0.8789	0.703124		1.23047						-3.64084	17.5444
											-0.8789										
											-0.70312										
92084	2	38	30	208	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	1.05469	69.9609	1.23047	0	22.125	1.8	-0.48489	-0.20992	-3.64084	17.5444
										10.5907	-0.70312	1.05469		1.23047						-3.64084	17.8705
											-0.70312										
											-0.70312										
92085				208	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	62.9297	1.23047	15.875	22	1.8	-0.96967	-0.20992	-3.59122	17.5444
										10.5907	-0.70312	0.703124		1.23047						-3.59122	17.5444
											-0.70312										
											-0.52734										
92086				208	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	54.4922	1.23047	0	22	1.8	-3.3066	-0.20992	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92087				208	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	48.8672	1.23047	15.875	22	1.7	-3.9482	-0.20992	-3.59122	17.5444
										10.5907	-0.52734	1.05469		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92088	2	38	34	208	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	1.05469	43.2422	1.23047	0	22	1.7	-3.9482	-0.20992	-3.59122	17.5444
										10.5907	-0.35156	1.05469		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92089				208	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	1.05469	40.0781	1.23047	15.875	22	1.7	-3.86808	-0.13996	-3.64084	17.5444
										10.5907	-0.35156	1.05469		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92090				208	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	38.3203	1.23047	0	22	1.7	-3.86808	-0.17494	-3.64084	17.8705
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.8705
											-0.35156										
											-0.35156										
92091				208	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	37.2656	1.23047	15.875	22.125	1.7	-3.86808	-0.13996	-3.64084	17.8705
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92092	2	38	38	208	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	1.05469	37.2656	1.23047	0	22.25	1.7	-3.86808	-0.27985	-3.64084	17.5444
										10.5907	-0.35156	1.05469		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92093				208	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	1.05469	37.6172	1.23047	15.875	22.25	1.7	-4.10832	-0.27985	-3.59122	17.5444
										10.5907	-0.35156	1.05469		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92094				208	45	-3.94032	-4.69666	0.969642	0.969645	10.5907	-0.35156	1.05469	37.6172	1.23047	0	22.25	1.7	-2.42185	-0.27985	-3.59122	17.5444
										10.5907	-0.35156	1.05469		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
92095				208	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	37.2656	1.23047	15.875	22.25	1.7	-1.45419	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92096	2	38	42	208	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	37.2656	1.23047	0	22.25	1.7	-0.72731	-0.27985	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92097				208	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	36.9141	1.23047	15.875	22.25	1.7	-1.45419	-0.20992	-3.59122	17.5444
										10.5907	-0.35156	0.351562		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92098				208	45	-3.88063	-4.75997	0.969642	0.969645	10.5907	-0.35156	0.703124	37.2656	1.23047	0	22.25	1.7	-2.18013	-0.24489	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92099				208	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	38.3203	1.23047	15.875	22.25	1.7	-0.24244	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92100	2	38	46	208	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	38.3203	1.23047	0	22.25	1.7	0	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	0.351562		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92101				208	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.351562	38.6719	1.23047	15.875	22.25	1.7	0.24246	-0.20992	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92102				208	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	39.0234	1.23047	0	22.375	1.7	-0.24244	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92103				204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	39.375	1.23047	15.875	22.375	1.7	0.323277	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92104	2	38	50	204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	39.7266	1.23047	0	22.375	1.7	0.404091	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92105				204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	40.0781	1.23047	15.875	22.375	1.7	1.37345	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92106				204	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	39.7266	1.23047	0	22.375	1.7	1.05045	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92107				204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	39.7266	1.23047	15.875	22.375	1.7	0.161641	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92108	2	38	54	204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	1.05469	39.375	1.23047	0	22.375	1.7	0.646514	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	1.05469		1.23047						-3.59122	17.5444
											-0.35156										
											-0.52734										
92109				204	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.52734	1.05469	39.0234	1.23047	15.875	22.375	1.7	0.161641	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92110				208	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	39.0234	1.23047	0	22.375	1.7	-0.24244	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											-0.35156										
											-0.52734										
92111				204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	39.0234	1.23047	15.875	22.375	1.7	0.24246	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92112	2	38	58	204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	38.6719	1.23047	0	22.375	1.7	0	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.35156										
92113				204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	38.6719	1.23047	15.875	22.25	1.7	-0.16164	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92114				204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	38.3203	1.23047	0	22.125	1.7	-0.24244	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92115				204	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	37.9688	1.23047	15.875	22.25	1.7	-0.24244	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	1.05469		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92116	2	39	2	204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	37.9688	1.23047	0	22.25	1.7	-0.80809	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92117				204	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	1.05469	38.3203	1.23047	15.875	22.25	1.7	-1.13121	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	1.05469		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92118				204	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.52734	1.05469	38.6719	1.23047	0	22.25	1.7	0	-0.27985	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92119				204	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.703124	38.6719	1.23047	15.875	22.25	1.7	-0.08082	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92120	2	39	6	204	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	38.6719	1.23047	0	22.375	1.7	-0.32326	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92121				204	45	-3.94032	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	39.0234	1.23047	15.875	22.25	1.8	-0.96967	-0.27985	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92122				204	45	-3.94032	-4.63334	0.969642	0.969645	10.5907	-0.52734	1.05469	39.375	1.23047	0	22.25	1.7	0	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92123				204	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.703124	39.375	1.23047	15.875	22.25	1.7	0.484903	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92124	2	39	10	204	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.703124	39.375	1.23047	0	22.25	1.7	-0.24244	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92125				204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	1.05469	39.7266	1.23047	15.875	22.25	1.7	0.323277	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	1.05469		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
92126				204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	39.7266	1.23047	0	22.375	1.7	-0.40409	-0.27985	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92127				204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	39.7266	1.23047	15.875	22.375	1.7	0.161641	0.104976	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92128	2	39	14	204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	1.05469	39.7266	1.23047	0	22.25	1.7	2.74388	0.594018	-3.59122	17.5444
										10.5907	-0.52734	1.05469		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92129				204	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.70312	1.05469	39.375	1.23047	15.875	22.25	1.8	0.969673	0.104976	-3.59122	17.5444
										10.5907	-0.70312	1.05469		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92130				200	45	-3.94032	-4.69666	0.969642	0.969645	10.5907	-0.52734	1.05469	39.375	1.23047	0	22.25	1.7	0.646514	0.139963	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92131				204	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	1.05469	39.0234	1.23047	15.875	22.25	1.7	0.161641	-0.20992	-3.59122	17.5444
										10.5907	-0.52734	1.05469		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92132	2	39	18	200	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	1.05469	38.6719	1.23047	0	22.375	1.7	0.08082	-0.20992	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92133				200	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	0.703124	38.3203	1.23047	15.875	22.25	1.7	-0.56571	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	0.703124		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92134				200	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	1.05469	38.3203	1.23047	0	22.25	1.7	-0.48489	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	1.05469		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92135				200	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	0.703124	38.3203	1.23047	15.875	21.125	1.7	-0.56571	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	0.703124		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92136	2	39	22	200	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	0.703124	38.3203	1.23047	0	20.625	1.7	-0.16164	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	0.703124		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92137				200	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	0.703124	37.9688	1.23047	15.875	21	1.7	-0.40409	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	1.05469		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92138				200	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	0.703124	37.9688	1.23047	0	21.25	1.7	-0.72731	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	0.703124		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92139				200	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	1.05469	38.3203	1.23047	15.875	21	1.7	-0.96967	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	1.05469		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92140	2	39	26	200	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	1.05469	38.6719	1.23047	0	21	1.7	-0.24244	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	1.40625		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92141				200	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.70312	1.05469	38.6719	1.23047	15.875	21	1.7	0.646514	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	1.05469		1.23047						-3.59122	17.5444

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											-0.70312										
											-0.70312										
92142				200	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	1.05469	37.9688	1.23047	0	21	1.7	0	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	0.703124		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92143				196	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	1.05469	37.9688	1.23047	15.875	21	1.7	-0.24244	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	1.05469		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92144	2	39	30	196	45	-3.94032	-4.69666	0.969642	0.969645	10.5907	-0.70312	0.703124	37.9688	1.23047	0	21	1.7	-0.32326	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	0.703124		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92145				196	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	0.703124	37.9688	1.23047	15.875	21	1.7	-0.56571	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	0.703124		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92146				196	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	0.703124	37.9688	1.23047	0	21	1.7	-0.16164	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	0.703124		1.23047						-3.59122	17.5444
											-0.8789										
											-0.70312										
92147				196	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.8789	0.703124	37.9688	1.23047	15.875	21	1.7	0.323277	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	0.703124		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92148	2	39	34	196	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.70312	0.703124	37.2656	1.23047	0	21	1.7	0.161641	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	0.703124		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92149				196	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	1.05469	37.2656	1.23047	15.875	21	1.7	-0.56571	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	1.05469		1.23047						-3.59122	17.5444
											-0.70312										
											-0.52734										
92150				196	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.52734	1.05469	37.2656	1.23047	0	21	1.7	-1.61561	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	1.05469		1.23047						-3.59122	17.5444
											-0.52734										
											-0.70312										
92151				196	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.70312	0.703124	37.6172	1.23047	15.875	21	1.8	-2.01891	-0.24489	-3.59122	17.5444
										10.5907	-0.70312	0.703124		1.23047						-3.59122	17.5444
											-0.70312										
											-0.52734										
92152	2	39	38	196	45	-3.88063	-4.63334	0.969642	1.04419	10.5907	-0.52734	0.703124	38.6719	1.23047	0	21	1.7	-1.13121	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92153				196	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.703124	39.375	1.23047	15.875	21	1.7	0.565711	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92154				196	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.703124	39.375	1.23047	0	21	1.7	0.565711	-0.20992	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										
92155				192	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	39.375	1.23047	15.875	21	1.7	0	-0.38469	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.52734										
92156	2	39	42	192	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.703124	39.7266	1.23047	0	21	1.7	0.08082	-0.41961	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
92157				196	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	39.7266	1.23047	15.875	21	1.7	-0.40409	-0.34976	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92158				192	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	39.7266	1.23047	0	21	1.7	0.323277	-0.34976	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92159				192	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	39.7266	1.23047	15.875	21	1.7	-0.32326	-0.34976	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.05469						-3.64084	17.5444
											-0.35156										
											-0.52734										
92160	2	39	46	192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	39.7266	1.05469	0	21	1.7	0	-0.27985	-3.64084	17.5444
										10.5907	-0.35156	1.05469		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92161				192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	1.05469	39.375	1.05469	15.875	21	1.7	0.161641	-0.27985	-3.64084	17.5444
										10.5907	-0.52734	1.05469		1.23047						-3.64084	17.5444
											-0.52734										
											-0.35156										
92162				192	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.35156	1.05469	39.375	1.23047	0	21	1.7	-0.96967	-0.27985	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92163				192	45	-3.88063	-4.69666	0.969642	1.04419	10.5907	-0.52734	1.05469	39.7266	1.23047	15.875	21	1.7	-0.72731	-0.24489	-3.64084	17.5444
										10.5907	-0.35156	1.05469		1.05469						-3.64084	17.5444
											-0.35156										
											-0.35156										
92164	2	39	50	192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	1.05469	39.7266	1.23047	0	21	1.7	0	-0.27985	-3.64084	17.5444
										10.5907	-0.35156	1.05469		1.05469						-3.64084	17.5444
											-0.35156										
											-0.52734										
92165				192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	1.05469	39.375	1.05469	15.875	21	1.7	-0.08082	-0.24489	-3.64084	17.5444
										10.5907	-0.52734	1.05469		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92166				192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	1.05469	39.375	1.05469	0	21	1.7	-0.56571	-0.27985	-3.64084	17.5444
										10.5907	-0.52734	1.05469		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92167				192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	1.05469	39.375	1.23047	15.875	21	1.7	-0.24244	-0.24489	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.05469						-3.64084	17.5444
											-0.52734										
											-0.35156										
92168	2	39	54	192	45	-3.94032	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	39.375	1.05469	0	21	1.7	-0.24244	-0.24489	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92169				192	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	1.05469	39.375	1.23047	15.875	21	1.8	-0.32326	-0.24489	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.05469						-3.64084	17.5444
											-0.35156										
											-0.35156										
92170				192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	39.7266	1.05469	0	21	1.7	-0.08082	-0.24489	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.05469						-3.64084	17.5444
											-0.35156										
											-0.35156										
92171				192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	39.375	1.23047	15.875	21	1.7	0.565711	-0.24489	-3.59122	17.5444
										10.5907	-0.35156	1.05469		1.05469						-3.64084	17.5444
											-0.35156										
											-0.35156										
92172	2	39	58	192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.17578	0.703124	39.0234	1.23047	0	21	1.7	0.404091	-0.20992	-3.64084	17.5444
										10.5907	-0.17578	0.703124		1.05469						-3.64084	17.5444

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											-0.17578										
											-0.35156										
92173				192	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.35156	1.05469	38.3203	1.23047	15.875	21	1.7	-1.13121	-0.24489	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.17578										
92174				192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	1.05469	38.3203	1.23047	0	21	1.7	-0.24244	-0.20992	-3.64084	17.5444
										10.5907	-0.35156	1.05469		1.05469						-3.64084	17.5444
											-0.35156										
											-0.52734										
92175				192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	1.05469	38.3203	1.23047	15.875	21	1.7	-0.88889	-0.17494	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.05469						-3.64084	17.5444
											-0.52734										
											-0.52734										
92176	2	40	2	192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	38.3203	1.05469	0	21	1.7	-1.5349	-0.20992	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92177				192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	39.0234	1.23047	15.875	21	1.7	-0.16164	-0.20992	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.05469						-3.64084	17.5444
											-0.35156										
											-0.35156										
92178				192	45	-3.94032	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	39.0234	1.05469	0	21	1.7	0.404091	-0.20992	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92179				192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	38.6719	1.05469	15.875	21	1.7	0.323277	-0.13996	-3.64084	17.5444
										10.5907	-0.52734	0.351562		1.23047						-3.64084	17.5444
											-0.52734										
											-0.35156										
92180	2	40	6	192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.351562	38.3203	1.05469	0	21	1.7	0.08082	-0.10497	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.35156										
92181				188	45	-3.76128	-4.63334	0.969642	0.969645	10.5907	-0.52734	1.05469	38.3203	1.23047	15.875	21	1.7	0	-0.13996	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.05469						-3.64084	17.5444
											-0.35156										
											-0.35156										
92182				192	45	-3.94032	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	38.3203	1.05469	0	21	1.7	-1.13121	-0.17494	-3.64084	17.5444
										10.5907	-0.35156	0.351562		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92183				192	45	-3.76128	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.351562	38.6719	1.23047	15.875	21	1.8	-0.48489	-0.17494	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.05469						-3.64084	17.5444
											-0.52734										
											-0.52734										
92184	2	40	10	192	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.351562	38.6719	1.23047	0	21	1.7	0.404091	-0.20992	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.05469						-3.64084	17.5444
											-0.52734										
											-0.52734										
92185				188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	38.6719	1.05469	15.875	21	1.7	0.323277	-0.24489	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92186				192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	38.3203	1.05469	0	21	1.8	-0.72731	-0.20992	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92187				192	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	38.6719	1.23047	15.875	21	1.7	-0.32326	-0.20992	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.59122	17.5444
											-0.35156										
											-0.35156										

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
92188	2	40	14	188	45	-3.94032	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	38.6719	1.23047	0	21	1.8	-0.16164	-0.20992	-3.59122	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92189				192	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.35156	1.05469	39.0234	1.05469	15.875	21	1.7	-0.24244	-0.20992	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92190				188	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	39.0234	1.23047	0	21	1.7	-0.48489	-0.20992	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.05469						-3.59122	17.5444
											-0.52734										
											-0.52734										
92191				188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	39.375	1.05469	15.875	21	1.7	0.323277	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92192	2	40	18	188	45	-3.94032	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.703124	39.0234	1.05469	0	21	1.7	-0.16164	-0.24489	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92193				188	45	-3.94032	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	39.375	1.23047	15.875	21	1.7	-0.24244	-0.24489	-3.64084	17.5444
										10.5907	-0.17578	0.703124		1.23047						-3.64084	17.5444
											-0.17578										
											-0.35156										
92194				188	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	39.375	1.05469	0	21	1.8	-0.48489	-0.20992	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92195				188	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	39.7266	1.23047	15.875	21	1.8	-0.72731	-0.20992	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.52734										
92196	2	40	22	188	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	40.0781	1.23047	0	21	1.8	-0.16164	-0.20992	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92197				188	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	40.0781	1.23047	15.875	21	1.7	0.565711	-0.20992	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92198				188	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	40.0781	1.23047	0	21	1.7	-0.32326	-0.20992	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92199				188	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.351562	40.0781	1.23047	15.875	21	1.7	1.21197	-0.24489	-3.64084	17.5444
										10.5907	-0.52734	0.351562		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92200	2	40	26	188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.351562	39.7266	1.23047	0	21	1.8	-0.24244	-0.24489	-3.64084	17.5444
										10.5907	-0.52734	0.351562		1.05469						-3.64084	17.5444
											-0.52734										
											-0.52734										
92201				188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	39.375	1.23047	15.875	21	1.7	-0.16164	-0.24489	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.52734										
92202				188	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	39.0234	1.23047	0	21	1.7	-0.40409	-0.24489	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92203				188	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.70312	0.703124	39.0234	1.23047	15.875	21	1.7	-0.72731	-0.24489	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											-0.52734										
											-0.52734										
92204	2	40	30	188	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.703124	39.0234	1.23047	0	20.875	1.8	-0.24244	-0.24489	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92205				188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	1.05469	39.0234	1.23047	15.875	21	1.7	-0.64651	-0.20992	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92206				188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	39.0234	1.23047	0	21	1.7	-0.32326	-0.20992	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92207				188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	39.375	1.23047	15.875	21	1.8	-0.24244	-0.20992	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92208	2	40	34	188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	39.0234	1.23047	0	21	1.7	0.646514	-0.24489	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92209				188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	38.6719	1.23047	15.875	21	1.7	-0.08082	-0.24489	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.35156										
92210				188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	38.3203	1.23047	0	21	1.7	-0.24244	-0.20992	-3.64084	17.5444
										10.5907	-0.35156	1.05469		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92211				188	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	38.3203	1.23047	15.875	21	1.7	-0.48489	-0.20992	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92212	2	40	38	188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	37.9688	1.23047	0	21	1.7	-0.40409	-0.20992	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.70312										
											-0.70312										
92213				188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	0.703124	37.9688	1.23047	15.875	21	1.7	-0.08082	-0.17494	-3.64084	17.5444
										10.5907	-0.70312	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92214				188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	37.9688	1.23047	0	21	1.7	-0.32326	-0.20992	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92215				184	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	37.9688	1.23047	15.875	21	1.8	-0.48489	-0.20992	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92216	2	40	42	188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.17578	1.05469	37.9688	1.23047	0	21	1.8	-0.64651	-0.20992	-3.64084	17.5444
										10.5907	-0.35156	1.05469		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92217				188	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.35156	1.05469	37.9688	1.23047	15.875	20.875	1.8	-0.48489	-0.20992	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92218				188	45	-3.94032	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	38.3203	1.23047	0	20.875	1.8	-0.32326	-0.20992	-3.64084	17.5444
										10.5907	-0.52734	1.05469		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
92219				188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	38.3203	1.23047	15.875	20.875	1.8	-0.16164	-0.17494	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92220	2	40	46	188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	38.3203	1.23047	0	20.875	1.7	-0.24244	-0.17494	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92221				188	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.703124	38.3203	1.23047	15.875	20.875	1.8	-0.24244	-0.17494	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92222				184	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.703124	38.6719	1.23047	0	20.875	1.7	-0.16164	-0.17494	-3.64084	17.5444
										10.5907	-0.52734	0.703124		1.05469						-3.64084	17.5444
											-0.52734										
											-0.35156										
92223				188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	1.05469	38.6719	1.23047	15.875	21	1.8	0	-0.17494	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92224	2	40	50	188	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	38.6719	1.23047	0	21	1.7	-0.08082	-0.20992	-3.64084	17.5444
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92225				184	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.35156	0.703124	38.6719	1.23047	15.875	20.875	1.8	0.08082	-0.17494	-3.64084	17.8705
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.8705
											-0.52734										
											-0.52734										
92226				184	45	-3.88063	-4.57003	0.969642	0.969645	10.5907	-0.52734	0.703124	38.6719	1.23047	0	20.875	1.8	-0.96967	-0.17494	-3.64084	17.8705
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.8705
											-0.52734										
											-0.52734										
92227				184	45	-3.82096	-4.57003	0.969642	0.969645	10.5907	-0.52734	0.703124	39.0234	1.23047	15.875	20.875	1.8	-1.77697	-0.17494	-3.64084	17.8705
										10.5907	-0.52734	0.703124		1.23047						-3.64084	17.8705
											-0.35156										
											-0.35156										
92228	2	40	54	184	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	40.0781	1.23047	0	20.875	1.7	-1.45419	-0.20992	-3.64084	17.8705
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.8705
											-0.35156										
											-0.35156										
92229				184	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.35156	0.703124	41.4844	1.23047	15.875	21	1.7	-1.5349	-0.20992	-3.64084	17.8705
										10.5907	-0.35156	0.703124		1.23047						-3.64084	17.8705
											-0.35156										
											-0.35156										
92230				184	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.351562	42.8906	1.23047	0	21	1.7	-2.01891	-0.20992	-3.64084	17.8705
										10.5907	-0.52734	0.351562		1.23047						-3.64084	17.8705
											-0.52734										
											-0.52734										
92231				184	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.351562	45	1.23047	15.875	21	1.8	-1.29272	-0.24489	-3.64084	17.8705
										10.5907	-0.52734	0.351562		1.23047						-3.64084	17.8705
											-0.52734										
											-0.52734										
92232	2	40	58	184	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.351562	47.1094	1.23047	0	20.875	1.8	-0.80809	-0.24489	-3.64084	17.8705
										10.5907	-0.52734	0.351562		1.05469						-3.64084	17.8705
											-0.52734										
											-0.52734										
92233				184	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.351562	49.2188	1.23047	15.875	20.875	1.8	-0.88889	-0.24489	-3.64084	17.8705
										10.5907	-0.52734	0.351562		1.23047						-3.64084	17.8705
											-0.52734										
											-0.52734										
92234				184	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.52734	0.351562	52.0312	1.23047	0	20.875	1.7	-2.18013	-0.27985	-3.64084	17.8705
										10.5907	-0.35156	0.351562		1.23047						-3.64084	17.8705

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											-0.52734										
											-0.52734										
92235				184	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.351562	54.8438	1.23047	15.875	21	1.8	-3.22628	-0.27985	-3.64084	17.8705
										10.5907	-0.52734	0.351562		1.23047						-3.64084	17.8705
											-0.52734										
											-0.52734										
92236	2	41	2	184	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0.351562	59.7656	1.23047	0	21	1.8	-3.3066	-0.27985	-3.64084	17.8705
										10.5907	-0.52734	0.351562		1.23047						-3.64084	17.8705
											-0.70312										
											-0.70312										
92237				184	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.70312	0.351562	63.9844	1.23047	15.875	21	1.8	-2.74389	-0.27985	-3.64084	17.5444
										10.5907	-0.8789	0.351562		1.23047						-3.64084	17.8705
											-0.8789										
											-0.8789										
92238				184	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.8789	0.351562	69.2578	1.23047	0	21	1.8	-2.26074	-0.27985	-3.64084	17.5444
										10.5907	-0.8789	0.703124		1.23047						-3.64084	17.5444
											-0.70312										
											-0.70312										
92239				184	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.70312	0.703124	74.1797	1.23047	15.875	21.125	1.8	-1.61561	-0.31481	-3.64084	17.5444
										10.5907	-0.70312	0.351562		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92240	2	41	6	184	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	0	80.1562	1.23047	0	21.125	1.8	-1.61561	-0.27985	-3.64084	17.5444
										10.5907	-0.35156	0		1.23047						-3.64084	17.5444
											-0.35156										
											-0.35156										
92241				184	45	-3.94032	-4.63334	0.969642	0.969645	10.5907	-0.35156	0	85.0781	1.05469	15.875	21.125	1.7	-1.29272	-0.27985	-3.64084	17.5444
										10.5907	-0.35156	-0.35156		1.23047						-3.64084	17.5444
											-0.35156										
											-0.52734										
92242				184	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.52734	-0.35156	91.7578	1.23047	0	21	1.8	-0.56571	-0.27985	-3.64084	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.64084	17.5444
											-0.70312										
											-0.70312										
92243				184	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.70312	-0.35156	96.6797	1.23047	15.875	21	1.8	0.888893	-0.27985	-3.64084	17.5444
										10.5907	-0.70312	-0.35156		1.23047						-3.64084	17.5444
											-0.70312										
											-0.70312										
92244	2	41	10	184	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.70312	-0.70312	102.656	1.23047	0	21	1.8	1.29271	-0.27985	-3.64084	17.5444
										10.5907	-0.70312	-0.35156		1.23047						-3.64084	17.5444
											-0.70312										
											-0.70312										
92245				184	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.70312	-0.35156	106.875	1.23047	15.875	21	1.8	1.37345	-0.27985	-3.64084	17.5444
										10.5907	-0.70312	-0.35156		1.23047						-3.64084	17.5444
											-0.70312										
											-0.70312										
92246				184	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	-0.35156	112.5	1.23047	0	21	1.7	1.37345	-0.27985	-3.64084	17.5444
										10.5907	-0.70312	-0.35156		1.23047						-3.64084	17.5444
											-0.70312										
											-0.70312										
92247				184	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	-0.35156	116.719	1.05469	15.875	21	1.7	1.69629	-0.27985	-3.64084	17.5444
										10.5907	-0.70312	-0.35156		1.23047						-3.64084	17.5444
											-0.70312										
											-0.70312										
92248	2	41	14	184	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.70312	-0.35156	121.641	1.23047	0	21	1.7	2.01892	-0.27985	-3.64084	17.5444
										10.5907	-0.70312	-0.35156		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92249				184	45	-3.94032	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	124.805	1.23047	15.875	20.875	1.8	3.46716	-0.27985	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETI HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
92250				184	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	127.266	1.23047	0	20.875	1.8	3.46716	-0.27985	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92251				184	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	128.672	1.23047	15.875	20.875	1.7	3.46716	-0.31481	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92252	2	41	18	184	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	129.375	1.23047	0	20.875	1.8	2.98518	-0.31481	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92253				184	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.70312	-0.35156	130.43	1.23047	15.875	20.875	1.7	1.93828	-0.27985	-3.59122	17.5444
										10.5907	-0.70312	-0.35156		1.23047						-3.59122	17.5444
											-0.70312										
											-0.70312										
92254				184	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.70312	-0.35156	131.133	1.23047	0	20.875	1.8	1.13121	-0.20992	-3.59122	17.5444
										10.5907	-0.70312	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.70312										
92255				184	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.70312	-0.70312	131.836	1.23047	15.875	20.875	1.8	0.808106	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92256	2	41	22	184	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.70312	132.539	1.23047	0	20.875	1.8	0.323277	-0.24489	-3.59122	17.5444
										10.5907	-0.52734	-0.70312		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92257				184	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.70312	133.242	1.23047	15.875	20.875	1.8	-0.24244	-0.34976	-3.59122	17.5444
										10.5907	-0.52734	-0.70312		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92258				184	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.70312	133.594	1.23047	0	20.875	1.8	-0.40409	-0.38469	-3.59122	17.5444
										10.5907	-0.52734	-0.70312		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92259				180	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.52734	-0.70312	134.297	1.23047	15.875	20.875	1.8	-0.56571	-0.38469	-3.59122	17.5444
										10.5907	-0.52734	-0.70312		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92260	2	41	26	180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.70312	134.648	1.05469	0	20.875	1.8	-0.80809	-0.38469	-3.59122	17.5444
										10.5907	-0.52734	-0.70312		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92261				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.70312	135	1.23047	15.875	20.875	1.8	-0.80809	-0.38469	-3.59122	17.5444
										10.5907	-0.52734	-0.70312		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92262				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.70312	135	1.23047	0	20.875	1.8	0.727313	-0.34976	-3.59122	17.5444
										10.5907	-0.52734	-0.70312		1.05469						-3.64084	17.5444
											-0.52734										
											-0.52734										
92263				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.70312	134.648	1.23047	15.875	20.875	1.8	-0.16164	-0.34976	-3.64084	17.5444
										10.5907	-0.52734	-0.70312		1.23047						-3.64084	17.5444
											-0.52734										
											-0.52734										
92264	2	41	30	180	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.70312	134.297	1.05469	0	20.875	1.8	-0.80809	-0.34976	-3.64084	17.5444
										10.5907	-0.52734	-0.70312		1.05469						-3.64084	17.5444
											-0.52734										
											-0.52734										
92265				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.70312	133.945	1.23047	15.875	20.875	1.8	-2.09953	-0.34976	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.64084	17.5444

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											-0.52734										
											-0.52734										
92266				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	134.297	1.23047	0	20.875	1.8	-2.01891	-0.31481	-3.64084	17.5444
										10.5907	-0.52734	-0.35156		1.05469						-3.59122	17.5444
											-0.52734										
											-0.52734										
92267				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	135	1.05469	15.875	20.875	1.8	-1.85764	-0.31481	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92268	2	41	34	180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	135.352	1.23047	0	20.875	1.8	-1.69628	-0.31481	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92269				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	136.406	1.23047	15.875	20.875	1.8	-1.85764	-0.27985	-3.59122	17.5444
										10.5907	-0.52734	-0.35156		1.23047						-3.59122	17.5444
											-0.52734										
											-0.52734										
92270				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-0.35156	137.109	1.23047	0	20.75	1.8	-2.09953	-0.27985	-3.64084	17.5444
										10.5907	-0.70312	-0.35156		1.23047						-3.64084	17.5444
											-0.70312										
											-0.8789										
92271				180	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.8789	-0.35156	138.867	1.23047	15.875	20.75	1.8	-3.86808	-0.27985	-3.64084	17.5444
										10.5907	-0.8789	-0.70312		1.23047						-3.64084	17.8705
											-0.8789										
											-0.8789										
92272	2	41	38	180	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.8789	-0.70312	141.328	1.23047	0	20.75	1.8	-4.10832	-0.27985	-3.64084	17.8705
										10.5907	-0.8789	-0.70312		1.23047						-3.64084	17.8705
											-0.70312										
											-0.70312										
92273				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.52734	-1.05469	146.602	1.23047	15.875	20.75	1.8	-4.10832	-0.27985	-3.64084	17.8705
										10.5907	-0.35156	-1.05469		1.23047						-3.64084	17.8705
											-0.17578										
											-0.17578										
92274				180	45	-3.94032	-4.63334	0.969642	0.969645	10.5907	0	-0.70312	152.227	1.23047	0	20.75	1.8	-4.10832	-0.27985	-3.64084	17.5444
										10.5907	0	-0.70312		1.23047						-3.64084	17.8705
											0										
											0										
92275				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	0	-0.70312	160.664	1.23047	15.875	20.75	1.8	-4.10832	-0.27985	-3.64084	17.5444
										10.5907	0	-0.35156		1.23047						-3.64084	17.8705
											0										
											-0.17578										
92276	2	41	42	180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.17578	-0.35156	167.695	1.23047	0	20.875	1.8	-4.10832	-0.27985	-3.64084	17.8705
										10.5907	-0.17578	-0.70312		1.23047						-3.64084	17.8705
											-0.17578										
											-0.17578										
92277				180	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.17578	-0.70312	175.078	1.23047	15.875	20.875	1.8	-1.77697	-0.27985	-3.64084	17.8705
										10.5907	-0.17578	-0.70312		1.23047						-3.64084	17.8705
											-0.17578										
											-0.17578										
92278				180	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	-0.17578	-0.70312	182.109	1.23047	0	21	1.8	0.404091	-0.27985	-3.64084	17.8705
										10.5907	-0.17578	-0.70312		1.05469						-3.64084	17.8705
											-0.17578										
											-0.17578										
92279				180	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	-0.17578	-0.70312	188.438	1.23047	15.875	21	1.8	1.6156	-0.27985	-3.64084	18.195
										10.5907	-0.17578	-0.70312		1.23047						-3.64084	18.195
											-0.17578										
											-0.17578										
92280	2	41	46	180	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.17578	-0.70312	193.711	1.23047	0	20.875	1.8	3.06557	-0.27985	-3.64084	17.8705
										10.5907	-0.17578	-0.70312		1.23047						-3.64084	17.8705
											-0.17578										
											-0.17578										

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
92281				180	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.17578	-1.05469	199.336	1.23047	15.875	20.875	1.8	2.3413	-0.27985	-3.64084	17.8705
										10.5907	-0.17578	-1.05469		1.23047						-3.64084	17.8705
											-0.17578										
											-0.17578										
92282				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	-0.17578	-1.05469	203.906	1.23047	0	20.875	1.8	2.3413	-0.27985	-3.64084	17.8705
										10.5907	-0.17578	-1.05469		1.23047						-3.64084	17.8705
											-0.17578										
											-0.17578										
92283				180	45	-3.88063	-4.63334	0.969642	0.969645	10.5907	-0.17578	-1.05469	208.828	1.23047	15.875	21.375	1.8	2.6634	-0.27985	-3.64084	17.8705
										10.5907	-0.17578	-0.70312		1.23047						-3.64084	17.8705
											-0.17578										
											-0.17578										
92284	2	41	50	180	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	0	-0.70312	212.344	1.23047	0	22.5	1.8	3.38689	-0.27985	-3.59122	17.8705
										10.5907	0	-0.70312		1.23047						-3.64084	17.5444
											0										
											0										
92285				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	0	-0.70312	215.156	1.23047	15.875	23.625	1.8	3.46716	-0.27985	-3.64084	17.5444
										10.5907	0	-1.05469		1.23047						-3.64084	17.5444
											0										
											0										
92286				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	0	-1.05469	216.562	1.23047	0	25.25	1.8	3.8681	-0.27985	-3.59122	17.5444
										10.5907	0	-1.05469		1.23047						-3.64084	17.5444
											0										
											0										
92287				180	45	-3.82096	-4.63334	0.969642	0.969645	10.5907	0	-1.05469	217.969	1.23047	15.875	27.75	1.8	3.62762	-0.24489	-3.64084	17.5444
										10.5907	0	-1.05469		1.23047						-3.64084	17.5444
											0										
											0										
92288	2	41	54	180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	0	-1.40625	219.023	1.23047	0	31.25	1.8	2.74388	-0.24489	-3.64084	17.5444
										10.5907	0	-1.40625		1.23047						-3.64084	17.5444
											0										
											0										
92289				180	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	0	-1.40625	219.727	1.23047	15.875	34.625	1.8	2.26073	-0.24489	-3.59122	17.5444
										10.5907	0	-1.40625		1.05469						-3.64084	17.5444
											0										
											0										
92290				180	45	-3.82096	-4.69666	0.969642	0.969645	10.5907	0	-1.05469	220.078	1.05469	0	39.875	1.8	1.53489	-0.20992	-3.59122	17.5444
										10.5907	0	-1.05469		1.23047						-3.64084	17.5444
											0										
											0										
92291				184	45	-3.88063	-4.69666	0.969642	0.969645	10.5907	0	-1.05469	220.43	1.23047	15.875	51	1.8	0.08082	-0.20992	-3.59122	17.5444
										10.5907	0	-1.05469		1.23047						-3.59122	17.5444
											0										
											0										
92292	2	41	58	180	45	-3.82096	-4.57003	0.969642	0.969645	10.5907	0	-1.05469	220.781	1.23047	0	63.625	1.8	5.06625	2.02953	-3.59122	17.5444
										10.5907	0	-1.05469		1.23047						-3.59122	17.5444
											0										
											0										
92293				184	45	-3.88063	-4.88658	0.969642	0.969645	10.5907	0	-1.05469	220.781	1.23047	15.875	65	1.8	4.02827	1.92954	-3.59122	17.5444
										10.5907	0	-1.05469		1.23047						-3.64084	17.5444
											0										
											0										
92294				184	45	-4.06334	-4.57003	0.969642	0.969645	10.5907	0	-1.40625	221.133	1.23047	0	63.875	1.8	-1.69628	-0.76797	-3.64084	17.5444
										10.5907	0	-1.05469		1.23047						-3.64084	17.5444
											0										
											0										
92295				184	45	-3.76128	-4.94987	0.969642	0.969645	10.5907	0	-1.40625	221.836	1.23047	15.875	63.75	1.7	-8.83442	-6.12378	-3.69037	16.887
										10.5907	0.17578	-1.40625		1.23047						-3.7398	16.2229
											0.17578										
											0.17578										
92296	2	42	2	188	45	-3.94032	-4.69666	1.19327	0.373006	10.5907	0.17578	-1.40625	223.242	1.23047	0	63.875	1.8	-20.8946	-6.7058	-3.78912	14.1923
										10.5907	0.35156	-1.05469		1.23047						-3.69037	14.1923

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											0.35156										
											0.35156										
92297				188	45	-3.76128	-4.75997	1.64028	0.298401	10.5907	0.17578	-0.70312	223.594	1.23047	15.875	70.875	1.7	-6.25592	-5.54503	-3.69037	14.1923
										10.5907	0.17578	-0.70312		1.23047						-3.7398	12.4588
											0.17578										
											0.17578										
92298				188	45	-3.64193	-4.38003	2.38422	-1.11874	10.5907	0.17578	-0.70312	223.594	1.23047	0	78.875	1.8	-14.5619	-7.07086	-3.83835	9.61627
										10.5907	0.17578	-1.05469		1.23047						-3.83835	9.25566
											0.17578										
											0.17578										
92299				188	45	-3.16465	-4.5067	3.12636	-1.19327	10.5907	0.17578	-1.05469	223.945	1.23047	15.875	79.5	1.7	-18.7308	-5.56834	-3.83835	8.894
										10.5907	0.17578	-1.05469		1.05469						-3.69037	9.61627
											0.17578										
											0.17578										
92300	2	42	6	192	45	-3.88063	-4.57003	3.20046	-1.19327	10.5907	0.35156	-1.05469	223.594	1.23047	0	82.75	1.7	-13.3384	-6.64858	-3.78912	8.894
										10.5907	0.35156	-1.75781		1.23047						-3.83835	8.894
											0.35156										
											0.17578										
92301				192	45.5	-3.58224	-4.82328	3.20046	-1.19327	10.5907	0.17578	-1.05469	223.594	1.23047	15.875	83.75	1.7	-16.4512	-6.27028	-3.78912	9.25566
										10.5907	0.17578	-1.40625		1.23047						-3.7398	9.61627
											0.17578										
											0.17578										
92302				192	49.5	-3.82096	-4.63334	3.12636	-0.373	10.5907	0.17578	-1.05469	222.891	1.23047	0	84.625	1.7	-13.4836	-2.84137	-3.64084	11.4022
										10.5907	0.17578	-1.05469		1.23047						-3.7398	12.8083
											0.35156										
											0.17578										
92303				196	56	-3.82096	-4.88658	2.3099	-0.2984	10.5907	0.17578	-1.05469	222.188	1.23047	15.875	87.25	1.7	-9.21957	-4.35142	-3.69037	13.1564
										10.5907	0.17578	-1.05469		1.05469						-3.69037	13.1564
											0.35156										
											0.35156										
92304	2	42	10	196	61	-3.52258	-4.5067	2.3099	-0.1492	10.5907	0.17578	-1.40625	222.188	1.05469	0	89.5	1.7	-11.5695	-0.69845	-3.69037	13.5032
										10.5907	0.17578	-1.05469		1.23047						-3.69037	13.8484
											0										
											0.17578										
92305				196	65	-3.7016	-4.44337	2.08683	-0.0746	10.5907	0.35156	-1.40625	222.188	1.05469	15.875	89.875	1.7	-7.90374	-4.46056	-3.78912	13.5032
										10.5907	0.35156	-1.40625		1.05469						-3.83835	13.1564
											0.17578										
											0.35156										
92306				196	70	-3.64193	-4.3167	2.1612	-0.2238	10.5907	0.35156	-1.40625	222.891	1.23047	0	90	1.7	-12.9738	-6.0167	-3.88747	12.1079
										10.5907	0.35156	-1.40625		1.23047						-3.88747	12.4588
											0.35156										
											0.35156										
92307				200	75.5	-3.88063	-4.57003	2.45853	-0.1492	10.5907	0.35156	-1.40625	222.891	1.05469	15.875	90.5	1.7	-13.3384	-3.51894	-3.83835	13.1564
										10.5907	0.35156	-1.40625		1.05469						-3.78912	13.1564
											0.35156										
											0.17578										
92308	2	42	14	200	78.5	-3.7016	-4.44337	2.3099	-0.0746	10.5907	0.17578	-1.05469	222.188	0.878905	0	90.625	1.7	-1.85764	-2.48924	-3.78912	13.5032
										10.5907	0.17578	-1.40625		0.878905						-3.78912	13.5032
											0.35156										
											0.35156										
92309				200	83.5	-3.58224	-4.38003	2.23556	-0.0746	10.5907	0.35156	-1.05469	222.188	0.878905	15.875	90.5	1.7	-4.5879	-3.30745	-3.78912	13.5032
										10.5907	0.35156	-1.40625		0.878905						-3.88747	13.8484
											0.17578										
											0.17578										
92310				200	89	-3.64193	-4.3167	1.86362	3.7923	10.5907	0.35156	-1.05469	222.539	0.703124	0	90.375	1.7	-12.1643	-4.80545	-3.93649	21.9487
										10.5907	0.35156	-1.40625		1.05469						-3.88747	30.1527
											0.35156										
											0.35156										
92311				200	93	-3.46291	-4.38003	-2.38422	4.52948	10.5907	0.17578	-1.05469	222.188	0.878905	15.875	90.375	1.7	-3.9482	-1.11405	-3.88747	29.9064
										10.5907	0.17578	-1.05469		0.703124						-3.83835	29.9064
											0.35156										
											0.35156										

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
92312	2	42	18	200	97.5	-3.52258	-4.44337	-2.38422	4.67653	10.5907	0.35156	-1.05469	221.836	0.527343	0	90.375	1.7	-3.3066	-2.22803	-3.83835	30.1527
										10.5907	0.35156	-1.05469		0.878905						-3.83835	30.8807
											0.17578										
											0.17578										
92313				204	101	-3.7016	-4.3167	-2.53282	4.89685	10.5907	0.35156	-1.05469	221.836	0.527343	15.875	90.5	1.7	-7.35702	-3.51894	-3.88747	31.1198
										10.5907	0.35156	-1.40625		0.878905						-3.98541	31.357
											0.35156										
											0.35156										
92314				204	106.5	-3.46291	-4.12669	-2.60708	4.97021	10.5907	0.35156	-1.05469	221.836	0.703124	0	90.5	1.7	-1.5349	-3.18483	-3.98541	31.357
										10.5907	0.35156	-1.40625		0.703124						-3.98541	32.0582
											0.35156										
											0.35156										
92315				204	109.5	-3.28394	-4.44337	-4.30865	7.23613	10.5907	0.35156	-1.40625	221.484	0.351562	15.875	90.375	1.7	-1.93828	-2.42432	-3.83835	37.5022
										10.5907	0.35156	-1.40625		0.878905						-3.93649	37.5022
											0.35156										
											0.35156										
92316	2	42	22	204	115.5	-3.40326	-4.38003	-5.18517	7.37611	10.5907	0.35156	-1.05469	221.836	0.703124	0	90.375	1.7	-5.30492	-2.42432	-3.93649	37.6904
										10.5907	0.35156	-1.05469		0.878905						-3.88747	37.6904
											0.35156										
											0.35156										
92317				204	119.5	-3.40326	-4.44337	-5.11381	7.37611	10.5907	0.35156	-1.05469	221.836	0.703124	15.875	90.25	1.7	-2.34132	-1.79549	-3.83835	37.5022
										10.5907	0.35156	-1.40625		1.05469						-3.88747	37.3125
											0.35156										
											0.35156										
92318				204	123.5	-3.58224	-4.19001	-5.11381	6.88525	10.5907	0.35156	-1.05469	222.188	0.351562	0	90.375	1.7	-6.3349	-3.09203	-4.03422	36.9287
										10.5907	0.35156	-1.05469		0.878905						-4.08292	35.9425
											0.52734										
											0.52734										
92319				208	127.5	-3.22428	-4.12669	-4.30865	6.74458	10.5907	0.52734	-1.05469	222.539	0.703124	15.875	90.5	1.6	-5.54325	-1.86262	-4.08292	35.3321
										10.5907	0.52734	-1.05469		0.878905						-3.83835	35.7406
											0.52734										
											0.52734										
92320	2	42	26	208	131.5	-3.28394	-4.44337	-4.23499	6.74458	10.5907	0.52734	-1.40625	222.188	0.703124	0	90.5	1.7	-3.14593	-1.79549	-3.78912	35.5372
										10.5907	0.52734	-1.40625		0.527343						-3.88747	35.5372
											0.52734										
											0.35156										
92321				208	135.5	-3.40326	-3.16464	-4.23499	6.60368	10.5907	0.52734	-1.05469	222.539	0.878905	15.875	90.375	1.6	-4.90694	-1.86262	-4.46862	35.1254
										10.5907	0.52734	-1.05469		0.878905						-5.30933	34.7073
											0.52734										
											0.52734										
92322				208	139	-0.37641	-0.31757	-3.7923	6.17992	10.5907	0.52734	-1.05469	222.891	1.05469	0	90.25	1.6	-4.98661	-3.12304	-6.45169	33.6331
										10.5907	0.70312	-1.40625		0.878905						-6.66115	33.4133
											0.87891										
											0.87891										
92323				204	142.5	1.27182	0.589495	-3.12636	6.10914	10.5907	1.23047	-1.05469	222.891	1.40625	15.875	90.375	1.6	-4.26831	-3.12304	-6.90805	33.1917
										10.5907	1.40625	-1.40625		1.75781						-7.34809	33.8513
											1.58203										
											1.58203										
92324	2	42	30	204	146	2.69003	2.08482	-3.42259	7.09592	10.5907	1.75781	-1.05469	222.188	2.28515	0	90.375	1.6	-3.62762	-2.74618	-7.65785	35.7406
										10.5907	1.93359	-1.40625		2.46093						-7.6196	36.3416
											1.93359										
											2.10937										
92325				196	150	3.15783	0.384021	-4.16128	7.65547	10.5907	2.63671	-1.40625	221.133	2.98828	15.875	90.375	1.7	-4.18833	-0.97593	-6.94873	36.9287
										10.5907	2.8125	-1.05469		4.04296						-6.94873	39.4382
											3.33984										
											3.86718										
92326				192	152	2.15227	0.657908	-5.61247	7.44602	10.5907	4.21874	-1.40625	220.781	5.62499	0	90.25	1.8	-4.26831	-1.49096	-6.98928	36.5388
										10.5907	5.09765	-1.05469		6.85546						-6.78521	34.4958
											5.27343										
											6.32812										
92327				192	155.5	1.40778	1.13568	-3.57054	8.4883	10.5907	6.67968	-1.05469	221.133	8.43749	15.875	90.375	1.8	-3.06559	-1.38863	-7.06996	38.0682
										10.5907	7.03124	-1.40625		9.84374						-7.18997	37.8786

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
											7.73436										
											7.91014										
92328	2	42	34	196	159	2.3543	1.81456	-3.86615	5.47019	10.5907	8.26171	-1.05469	221.133	10.7226	0	90.375	1.8	-2.42185	-1.35444	-7.5427	30.3972
										10.5907	8.61327	-0.70312		10.8984						-7.65785	32.0582
											8.78905										
											8.96483										
92329				208	162	3.42392	3.15781	-2.60708	7.58571	10.5907	8.96483	-0.70312	220.781	10.7226	15.875	90.375	1.8	-1.93828	-1.25164	-7.84708	35.3321
										10.5907	8.96483	-1.05469		10.1953						-8.17929	35.5372
											8.96483										
											8.96483										
92330				220	165.5	4.54443	2.62298	-2.97811	7.5159	10.5907	9.14061	-1.05469	220.781	10.3711	0	90.375	1.8	-2.42185	-1.2173	-7.84708	35.1254
										10.5907	9.49217	-1.40625		10.7226						-7.6196	34.7073
											9.84374										
											10.5469										
92331				240	167.5	3.22443	0.726283	-2.68131	7.5159	10.5907	10.8984	-1.05469	220.781	11.6015	15.875	90.375	1.8	-1.29272	-0.55916	-7.34809	35.5372
										10.5907	11.0742	-1.05469		11.9531						-6.90805	31.357
											11.9531										
											12.3047										
92332	2	42	38	268	169.5	1.47568	-0.67097	-0.2984	4.97021	10.5907	12.832	-0.70312	221.133	12.3047	0	90.375	1.8	-1.5349	-0.55916	-6.28172	26.8063
										10.5907	13.0078	-0.35156		12.3047						-6.32441	28.39
											13.3594										
											13.7109										
92333				300	171.5	0.246849	-0.90708	0	3.20046	10.5907	13.8867	0	221.836	11.9531	15.875	90.5	1.8	-1.05045	-0.55916	-6.19593	25.1545
										10.5907	14.0625	0		11.4258						-6.06626	18.8386
											14.414										
											14.5898										
92334				328	172	-0.55307	-4.06334	2.60708	2.75555	10.5907	14.7656	0.703124	222.188	11.4258	0	90.5	1.8	-0.56571	-0.55916	-5.49076	18.195
										10.5907	15.1172	1.05469		11.25						-3.59122	16.887
											15.2929										
											15.6445										
92335				364	173	-4.44337	-5.07644	3.34857	0.969645	10.5907	15.6445	1.75781	222.539	10.8984	15.875	90.5	1.8	-0.48489	-0.55916	-2.88671	11.7557
										10.5907	15.6445	2.10937		9.66795						-3.54149	8.894
											15.2929										
											15.1172										
92336	2	42	42	400	174	-3.82096	-4.5067	4.82345	0	10.5907	14.5898	1.75781	222.891	8.26171	0	90.625	1.8	-0.64651	-0.55916	-3.7398	8.5313
										10.5907	14.414	1.05469		7.3828						-3.93649	8.894
											14.2383										
											13.8867										
92337				440	174.5	-3.64193	-4.69666	4.89685	0.074605	10.5907	13.8867	0.703124	223.594	7.55858	15.875	90.75	1.8	-0.64651	-0.55916	-3.54149	8.16762
										10.5907	13.8867	0		7.91014						-3.03913	8.5313
											13.8867										
											13.8867										
92338				480	176	-4.63335	-5.96125	4.97022	-0.0746	10.5907	13.8867	-0.35156	223.945	8.08593	0	90.625	1.8	-0.08082	-0.55916	-2.68234	8.16762
										10.5907	13.8867	-0.70312		7.73436						-2.9376	7.80299
											13.8867										
											13.7109										
92339				512	176.5	-4.75998	-5.77184	5.04242	-0.1492	10.5907	13.7109	-0.70312	223.945	7.20702	15.875	90.75	1.8	0.08082	-0.55916	-2.73355	7.80299
										10.5907	13.3594	-0.35156		6.85546						-3.08977	7.43745
											13.1836										
											13.0078										
92340	2	42	46	548	177	-4.06334	-5.01316	5.1138	-0.2238	10.5907	12.832	-0.35156	223.945	6.5039	0	90.75	1.8	0	-0.55916	-3.29145	7.43745
										10.5907	12.6562	-0.35156		6.5039						-3.49167	7.43745
											12.6562										
											12.6562										
92341				584	178	-4	-4.69666	5.1138	-0.1492	10.5907	12.6562	-0.35156	223.945	6.67968	15.875	90.75	1.8	0	-0.5243	-3.54149	7.43745
										10.5907	12.6562	-0.35156		6.85546						-3.59122	9.61627
											12.6562										
											12.832										
92342				616	178.5	-3.82096	-4.69666	3.7184	2.68131	10.5907	12.832	-0.70312	223.945	7.20702	0	90.75	1.8	-0.08082	-0.5243	-3.59122	18.5176
										10.5907	13.0078	-0.70312		7.55858						-3.19079	22.8457
											13.0078										
											13.1836										

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
92343				652	179	-4.25337	-5.13971	1.64028	2.68131	10.5907	13.1836	-0.70312	223.594	7.91014	15.875	90.75	1.8	-0.40409	-0.48942	-3.14032	18.8386
										10.5907	13.1836	-0.35156		7.73436						-3.19079	19.1577
											13.1836										
											13.1836										
92344	2	42	50	688	178.5	-4.19003	-4.69666	2.45853	2.60708	10.5907	13.1836	-0.35156	223.594	7.20702	0	90.875	1.8	-0.48489	-0.48942	-3.59122	18.5176
										10.5907	13.0078	0		7.20702						-3.49167	16.2229
											13.0078										
											13.0078										
92345				720	179.5	-3.82096	-4.75997	3.64449	0.820516	10.5907	13.0078	0	223.242	7.20702	15.875	90.875	1.8	-0.64651	-0.48942	-3.44176	10.6914
										10.5907	13.0078	0		7.3828						-3.49167	18.5176
											13.0078										
											13.0078										
92346				756	179.5	-3.82096	-4.69666	2.53281	2.68131	10.5907	13.0078	-0.35156	223.242	7.3828	0	90.875	1.8	-0.88889	-0.48942	-3.49167	19.1577
										10.5907	13.0078	-0.70312		7.20702						-3.39175	20.7266
											13.1836										
											13.1836										
92347				792	180	-3.94032	-4.75997	2.08683	2.75555	10.5907	13.1836	-0.70312	223.242	7.20702	15.875	90.875	1.8	-0.48489	-0.48942	-3.49167	20.4165
										10.5907	13.1836	-0.70312		7.3828						-3.49167	18.5176
											13.1836										
											13.1836										
92348	2	42	54	832	180	-4	-4.88658	2.53281	1.86361	10.5907	13.1836	-0.35156	222.891	7.3828	0	90.875	1.8	-0.56571	-0.48942	-3.34164	17.2165
										10.5907	13.1836	-0.35156		7.20702						-3.03913	10.6914
											13.3594										
											13.3594										
92349				868	181	-4.44337	-5.32945	4.75001	-0.0746	10.5907	13.3594	0	222.891	7.20702	15.875	90.875	1.8	-0.32326	-0.5243	-3.08977	7.80299
										10.5907	13.1836	0		7.20702						-3.14032	7.80299
											13.1836										
											13.1836										
92350				904	180.5	-4.25337	-4.82328	5.1138	0.522196	10.5907	13.0078	-0.35156	222.539	6.85546	0	91	1.8	-0.88889	-0.48942	-3.29145	8.5313
										10.5907	13.0078	-0.70312		6.5039						-3.69037	12.8083
											12.832										
											12.832										
92351				940	181.5	-3.7016	-4.57003	3.93997	0.447591	10.5907	12.832	-1.40625	222.539	6.85546	15.875	90.875	1.8	-0.56571	-0.5243	-3.83835	11.7557
										10.5907	12.832	-1.40625		7.03124						-3.59122	10.3342
											13.0078										
											13.1836										
92352	2	42	58	976	181	-3.76128	-4.57003	4.52949	1.11873	10.5907	13.1836	-1.40625	222.539	7.20702	0	91	1.8	-0.24244	-0.48942	-3.59122	11.0474
										10.5907	13.3594	-1.75781		7.20702						-3.64084	12.8083
											13.3594										
											13.5351										
92353				1016	181.5	-3.76128	-4.63334	4.08754	0	10.5907	13.5351	-2.10937	222.188	7.73436	15.875	91	1.8	-0.48489	-0.5243	-3.59122	8.5313
										10.5907	13.7109	-2.10937		7.55858						-3.69037	8.16762
											13.7109										
											13.7109										
92354				1052	181.5	-3.76128	-4.69666	4.67654	1.71474	10.5907	13.7109	-2.46093	221.836	7.03124	0	91	1.8	-0.32326	-0.48942	-3.69037	12.4588
										10.5907	13.7109	-3.16406		7.20702						-3.69037	15.2146
											13.7109										
											13.7109										
92355				1096	183	-3.7016	-4.63334	3.34857	1.86361	10.5907	13.8867	-3.86718	221.484	7.3828	15.875	91	1.8	-0.64651	-0.48942	-3.59122	14.8754
										10.5907	13.8867	-3.86718		7.20702						-3.59122	13.8484
											13.8867										
											13.8867										
92356	2	43	2	1136	183	-3.88063	-4.69666	3.86615	1.04419	10.5907	13.8867	-3.86718	221.133	7.03124	0	91	1.7	-0.32326	-0.48942	-3.54149	11.7557
										10.5907	13.8867	-3.86718		7.03124						-3.49167	11.7557
											14.0625										
											14.0625										
92357				1180	184	-3.82096	-4.82328	4.23498	0.14921	10.5907	14.0625	-3.86718	220.43	7.03124	15.875	91	1.7	-0.56571	-0.5243	-3.39175	9.61627
										10.5907	14.0625	-3.86718		7.03124						-3.49167	8.16762
											14.0625										
											14.2383										
92358				1220	184	-3.82096	-4.69666	5.25647	0.969645	10.5907	14.2383	-4.21874	220.078	7.03124	0	91	1.7	-0.56571	-0.48942	-3.54149	9.25566
										10.5907	14.2383	-5.27343		7.03124						-3.54149	13.1564

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
											14.2383										
											14.2383										
92359				1268	184	-3.88063	-4.63334	3.86615	1.04419	10.5907	14.0625	-6.32812	219.375	6.67968	15.875	90	1.7	-0.72731	-0.48942	-3.59122	12.8083
										10.5907	14.0625	-6.67968		6.85546						-3.49167	7.07103
											14.0625										
											14.0625										
92360	2	43	6	1312	184	-3.94032	-4.69666	6.25067	-3.27453	10.5907	14.0625	-6.67968	219.023	6.67968	0	89.125	1.7	-0.24244	-0.5243	-3.49167	6.33574
										10.5907	14.0625	-6.67968		6.85546						-3.44176	6.33574
											14.0625										
											14.0625										
92361				1352	183	-3.88063	-4.57003	8.48829	-2.01244	10.5907	14.0625	-7.3828	218.32	6.67968	15.875	89.125	1.8	-0.08082	-0.5243	-3.59122	11.0474
										10.5907	13.8867	-8.43749		6.5039						-3.78912	16.887
											13.8867										
											13.8867										
92362				1396	184	-3.52258	-3.94032	5.1138	0.671366	10.5907	13.8867	-10.8984	216.914	6.32812	0	89.125	1.7	-0.56571	-0.5243	-4.18001	22.8457
										10.5907	13.7109	-12.3047		6.5039						-4.08292	21.646
											13.7109										
											13.8867										
92363				1440	184	-3.22428	-3.94032	4.82345	0.373006	10.5907	13.8867	-12.6562	215.859	7.20702	15.875	89.125	1.8	-0.40409	-0.5243	-4.13152	21.646
										10.5907	13.8867	-13.3594		7.20702						-4.13152	22.5486
											14.0625										
											14.0625										
92364	2	43	10	1484	183.5	-3.16465	-3.76127	3.86615	1.71474	10.5907	14.0625	-13.7109	213.75	7.03124	0	89.125	1.8	-0.48489	-0.48942	-4.32482	25.7127
										10.5907	14.0625	-14.7656		7.55858						-4.32482	26.8063
											14.2383										
											14.2383										
92365				1528	183	-2.86654	-3.58224	2.75555	2.60708	10.5907	14.414	-15.4687	212.344	7.55858	15.875	89.25	2.1	-0.56571	-0.45452	-4.51633	28.6474
										10.5907	14.414	-16.1719		7.55858						-4.27666	28.39
											14.5898										
											14.7656										
92366				1576	183.5	-3.28394	-5.07644	2.97811	1.71474	10.5907	14.9414	-16.1719	210.234	8.43749	0	89.125	2.2	-0.64651	-0.48942	-3.64084	25.989
										10.5907	15.2929	-16.1719		8.96483						-2.57969	25.4345
											15.4687										
											15.4687										
92367				1624	183	-5.32946	-5.77184	3.7184	1.04419	10.5907	15.4687	-16.1719	208.477	8.26171	15.875	89.25	2.2	-0.80809	-0.45452	-2.78468	23.7257
										10.5907	15.4687	-16.1719		7.91014						-2.73355	21.9487
											15.2929										
											14.9414										
92368	2	43	14	1668	182.5	-5.07643	-5.89811	4.60303	0.14921	10.5907	14.7656	-16.1719	207.07	7.3828	0	89.125	2.2	-0.48489	-0.45452	-2.68234	21.0349
										10.5907	14.414	-16.1719		7.03124						-2.78468	21.0349
											14.2383										
											14.0625										
92369				1708	183	-5.07643	-5.89811	4.82345	0.298401	10.5907	13.8867	-16.875	205.312	6.85546	15.875	89.125	2.2	-0.64651	-0.45452	-2.73355	21.3414
										10.5907	13.7109	-17.9297		6.67968						-2.78468	22.5486
											13.5351										
											13.3594										
92370				1748	183.5	-5.07643	-5.89811	4.16128	0.895081	10.5907	13.3594	-18.2812	203.906	6.67968	0	89.125	2.2	-0.56571	-0.45452	-2.78468	23.4343
										10.5907	13.0078	-19.3359		6.67968						-2.78468	23.1409
											13.0078										
											12.832										
92371				1784	184.5	-5.07643	-5.83499	4.23498	0.745931	10.5907	12.6562	-19.6875	202.148	6.67968	15.875	89	2.2	-0.48489	-0.45452	-2.73355	22.8457
										10.5907	12.4805	-20.039		6.67968						-2.73355	23.1409
											12.3047										
											12.1289										
92372	2	43	18	1816	185.5	-5.26621	-5.77184	4.23498	0.820516	10.5907	11.9531	-20.039	200.742	6.5039	0	89	2.2	-0.40409	-0.45452	-2.68234	23.1409
										10.5907	11.7773	-20.3906		6.5039						-3.24116	23.7257
											11.4258										
											11.4258										
92373				1844	186.5	-4.3167	-4.82328	4.01377	1.5658	10.5907	11.0742	-20.7422	198.984	6.32812	15.875	89	2.2	-0.40409	-0.45452	-3.44176	24.8725
										10.5907	10.8984	-20.7422		6.5039						-3.54149	25.7127
											10.7226										
											10.7226										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
92374				1868	187.5	-3.94032	-4.82328	3.49658	1.71474	10.5907	10.5469	-21.0937	196.875	6.85546	0	89	2.2	-0.56571	-0.45452	-3.54149	25.7127
										10.5907	10.5469	-21.4453		7.20702						-3.59122	27.075
											10.3711										
											10.3711										
92375				1892	188.5	-3.88063	-4.57003	2.68133	2.68131	10.5907	10.3711	-21.7968	194.766	7.3828	15.875	89	2.2	-0.64651	-0.45452	-3.78912	28.9029
										10.5907	10.1953	-21.7968		7.3828						-4.03422	30.1527
											10.1953										
											10.0195										
92376	2	43	22	1912	190	-3.34359	-4.19001	2.1612	3.05225	10.5907	9.84374	-21.7968	193.008	7.3828	0	89	2.2	-0.56571	-0.48942	-4.08292	30.6399
										10.5907	9.84374	-21.4453		7.3828						-4.18001	32.5168
											9.66795										
											9.66795										
92377				1932	191.5	-3.10501	-4.25336	1.2678	3.7923	10.5907	9.49217	-21.4453	190.898	7.3828	15.875	89	2.2	-0.56571	-0.45452	-3.98541	32.5168
										10.5907	9.49217	-21.0937		7.3828						-4.08292	32.5168
											9.49217										
											9.49217										
92378				1948	193	-3.40326	-4	1.71474	2.90393	10.5907	9.31639	-20.7422	189.141	7.55858	0	89	2.2	-0.72731	-0.48942	-4.22839	30.1527
										10.5907	9.31639	-20.3906		7.3828						-4.03422	29.6583
											9.31639										
											9.14061										
92379				1964	194.5	-3.40326	-4.25336	2.45853	2.82977	10.5907	9.14061	-20.3906	187.031	7.3828	15.875	89	2.4	-0.72731	-0.48942	-4.03422	29.6583
										10.5907	9.14061	-20.3906		7.3828						-4.08292	29.4084
											8.96483										
											8.96483										
92380	2	43	26	1980	196.5	-3.16465	-3.70159	2.53281	2.90393	10.5907	8.96483	-20.3906	185.273	7.55858	0	89	2.6	-0.72731	-0.48942	-4.46862	29.4084
										10.5907	9.14061	-20.3906		7.91014						-4.32482	29.6583
											9.14061										
											9.49217										
92381				2000	198.5	-3.22428	-4.44337	2.53281	2.90393	10.5907	9.66795	-20.7422	183.164	8.43749	15.875	89	2.7	-0.80809	-0.48942	-3.98541	29.6583
										10.5907	9.84374	-21.0937		8.96483						-3.83835	29.1565
											10.0195										
											10.1953										
92382				2020	200.5	-3.76128	-4.5067	2.75555	2.53282	10.5907	10.1953	-21.0937	181.406	8.78905	0	89.125	2.7	-0.56571	-0.48942	-3.83835	27.8696
										10.5907	10.1953	-21.0937		8.61327						-3.83835	27.8696
											10.1953										
											10.1953										
92383				2040	202	-3.76128	-4.38003	2.82976	2.60708	10.5907	10.1953	-20.7422	179.297	8.43749	15.875	89.125	2.7	-0.56571	-0.48942	-3.83835	27.8696
										10.5907	10.1953	-20.7422		8.43749						-4.22839	28.6474
											10.1953										
											10.1953										
92384	2	43	30	2064	203.5	-3.22428	-4.57003	2.60708	2.60708	10.5907	10.1953	-21.0937	177.539	8.43749	0	89.125	2.7	-0.64651	-0.45452	-3.83835	28.6474
										10.5907	10.3711	-21.0937		8.61327						-3.83835	28.6474
											10.3711										
											10.7226										
92385				2084	205	-3.82096	-4.57003	2.60708	2.68131	10.5907	10.7226	-21.4453	175.43	8.96483	15.875	89.125	2.7	-0.56571	-0.45452	-3.78912	28.9029
										10.5907	10.7226	-21.4453		8.96483						-3.64084	28.9029
											10.8984										
											11.0742										
92386				2112	206	-3.94032	-4.75997	2.53281	2.68131	10.5907	11.0742	-21.4453	173.672	8.96483	0	89.125	2.7	-0.64651	-0.45452	-3.59122	28.9029
										10.5907	11.0742	-21.4453		8.78905						-3.49167	28.9029
											11.25										
											11.25										
92387				2136	207.5	-4.12669	-5.58231	2.53281	2.68131	10.5907	11.25	-21.0937	171.562	8.61327	15.875	89	2.7	-0.56571	-0.45452	-3.24116	28.6474
										10.5907	11.4258	-21.0937		8.61327						-2.73355	28.39
											11.4258										
											11.4258										
92388	2	43	34	2168	208.5	-5.32946	-6.84313	2.75555	2.38422	10.5907	11.6015	-20.7422	169.805	8.61327	0	89.125	2.7	-0.56571	-0.45452	-2.42516	27.8696
										10.5907	11.4258	-20.7422		8.26171						-2.27	27.8696
											11.4258										
											11.0742										
92389				2196	209	-5.96124	-5.83499	2.68133	2.30992	10.5907	10.8984	-20.7422	168.047	7.55858	15.875	89.125	2.7	-0.64651	-0.45452	-2.63105	27.8696
										10.5907	10.8984	-20.7422		7.03124						-3.19079	28.9029

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											10.5469										
											10.3711										
92390				2224	210.5	-4.5067	-5.39269	2.38422	2.60708	10.5907	10.1953	-20.7422	166.992	6.67968	0	89.125	2.7	-0.64651	-0.45452	-3.14032	29.1565
										10.5907	10.1953	-20.7422		7.03124						-3.08977	29.1565
											10.3711										
											10.5469										
92391				2252	212	-4.69666	-5.45591	2.45853	2.68131	10.5907	10.7226	-20.7422	164.883	7.55858	15.875	89.125	2.7	-0.48489	-0.45452	-3.08977	29.1565
										10.5907	10.7226	-20.3906		7.91014						-2.98841	29.1565
											11.0742										
											11.0742										
92392	2	43	38	2284	213.5	-4.94987	-5.51912	2.45853	2.75555	10.5907	11.25	-20.3906	163.125	7.91014	0	89.125	2.7	-0.48489	-0.45452	-3.03913	29.6583
										10.5907	11.25	-20.039		7.73436						-3.08977	29.9064
											11.25										
											11.25										
92393				2320	214.5	-4.69666	-5.45591	2.38422	2.82977	10.5907	11.25	-20.039	161.367	7.55858	15.875	89.125	2.7	-0.40409	-0.41961	-3.08977	29.9064
										10.5907	11.4258	-19.6875		7.20702						-3.08977	29.9064
											11.4258										
											11.4258										
92394				2352	215.5	-4.69666	-5.51912	2.38422	3.64449	10.5907	11.4258	-19.3359	159.609	7.3828	0	89.125	2.7	-0.48489	-0.41961	-3.08977	31.1198
										10.5907	11.6015	-18.6328		7.55858						-3.08977	32.9685
											11.6015										
											11.7773										
92395				2392	215.5	-4.69666	-5.45591	1.34232	3.7923	10.5907	11.7773	-18.6328	157.5	7.3828	15.875	89.25	2.7	-0.56571	-0.41961	-3.14032	32.9685
										10.5907	11.9531	-17.9297		7.3828						-3.14032	33.1917
											11.9531										
											12.1289										
92396	2	43	42	2432	216	-4.63335	-5.51912	0.745944	6.25067	10.5907	12.3047	-17.5781	155.742	7.73436	0	89.125	2.7	-0.72731	-0.41961	-3.08977	39.4382
										10.5907	12.3047	-17.5781		7.55858						-3.14032	37.1213
											12.4805										
											12.4805										
92397				2472	216.5	-4.5067	-5.13971	0	4.97021	10.5907	12.6562	-17.2265	154.336	7.3828	15.875	89.125	2.7	-0.88889	-0.41961	-3.29145	35.9425
										10.5907	12.832	-16.1719		7.20702						-3.39175	34.4958
											12.832										
											12.832										
92398				2520	216.5	-4.25337	-5.51912	1.86362	2.82977	10.5907	13.1836	-15.1172	152.93	7.3828	0	89.125	2.7	-0.56571	-0.41961	-3.14032	29.1565
										10.5907	13.3594	-14.414		7.91014						-2.98841	30.3972
											13.5351										
											13.7109										
92399				2572	217	-4.75998	-5.83499	1.93804	3.20046	10.5907	13.8867	-14.414	151.523	8.08593	15.875	89.125	2.7	-0.88889	-0.45452	-2.88671	31.1198
										10.5907	14.0625	-14.414		7.73436						-2.63105	29.4084
											14.0625										
											14.0625										
92400	2	43	46	2624	216.5	-5.51912	-6.59153	2.45853	2.75555	10.5907	14.2383	-14.414	150.469	7.55858	0	89	2.7	-0.64651	-0.45452	-2.52825	29.4084
										10.5907	14.2383	-14.414		7.03124						-2.42516	29.4084
											14.2383										
											14.0625										
92401				2676	216.5	-5.70868	-6.27659	2.3099	2.68131	10.5907	14.0625	-14.414	149.766	6.5039	15.875	89	2.7	-0.48489	-0.45452	-2.52825	29.4084
										10.5907	13.8867	-14.0625		6.5039						-2.37351	29.4084
											13.8867										
											13.8867										
92402				2728	216	-6.02434	-6.65446	2.3099	2.68131	10.5907	13.8867	-13.7109	148.711	6.15233	0	89.125	2.7	-0.32326	-0.45452	-2.32178	29.4084
										10.5907	13.8867	-13.3594		6.32812						-2.37351	29.6583
											13.8867										
											13.8867										
92403				2784	216.5	-5.70868	-6.4656	2.38422	2.90393	10.5907	13.8867	-13.0078	147.656	6.32812	15.875	89.125	2.6	-0.48489	-0.45452	-2.63105	29.6583
										10.5907	13.8867	-13.0078		6.32812						-2.32178	33.4133
											13.8867										
											13.8867										
92404	2	43	50	2840	217	-5.70868	-6.21355	0.596783	5.47019	10.5907	14.0625	-13.0078	146.602	6.5039	0	89.125	2.6	-0.56571	-0.41961	-2.57969	36.5388
										10.5907	14.0625	-13.0078		6.67968						-2.27	38.6462
											14.0625										
											14.0625										

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
92405				2892	217	-5.83498	-6.52858	-1.41683	6.17992	10.5907	14.0625	-12.3047	145.547	6.67968	15.875	89.125	2.6	-0.56571	-0.45452	-2.47674	39.4382
										10.5907	14.0625	-11.6015		6.32812						-2.63105	36.5388
											14.0625										
											13.8867										
92406				2948	216.5	-5.20296	-6.1505	1.11874	3.7184	10.5907	13.8867	-10.1953	144.844	6.15233	0	89.125	2.6	-0.48489	-0.45452	-2.63105	32.5168
										10.5907	13.8867	-9.14061		6.32812						-2.63105	32.2883
											14.0625										
											14.0625										
92407				3004	216.5	-5.26621	-6.1505	1.78918	3.05225	10.5907	14.2383	-8.43749	144.141	6.32812	15.875	89.125	2.6	-0.56571	-0.41961	-2.73355	30.6399
										10.5907	14.414	-8.08593		6.85546						-2.88671	30.6399
											14.414										
											14.5898										
92408	2	43	54	3064	216	-4.69666	-5.32945	2.01244	3.12636	10.5907	14.7656	-8.08593	143.438	6.85546	0	89.125	2.6	-0.64651	-0.41961	-3.14032	30.6399
										10.5907	14.7656	-8.08593		6.85546						-3.14032	31.357
											14.9414										
											15.1172										
92409				3124	216	-4.63335	-5.20297	1.86362	3.20046	10.5907	15.2929	-7.73436	142.734	7.20702	15.875	89.125	2.5	-0.48489	-0.41961	-3.29145	30.8807
										10.5907	15.6445	-7.3828		7.3828						-3.19079	30.6399
											15.8203										
											15.9961										
92410				3188	214.5	-5.39269	-6.08744	2.1612	2.97811	10.5907	16.1719	-7.3828	142.383	7.55858	0	89.125	2.5	-0.48489	-0.41961	-2.63105	30.3972
										10.5907	16.1719	-7.03124		7.55858						-2.73355	30.1527
											16.3476										
											16.3476										
92411				3252	214	-5.20296	-5.01316	2.08683	2.90393	10.5907	16.1719	-7.03124	141.68	6.85546	15.875	89.125	2.5	-0.48489	-0.41961	-3.19079	30.1527
										10.5907	16.1719	-7.03124		6.5039						-3.54149	29.9064
											16.1719										
											16.1719										
92412	2	43	58	3320	213.5	-3.94032	-4.82328	2.3099	2.82977	10.5907	16.3476	-6.67968	141.328	6.67968	0	89.25	2.5	-0.56571	-0.41961	-3.64084	29.6583
										10.5907	16.3476	-6.67968		7.20702						-3.64084	29.6583
											16.875										
											17.2265										
92413				3392	212	-4	-4.82328	2.38422	2.82977	10.5907	17.5781	-6.67968	140.625	7.91014	15.875	89.125	2.5	-0.80809	-0.41961	-3.59122	29.6583
										10.5907	17.7539	-6.67968		8.26171						-3.59122	29.6583
											17.9297										
											18.2812										
92414				3468	209.5	-4	-4.63334	2.38422	3.57054	10.5907	18.457	-6.67968	140.273	7.91014	0	89.125	2.5	-0.08082	-0.38469	-3.7398	29.9064
										10.5907	18.6328	-6.67968		8.43749						-3.49167	36.3416
											18.8086										
											18.9843										
92415				3544	209.5	-4.94987	-6.21355	-0.82051	7.16603	10.5907	19.1601	-7.03124	139.922	8.78905	15.875	89.25	2.5	-0.72731	-0.20992	-3.19079	40.4635
										10.5907	19.3359	-6.67968		8.26171						-3.93649	37.6904
											19.3359										
											19.3359										
92416	2	44	2	3624	207	-3.46291	-4.57003	0.671366	4.3823	10.5907	19.3359	-5.62499	139.922	7.91014	0	89.25	2.5	-0.32326	-0.24489	-3.78912	34.0678
										10.5907	19.1601	-3.86718		8.08593						-3.98541	33.8513
											19.3359										
											19.5117										
92417				3712	206	-3.64193	-4.69666	0.820516	3.57054	10.5907	19.6875	-2.8125	139.57	7.91014	15.875	89.375	2.5	-0.32326	-0.27985	-3.78912	33.6331
										10.5907	20.039	-1.75781		8.26171						-2.98841	29.1565
											20.2148										
											20.5664										
92418				3796	204.5	-5.45591	-6.40264	2.38422	3.27454	10.5907	20.7422	-1.05469	139.57	8.96483	0	89.375	2.5	-0.24244	-0.27985	-2.63105	29.9064
										10.5907	20.9179	-0.35156		8.96483						-2.0622	32.7435
											20.9179										
											20.9179										
92419				3880	203	-6.1505	-5.89811	1.19327	3.64449	10.5907	20.5664	0	139.57	8.26171	15.875	89.375	2.5	-0.40409	-0.27985	-2.42516	32.7435
										10.5907	20.3906	0.351562		6.67968						-2.63105	34.4958
											20.039										
											19.6875										
92420	2	44	6	3964	201	-5.26621	-5.39269	-0.44759	6.39202	10.5907	19.5117	0.351562	139.57	6.5039	0	89.375	2.5	-0.56571	-0.24489	-3.24116	37.6904
										10.5907	19.5117	0.351562		7.20702						-3.24116	41.7476

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											19.5117										
											19.6875										
92421				4056	199	-4.38004	-5.07644	-2.68131	7.02575	10.5907	19.8633	0.351562	139.57	7.03124	15.875	89.25	2.5	-1.29272	-0.24489	-3.34164	41.7476
										10.5907	20.039	0.703124		7.03124						-3.54149	41.7476
											20.2148										
											20.3906										
92422				4136	196.5	-4	-4.82328	-2.68131	7.23613	10.5907	20.5664	1.40625	140.273	7.91014	0	89.25	2.5	-0.24244	-0.24489	-3.64084	41.9675
										10.5907	21.0937	2.8125		8.78905						-3.59122	39.4382
											21.2695										
											21.6211										
92423				4220	194.5	-4.44337	-7.37929	0.149207	4.23499	10.5907	21.7968	3.86718	140.625	9.49217	15.875	89.375	2.5	-0.96967	-0.31481	-2.11424	34.7073
										10.5907	21.9726	5.27343		9.66795						-1.74871	33.8513
											22.1484										
											22.1484										
92424	2	44	10	4308	195	-6.40263	-7.02937	-0.67136	5.54135	10.5907	21.9726	5.62499	141.328	9.14061	0	89.5	2.5	-1.21196	-0.34976	-2.32178	39.2379
										10.5907	21.4453	5.27343		8.43749						-1.59124	34.4958
											21.0937										
											20.9179										
92425				4388	192	-6.65446	-7.6121	0.447603	3.05225	10.5907	20.2148	6.32812	142.383	7.55858	15.875	89.25	2.5	-1.13121	-0.34976	-1.69627	33.1917
										10.5907	19.8633	7.03124		6.85546						-2.01009	31.1198
											19.5117										
											19.1601										
92426				4460	190	-5.83498	-6.65446	1.49132	3.05225	10.5907	18.9843	6.67968	143.438	6.32812	0	89.375	2.5	-0.80809	-0.38469	-2.42516	31.1198
										10.5907	18.457	6.32812		6.85546						-2.78468	32.0582
											18.2812										
											18.2812										
92427				4532	190	-5.07643	-7.43754	0.969642	3.34857	10.5907	18.1054	5.62499	144.844	7.3828	15.875	89.375	2.5	-0.80809	-0.41961	-2.21814	32.5168
										10.5907	18.1054	5.62499		7.55858						-1.69627	31.357
											18.1054										
											18.1054										
92428	2	44	14	4600	188.5	-6.33962	-6.33962	1.49132	2.97811	10.5907	18.1054	5.62499	146.25	7.73436	0	89.25	2.5	0.08082	-0.41961	-2.57969	31.357
										10.5907	17.7539	7.03124		7.73436						-2.42516	29.1565
											17.4023										
											17.4023										
92429				4660	188	-5.45591	-6.40264	2.08683	2.53282	10.5907	17.0508	8.08593	146.953	7.73436	15.875	89.375	2.5	0.404091	-0.41961	-2.63105	29.4084
										10.5907	17.0508	9.14061		7.73436						-2.0622	29.1565
											16.875										
											16.6992										
92430				4720	187.5	-6.33962	-6.84313	2.08683	2.45854	10.5907	16.6992	9.84374	148.008	7.73436	0	89.375	2.5	0.24246	-0.41961	-2.01009	28.9029
										10.5907	16.5234	10.8984		7.91014						-2.42516	27.8696
											16.3476										
											16.1719										
92431				4772	187	-5.07643	-5.20297	2.45853	2.08683	10.5907	15.8203	11.9531	148.711	7.73436	15.875	89.375	2.5	0	-0.41961	-3.59122	27.6066
										10.5907	15.6445	12.3047		7.73436						-3.29145	24.0153
											15.4687										
											15.4687										
92432	2	44	18	4824	186.5	-4.19003	-5.13971	4.16128	0.820516	10.5907	15.4687	12.6562	149.414	8.08593	0	89.375	2.5	-0.32326	-0.45452	-3.49167	22.8457
										10.5907	15.6445	12.6562		8.96483						-2.88671	24.0153
											15.6445										
											15.8203										
92433				4876	186	-5.01316	-5.32945	3.42259	2.53282	10.5907	15.9961	12.3047	150.82	9.14061	15.875	89.375	2.5	-0.48489	-0.38469	-3.03913	28.1307
										10.5907	15.9961	11.9531		9.49217						-3.34164	36.7345
											15.9961										
											15.9961										
92434				4920	185.5	-3.94032	-5.01316	-0.82051	4.3823	10.5907	15.8203	11.6015	151.875	9.31639	0	89.375	2.5	-0.40409	-0.38469	-3.44176	36.9287
										10.5907	15.8203	11.9531		9.31639						-2.57969	31.8262
											15.8203										
											15.8203										
92435				4968	185.5	-6.02434	-7.32104	2.1612	2.53282	10.5907	15.8203	13.0078	152.93	9.49217	15.875	89.25	2.5	-0.40409	-0.48942	-1.69627	29.1565
										10.5907	15.6445	13.7109		9.31639						-2.21814	29.1565
											15.4687										
											15.1172										

Time	GMT HOURS	GMT MINUTES	GMT SECONDS	ALTITUDE (29 92)	COMPUTED AIRSPD	ELEVATOR POSN L	ELEVATOR POSN R	AILERON POSN L	AILERON POSN R	SPD BRAKE HANDLE	PITCH ANGLE EFIS	ROLL ANGLE EFIS	MAGNETIC HEADING EFIS	AOA	N1 L	N1 R	PITCH TRIM POSITION	RUDDER POSN	RUDDER PEDAL POSN	CONTROL COLUMN POSN	CONTROL WHEEL POSN
(seconds)	(HOURS)	(MINUTES)	(SECONDS)	(FEET)	(KNOTS)	()	()	()	()	()	(DEG)	(DEG)	(DEG)	(DEG)	(%RPM)	(%RPM)	()	()	()	()	()
92436	2	44	22	5008	185	-5.96124	-6.59153	2.1612	2.45854	10.5907	14.9414	13.7109	153.633	8.61327	0	89.375	2.5	-0.72731	-0.5243	-2.37351	29.1565
										10.5907	14.414	13.7109		7.91014						-2.9376	29.4084
											14.0625										
											13.3594										
92437				5044	184.5	-4.57003	-4.75997	2.08683	4.89685	10.5907	13.1836	13.7109	154.688	7.55858	15.875	89.375	2.5	-0.64651	-0.48942	-3.54149	33.6331
										10.5907	13.0078	13.7109		7.55858						-3.69037	36.5388
											13.0078										
											13.0078										
92438				5076	185.5	-3.82096	-4.82328	-0.67136	6.32137	10.5907	13.0078	14.0625	155.742	8.61327	0	89.375	2.5	-0.56571	-0.48942	-3.64084	39.4382
										10.5907	13.1836	14.414		9.31639						-3.54149	35.1254
											13.3594										
											13.5351										
92439				5112	186	-3.82096	-4.69666	1.49132	2.60708	10.5907	13.7109	15.4687	157.5	10.0195	15.875	89.375	2.5	-0.64651	-0.48942	-3.54149	28.6474
										10.5907	13.7109	16.5234		10.1953						-3.69037	29.4084
											13.7109										
											13.7109										
92440	2	44	26	5144	186.5	-3.76128	-4.94987	2.3099	2.60708	10.5907	13.7109	16.875	158.906	10.3711	0	89.375	2.5	-0.64651	-0.45452	-3.39175	29.4084
										10.5907	13.7109	16.875		10.0195						-3.54149	29.1565
											13.7109										
											13.5351										
92441				5172	186	-3.88063	-5.01316	2.3099	1.34233	10.5907	13.3594	16.875	160.664	9.84374	15.875	89.375	2.5	-0.80809	-0.5243	-3.08977	28.1307
										10.5907	13.3594	16.875		9.84374						-3.69037	21.3414
											13.1836										
											13.0078										
92442				5204	186.5	-3.76128	-4.63334	3.49658	2.53282	10.5907	13.0078	16.5234	162.422	9.66795	0	89.375	2.5	-0.56571	-0.48942	-3.78912	28.9029
										10.5907	12.832	16.1719		9.31639						-3.88747	27.3417
											12.832										
											12.6562										
92443				5232	187	-3.16465	-4	3.93997	0.969645	10.5907	12.6562	16.1719	164.18	9.66795	15.875	89.375	2.5	-0.48489	-0.5243	-4.13152	23.4343
										10.5907	12.6562	16.1719		10.0195						-4.08292	23.1409
											12.6562										
											12.832										
92444	2	44	30	5260	187.5	-3.16465	-4.5067	3.49658	3.49658	10.5907	13.0078	16.1719	165.938	10.3711	0	89.375	2.5	-0.24244	-0.45452	-4.08292	29.9064
										10.5907	13.0078	16.1719		10.3711						-3.7398	32.7435
											13.1836										
											13.1836										
92445				5288	188.5	-3.76128	-4.69666	1.19327	3.57054	10.5907	13.1836	16.1719	167.695	10.3711	15.875	89.375	2.5	-0.56571	-0.48942	-3.49167	31.8262
										10.5907	13.1836	16.5234		10.3711						-3.64084	33.1917
											13.0078										
											13.0078										
92446				5320	189	-3.76128	-4.69666	-0.0746	6.46262	10.5907	12.832	17.2265	169.102	9.84374	0	89.375	2.5	-0.56571	-0.48942	-3.69037	38.0682
										10.5907	12.6562	17.9297		9.66795						-3.69037	42.6372
											12.6562										
											12.4805										
92447				5344	189.5	-3.7016	-4.82328	-2.97811	7.16603	10.5907	12.4805	18.2812	170.859	9.31639	15.875	89.375	2.5	-0.64651	-0.48942	-3.64084	41.9675
										10.5907	12.3047	20.039		9.49217						-3.59122	39.8436
											12.3047										
											12.1289										
92448	2	44	34	5372	191	-3.88063	-4.82328	-1.71474	5.75458	10.5907	12.1289	21.4453	172.266	9.49217	0	89.5	2.5	-0.64651	-0.48942	-3.59122	39.0391
										10.5907	12.1289	22.8515		9.14061						-3.49167	36.5388
											11.9531										
											11.9531										
92449				5396	192	-3.94032	-5.01316	-0.14921	6.67415	10.5907	11.7773	23.5547	174.727	9.31639	15.875	89.5	2.5	-0.96967	-0.45452	-3.49167	36.3416
										10.5907	11.6015	24.2578		9.31639						-3.64084	53.1311
											11.6015										
											11.4258										
92450				5420	193.5	-3.88063	-4.94987	-8.14226	11.7716	10.5907	11.25	24.6093	176.484	9.14061	0	89.375	2.5	-1.13121	-0.45452	-3.64084	60.1661
										10.5907	11.0742	26.0156		8.96483						-3.64084	54.3458
											11.0742										
											10.8984										
92451				5436	195	-3.88063	-4.82328	-6.67415	10.7237	10.5907	10.7226	27.7734	179.648	8.96483	15.875	89.375	2.5	-1.21196	-0.45452	-3.69037	53.432
										10.5907	10.3711	31.6406		8.96483						-3.83835	52.8322

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
											10.1953										
											10.1953										
92452	2	44	38	5452	196.5	-3.58224	-4.63334	-6.32137	9.44921	10.5907	9.84374	35.1562	182.812	8.96483	0	89.375	2.5	-1.29272	-0.48942	-3.88747	51.3654
										10.5907	9.66795	38.6718		8.78905						-4.03422	46.2242
											9.49217										
											9.14061										
92453				5460	198.5	-2.92614	-4.25336	-4.16128	-1.71474	10.5907	8.78905	40.0781	186.328	8.78905	15.875	89.375	2.5	-1.45419	-0.59401	-4.18001	32.9685
										10.5907	8.26171	42.539		8.96483						-4.32482	10.3342
											8.08593										
											7.91014										
92454				5464	200.5	-2.03317	-2.44957	2.82976	7.93397	10.5907	7.3828	43.2421	190.547	8.96483	0	89.375	2.5	-0.88889	-0.17494	-5.26365	39.4382
										10.5907	7.03124	42.1874		9.14061						-5.62551	48.5744
											6.85546										
											6.67968										
92455				5468	202.5	-0.84801	-1.85494	-4.67653	9.58546	10.5907	6.5039	41.8359	194.766	9.66795	15.875	89.375	2.5	0.24246	0.174945	-5.58072	48.3058
										10.5907	6.32812	43.5937		10.3711						-5.5358	48.039
											6.32812										
											6.15233										
92456	2	44	42	5460	205.5	-0.90708	-2.50911	-3.64449	2.90393	10.5907	5.97655	46.4062	200.742	10.8984	0	89.375	2.5	0.484903	-0.03499	-5.26365	29.9064
										10.5907	5.80077	49.5702		10.8984						-5.80337	29.6583
											5.62499										
											5.44921										
92457				5452	207.5	-0.55307	-2.50911	1.71474	2.90393	10.5907	5.09765	51.6796	205.312	10.5469	15.875	89.375	2.5	0.404091	-0.03499	-5.4003	31.5925
										10.5907	4.57031	52.3827		10.3711						-5.4003	31.1198
											4.39453										
											4.21874										
92458				5432	209.5	-1.26193	-2.33054	0	7.5159	10.5907	3.51562	53.0859	210.586	10.1953	0	89.375	2.5	0.323277	0.314812	-5.44559	41.5294
										10.5907	3.16406	53.4374		9.66795						-5.21786	37.8786
											2.63671										
											2.28515										
92459				5408	212	-1.43963	4.41352	2.01244	6.81492	10.5907	1.75781	55.1952	215.156	9.66795	15.875	89.25	2.4	0.646514	0.489422	-8.17929	36.9287
										10.5907	1.05469	56.2499		9.49217						-6.70263	41.9675
											0.87891										
											0.52734										
92460	2	44	46	5380	215	1.54354	1.74687	-4.23499	9.72149	10.5907	0.52734	58.0077	222.188	10.7226	0	89.25	2.5	2.3413	0.802696	-7.1101	48.845
										10.5907	0.35156	60.1171		11.9531						-7.02969	41.9675
											0										
											-0.17578										
92461				5332	218.5	-0.31757	0.384021	-1.86361	7.86443	10.5907	-0.52734	63.6327	229.219	12.4805	15.875	89.25	2.5	1.6156	0.802696	-6.53587	41.7476
										10.5907	-1.05469	65.3905		12.4805						-6.98928	40.4635
											-1.58203										
											-2.8125										
92462				5276	222	1.61137	3.15781	0.074603	5.25647	10.5907	-3.51562	68.9062	235.898	11.4258	0	89.125	2.5	-0.24244	0.069985	-7.06996	29.1565
										10.5907	-4.04296	71.3671		11.0742						-8.43026	49.3918
											-5.09765										
											-5.62499										
92463				5204	225.5	5.00058	-1.43963	-5.96745	9.92502	10.5907	-6.15233	73.1249	242.578	10.8984	15.875	89.125	2.4	1.53489	0.594018	-7.42634	51.9464
										10.5907	-6.85546	74.1796		12.1289						-5.67017	44.9835
											-7.3828										
											-8.61327										
92464	2	44	50	5096	230.5	-1.08441	-2.80694	-2.45854	7.09592	10.5907	-9.49217	77.6952	251.367	12.3047	0	89.125	2.5	1.05045	0.524303	-5.03343	40.4635
										10.5907	-9.84374	80.5077		10.7226						-5.12589	40.4635
											-11.7773										
											-12.6562										
92465				4972	236.5	-1.73618	-2.98576	-2.97811	7.37611	10.5907	-13.7109	83.3202	255.586	8.43749	15.875	89	2.4	1.21197	0.524303	-5.21786	43.0924
										10.5907	-15.2929	84.7264		6.5039						-4.80016	38.6462
											-16.3476										
											-18.457										
92466				4816	244.5	-2.50911	-4.25336	-0.44759	5.61247	10.5907	-19.3359	87.1874	260.508	6.15233	0	89	2.5	1.77697	0.489422	-4.56393	37.5022
										10.5907	-20.7422	89.2967		5.80077						-3.59122	36.5388
											-22.6757										
											-23.7304										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	ELEVATOR POSN L ()	ELEVATOR POSN R ()	AILERON POSN L ()	AILERON POSN R ()	SPD BRAKE HANDLE ()	PITCH ANGLE EFIS (DEG)	ROLL ANGLE EFIS (DEG)	MAGNETIC HEADING EFIS (DEG)	AOA (DEG)	N1 L (%RPM)	N1 R (%RPM)	PITCH TRIM POSITION ()	RUDDER POSN ()	RUDDER PEDAL POSN ()	CONTROL COLUMN POSN ()	CONTROL WHEEL POSN ()
92467				4628	254	-3.94032	-5.45591	0	3.05225	10.5907	-25.1367	91.4061	265.078	5.44921	15.875	89.625	2.5	2.09954	0.349758	-3.64084	35.5372
										10.5907	-26.0156	92.8124		4.57031						-3.19079	25.7127
											-27.0703										
											-28.8281										
92468	2	44	54	4388	264.5	-4	-6.08744	2.53281	7.16603	10.5907	-29.707	95.2733	270	3.86718	0	89.875	2.5	1.85763	0.419615	-3.14032	36.1428
										10.5907	-30.2343	96.6796		3.33984						-1.90571	41.7476
											-31.1132										
											-31.8164										
92469				4124	275.5	-6.1505	-7.02937	-2.23555	6.46262	10.5907	-33.0468	98.0858	273.516	2.98828	15.875	90	2.5	2.26073	0.66366	-1.53866	41.7476
										10.5907	-33.9257	99.8436		2.10937						-1.38063	33.1917
											-34.8046										
											-36.5624										
92470				3820	289.5	-6.33962	-9.11425	2.01244	2.68131	10.5907	-36.914	103.008	277.031	1.23047	0	89.875	2.5	1.93828	-0.20992	-0.90449	29.6583
										10.5907	-37.7929	105.469		0.703124						2.32179	27.6066
											-39.5507										
											-40.2538										
92471				3508	306.5	-9.8567	-8.30798	2.23556	-9.92503	10.5907	-41.3085	107.578	279.844	0	15.875	89.875	2.5	1.53489	-0.24489	0.957521	11.7557
										7.45171	-41.6601	110.039		-2.63671						-1.69627	2.621
											-42.0117										
											-43.0663										
92472	2	44	58	3068	317.5	-5.45591	-6.21355	19.9852	-12.609	8.50137	-43.2421	111.094	281.602	-2.28515	0	89.625	2.5	1.21197	-0.20992	-1.48603	3.74078
										9.54769	-43.9452	98.0858		0.527343						-1.59124	31.357
											-45.1757										
											-45.5273										
92473				2640	334	-5.07643	-5.77184	16.2187	-5.61246	10.5907	-45.7031	78.7499	290.391	2.98828	15.875	89.125	2.5	1.77697	1.11405	-2.47674	38.6462
										10.5907	-45.8788	60.4687		3.16406						-1.95793	57.5102
											-45.8788										
											-45.8788										
92474				2216	352	-5.07643	-5.32945	8.6952	-7.65547	10.5907	-45.7031	54.1405	298.477	2.8125	0	87.5	2.5	2.3413	1.01051	-2.01009	54.3458
										9.54769	-45.3515	49.5702		2.28515						-2.98841	14.8754
											-44.9999										
											-44.6484										
92475				1748	368.5	-4.44337	-5.45591	18.83	-9.1074	9.54769	-44.121	48.164	302.695	2.28515	15.875	77.125	2.6	2.98518	1.01051	-2.27	12.8083
										10.5907	-43.4179	37.9687		3.33984						-3.59122	65.7645
											-42.7148										
											-41.4843										
92476	2	45	2	1320	382.5	-3.34359	-4.75997	5.39898	-4.23498	10.5907	-40.6054	30.2343	306.914	3.51562	0	63.375	2.4	1.37345	1.07957	-2.98841	59.1578
										10.5907	-39.0234	22.8515		3.33984						-3.19079	28.9029
											-38.3203										
											-37.9687										
92477				904	395	-2.80693	-3.64192	14.1822	-4.01377	10.5907	-36.914	23.9062	309.023	2.63671	15.875	55.75	2.4	2.18014	1.86262	-3.98541	31.1198
										10.5907	-36.2109	18.2812		3.51562						-6.4094	63.6251
											-35.332										
											-33.75										
92478				524	410	0.999374	2.15226	1.64028	3.42259	10.5907	-32.6953	14.0625	311.133	3.51562	0	51.5	2.2	3.46716	3.33793	-8.81175	57.1858
										10.5907	-30.5859	14.414		4.92187						-7.88453	41.0981
											-29.8828										
											-29.0039										
92479				180	416	-0.67098	-3.28393	6.95553	0.14921	10.5907	-25.4882	19.3359	315.703	6.85546	15.875	48.375	2.4	3.3066	4.48769	-5.89152	41.5294
										10.5907	-24.4336	24.6093		5.44921						-5.35487	40.0486
											-23.7304										
											-23.2031										
92480																					

 # Flash Air B737-300 Accident
 # Preliminary Data Created: January 20 2004
 # MCA

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	MASTER CAUTION (0-WARN 1-.)	EFIS SEL SW CAPT (0-LEFT 1-RIGHT)	V/S MODE FCC (0-. 1-ENGA)	A/T ENGA (0-. 1-ENGA)	A/T GA (0-. 1-ENGA)	A/T LIMIT (0-. 1-LIMIT)	A/T MAN DISC (0-DISC 1-.)	A/T MCP SPEED (0-. 1-ENGA)	A/T MIN SPEED (0-. 1-ENGA)	A/T N1 (0-. 1-ENGA)	A/T RETARD (0-. 1-ENGA)	A/T WARN (0-WARN 1-.)	N1 LIMIT MODE A/T (0-NOCODE 1-CODED)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)
91864	2	34	50	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91865				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91866				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91867				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91868	2	34	54	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91869				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91870				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91871				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91872	2	34	58	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91873				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91874				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91875				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91876	2	35	2	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91877				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91878				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91879				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91880	2	35	6	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91881				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91882				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91883				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91884	2	35	10	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91885				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91886				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91887				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91888	2	35	14	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91889				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91890				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91891				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91892	2	35	18	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91893				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91894				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91895				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91896	2	35	22	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91897				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91898				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91899				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91900	2	35	26	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91901				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91902				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91903				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91904	2	35	30	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91905				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91906				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91907				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91908	2	35	34	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91909				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91910				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91911				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91912	2	35	38	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91913				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91914				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91915				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91916	2	35	42	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91917				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91918				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91919				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91920	2	35	46	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91921				216	45	.		.	.	.	.	.	.	.	.	.	.		2.63671	
91922				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91923				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.63671	
91924	2	35	50	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91925				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91926				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91927				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91928	2	35	54	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91929				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91930				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91931				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91932	2	35	58	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91933				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91934				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91935				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91936	2	36	2	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91937				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91938				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91939				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91940	2	36	6	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91941				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91942				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91943				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.28515	
91944	2	36	10	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91945				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91946				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91947				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91948	2	36	14	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91949				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91950				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91951				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91952	2	36	18	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91953				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91954				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91955				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91956	2	36	22	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91957				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91958				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91959				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91960	2	36	26	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91961				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91962				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91963				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91964	2	36	30	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91965				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91966				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91967				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91968	2	36	34	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91969				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91970				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91971				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91972	2	36	38	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91973				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91974				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91975				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91976	2	36	42	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91977				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	MASTER CAUTION (0-WARN 1-.)	EFIS SEL SW CAPT (0-LEFT 1-RIGHT)	V/S MODE FCC (0-. 1-ENGA)	A/T ENGA (0-. 1-ENGA)	A/T GA (0-. 1-ENGA)	A/T LIMIT (0-. 1-LIMIT)	A/T MAN DISC (0-DISC 1-.)	A/T MCP SPEED (0-. 1-ENGA)	A/T MIN SPEED (0-. 1-ENGA)	A/T N1 (0-. 1-ENGA)	A/T RETARD (0-. 1-ENGA)	A/T WARN (0-WARN 1-.)	N1 LIMIT MODE A/T (0-NOCODE 1-CODED)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)
91978				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91979				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91980	2	36	46	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91981				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	MASTER CAUTION (0-WARN 1-.)	EFIS SEL SW CAPT (0-LEFT 1-RIGHT)	V/S MODE FCC (0-. 1-ENGA)	A/T ENGA (0-. 1-ENGA)	A/T GA (0-. 1-ENGA)	A/T LIMIT (0-. 1-LIMIT)	A/T MAN DISC (0-DISC 1-.)	A/T MCP SPEED (0-. 1-ENGA)	A/T MIN SPEED (0-. 1-ENGA)	A/T N1 (0-. 1-ENGA)	A/T RETARD (0-. 1-ENGA)	A/T WARN (0-WARN 1-.)	N1 LIMIT MODE A/T (0-NOCODE 1-CODED)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)
91982				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91983				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91984	2	36	50	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91985				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91986				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91987				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91988	2	36	54	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91989				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91990				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91991				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91992	2	36	58	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91993				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91994				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91995				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
91996	2	37	2	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
91997				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
91998				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
91999				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
92000	2	37	6	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
92001				216	45	.		.	.	.	.	.	.	.	.	.	.		2.46093	
92002				216	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
92003				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.46093	
92004	2	37	10	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
92005				216	45	.		.	.	.	.	.	.	.	.	.	.		5.97655	
92006				216	45	.		.	.	.	.	.	.	.	.	.	.			5.44921
92007				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		5.97655	
92008	2	37	14	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.44921
92009				216	45	.		.	.	.	.	.	.	.	.	.	.		6.15233	
92010				216	45	.		.	.	.	.	.	.	.	.	.	.			7.73436
92011				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		10.3711	
92012	2	37	18	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		8.78905
92013				216	45	.		.	.	.	.	.	.	.	.	.	.		11.9531	
92014				216	45	.		.	.	.	.	.	.	.	.	.	.			9.84374
92015				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		14.414	
92016	2	37	22	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		12.4805
92017				216	45	.		.	.	.	.	.	.	.	.	.	.		15.2929	
92018				216	45	.		.	.	.	.	.	.	.	.	.	.			12.4805
92019				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		15.4687	
92020	2	37	26	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		11.25
92021				216	45	.		.	.	.	.	.	.	.	.	.	.		12.3047	
92022				216	45	.		.	.	.	.	.	.	.	.	.	.			8.96483
92023				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		12.1289	
92024	2	37	30	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		8.96483
92025				216	45	.		.	.	.	.	.	.	.	.	.	.		12.1289	
92026				216	45	.		.	.	.	.	.	.	.	.	.	.			8.96483
92027				216	45	WARN	LEFT	.	.	.	.	.	.	.	.	.	.		10.1953	
92028	2	37	34	216	45	WARN		.	.	.	.	.	.	.	.	.	.	T/O		7.20702
92029				216	45	.		.	.	.	.	.	.	.	.	.	.		10.0195	
92030				216	45	.		.	.	.	.	.	.	.	.	.	.			6.5039
92031				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		8.61327	
92032	2	37	38	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.80077
92033				216	45	.		.	.	.	.	.	.	.	.	.	.		8.43749	
92034				216	45	.		.	.	.	.	.	.	.	.	.	.			5.80077
92035				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		8.43749	
92036	2	37	42	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.80077
92037				216	45	.		.	.	.	.	.	.	.	.	.	.		8.43749	
92038				216	45	.		.	.	.	.	.	.	.	.	.	.			5.80077
92039				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		8.43749	
92040	2	37	46	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.80077
92041				216	45	.		.	.	.	.	.	.	.	.	.	.		8.43749	
92042				216	45	.		.	.	.	.	.	.	.	.	.	.			5.80077
92043				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.91014	
92044	2	37	50	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.80077
92045				216	45	.		.	.	.	.	.	.	.	.	.	.		7.3828	
92046				216	45	.		.	.	.	.	.	.	.	.	.	.			5.80077
92047				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.3828	
92048	2	37	54	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.80077
92049				216	45	.		.	.	.	.	.	.	.	.	.	.		7.3828	
92050				216	45	.		.	.	.	.	.	.	.	.	.	.			5.80077
92051				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.3828	
92052	2	37	58	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.80077
92053				216	45	.		.	.	.	.	.	.	.	.	.	.		7.3828	
92054				216	45	.		.	.	.	.	.	.	.	.	.	.			5.80077
92055				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.3828	
92056	2	38	2	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.80077
92057				216	45	.		.	.	.	.	.	.	.	.	.	.		7.3828	
92058				216	45	.		.	.	.	.	.	.	.	.	.	.			5.80077
92059				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.3828	
92060	2	38	6	216	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92061				216	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92062				212	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92063				216	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92064	2	38	10	212	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92065				212	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92066				212	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92067				212	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92068	2	38	14	212	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92069				212	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92070				212	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92071				212	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92072	2	38	18	212	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92073				212	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92074				212	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92075				212	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92076	2	38	22	212	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92077				208	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92078				208	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92079				208	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92080	2	38	26	208	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92081				208	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92082				208	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92083				208	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92084	2	38	30	208	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92085				208	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92086				208	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92087				208	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92088	2	38	34	208	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92089				208	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92090				208	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92091				208	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92092	2	38	38	208	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92093				208	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92094				208	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92095				208	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92096	2	38	42	208	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92097				208	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92098				208	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92099				208	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92100	2	38	46	208	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92101				208	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	MASTER CAUTION (0-WARN 1-.)	EFIS SEL SW CAPT (0-LEFT 1-RIGHT)	V/S MODE FCC (0-. 1-ENGA)	A/T ENGA (0-. 1-ENGA)	A/T GA (0-. 1-ENGA)	A/T LIMIT (0-. 1-LIMIT)	A/T MAN DISC (0-DISC 1-.)	A/T MCP SPEED (0-. 1-ENGA)	A/T MIN SPEED (0-. 1-ENGA)	A/T N1 (0-. 1-ENGA)	A/T RETARD (0-. 1-ENGA)	A/T WARN (0-WARN 1-.)	N1 LIMIT MODE A/T (0-NOCODE 1-CODED)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)
92102				208	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92103				204	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92104	2	38	50	204	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92105				204	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	MASTER CAUTION (0-WARN 1-.)	EFIS SEL SW CAPT (0-LEFT 1-RIGHT)	V/S MODE FCC (0-. 1-ENGA)	A/T ENGA (0-. 1-ENGA)	A/T GA (0-. 1-ENGA)	A/T LIMIT (0-. 1-LIMIT)	A/T MAN DISC (0-DISC 1-.)	A/T MCP SPEED (0-. 1-ENGA)	A/T MIN SPEED (0-. 1-ENGA)	A/T N1 (0-. 1-ENGA)	A/T RETARD (0-. 1-ENGA)	A/T WARN (0-WARN 1-.)	N1 LIMIT MODE A/T (0-NOCODE 1-CODED)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)
92106				204	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92107				204	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92108	2	38	54	204	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92109				204	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92110				208	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92111				204	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92112	2	38	58	204	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92113				204	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92114				204	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92115				204	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92116	2	39	2	204	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92117				204	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92118				204	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92119				204	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92120	2	39	6	204	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92121				204	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92122				204	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92123				204	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92124	2	39	10	204	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92125				204	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92126				204	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92127				204	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92128	2	39	14	204	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92129				204	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92130				200	45	.		.	.	.	.	.	.	.	.	.	.			5.62499
92131				204	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		7.03124	
92132	2	39	18	200	45	.		.	.	.	.	.	.	.	.	.	.	T/O		5.62499
92133				200	45	.		.	.	.	.	.	.	.	.	.	.		7.03124	
92134				200	45	.		.	.	.	.	.	.	.	.	.	.			5.44921
92135				200	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		3.51562	
92136	2	39	22	200	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.40625
92137				200	45	.		.	.	.	.	.	.	.	.	.	.		2.8125	
92138				200	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
92139				200	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.8125	
92140	2	39	26	200	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
92141				200	45	.		.	.	.	.	.	.	.	.	.	.		2.8125	
92142				200	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
92143				196	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.8125	
92144	2	39	30	196	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
92145				196	45	.		.	.	.	.	.	.	.	.	.	.		2.8125	
92146				196	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
92147				196	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.8125	
92148	2	39	34	196	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
92149				196	45	.		.	.	.	.	.	.	.	.	.	.		2.8125	
92150				196	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
92151				196	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.8125	
92152	2	39	38	196	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
92153				196	45	.		.	.	.	.	.	.	.	.	.	.		2.8125	
92154				196	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
92155				192	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.8125	
92156	2	39	42	192	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
92157				196	45	.		.	.	.	.	.	.	.	.	.	.		2.8125	
92158				192	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
92159				192	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.8125	
92160	2	39	46	192	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
92161				192	45	.		.	.	.	.	.	.	.	.	.	.		2.8125	
92162				192	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
92163				192	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.8125	
92164	2	39	50	192	45	.		.	.	.	.	.	.	.	.	.	.	T/O		1.23047
92165				192	45	.		.	.	.	.	.	.	.	.	.	.		2.8125	
92166				192	45	.		.	.	.	.	.	.	.	.	.	.			1.23047
92167				192	45	.	LEFT	.	.	.	.	.	.	.	.	.	.		2.8125	
92168	2	39	54	192	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92169				192	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92170				192	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92171				192	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92172	2	39	58	192	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92173				192	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92174				192	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92175				192	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92176	2	40	2	192	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92177				192	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92178				192	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92179				192	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92180	2	40	6	192	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92181				188	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92182				192	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92183				192	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92184	2	40	10	192	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92185				188	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92186				192	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92187				192	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92188	2	40	14	188	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92189				192	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92190				188	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92191				188	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92192	2	40	18	188	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92193				188	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92194				188	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92195				188	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92196	2	40	22	188	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92197				188	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92198				188	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92199				188	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92200	2	40	26	188	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92201				188	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92202				188	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92203				188	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92204	2	40	30	188	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92205				188	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92206				188	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92207				188	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92208	2	40	34	188	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92209				188	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92210				188	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92211				188	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92212	2	40	38	188	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92213				188	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92214				188	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92215				184	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92216	2	40	42	188	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92217				188	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92218				188	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92219				188	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92220	2	40	46	188	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92221				188	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92222				184	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92223				188	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92224	2	40	50	188	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92225				184	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	MASTER CAUTION (0-WARN 1-.)	EFIS SEL SW CAPT (0-LEFT 1-RIGHT)	V/S MODE FCC (0-. 1-ENGA)	A/T ENGA (0-. 1-ENGA)	A/T GA (0-. 1-ENGA)	A/T LIMIT (0-. 1-LIMIT)	A/T MAN DISC (0-DISC 1-.)	A/T MCP SPEED (0-. 1-ENGA)	A/T MIN SPEED (0-. 1-ENGA)	A/T N1 (0-. 1-ENGA)	A/T RETARD (0-. 1-ENGA)	A/T WARN (0-WARN 1-.)	N1 LIMIT MODE A/T (0-NOCODE 1-CODED)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)
92226				184	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92227				184	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92228	2	40	54	184	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92229				184	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	MASTER CAUTION (0-WARN 1-.)	EFIS SEL SW CAPT (0-LEFT 1-RIGHT)	V/S MODE FCC (0-. 1-ENGA)	A/T ENGA (0-. 1-ENGA)	A/T GA (0-. 1-ENGA)	A/T LIMIT (0-. 1-LIMIT)	A/T MAN DISC (0-DISC 1-.)	A/T MCP SPEED (0-. 1-ENGA)	A/T MIN SPEED (0-. 1-ENGA)	A/T N1 (0-. 1-ENGA)	A/T RETARD (0-. 1-ENGA)	A/T WARN (0-WARN 1-.)	N1 LIMIT MODE A/T (0-NOCODE 1-CODED)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)
92230				184	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92231				184	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92232	2	40	58	184	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92233				184	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92234				184	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92235				184	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92236	2	41	2	184	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92237				184	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92238				184	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92239				184	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92240	2	41	6	184	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92241				184	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92242				184	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92243				184	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92244	2	41	10	184	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92245				184	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92246				184	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92247				184	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92248	2	41	14	184	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92249				184	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92250				184	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92251				184	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92252	2	41	18	184	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.23047
92253				184	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92254				184	45	.		.	ENGA	.	.	.	.	.	.	.	.			1.23047
92255				184	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.8125	
92256	2	41	22	184	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		1.75781
92257				184	45	.		.	ENGA	.	.	.	.	.	.	.	.		2.98828	
92258				184	45	.		.	ENGA	.	.	.	.	.	.	.	.			2.10937
92259				180	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		2.98828	
92260	2	41	26	180	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		3.6914
92261				180	45	.		.	ENGA	.	.	.	.	.	.	.	.		5.44921	
92262				180	45	.		.	ENGA	.	.	.	.	.	.	.	.			3.86718
92263				180	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		5.44921	
92264	2	41	30	180	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		3.86718
92265				180	45	.		.	ENGA	.	.	.	.	.	.	.	.		5.44921	
92266				180	45	.		.	ENGA	.	.	.	.	.	.	.	.			3.86718
92267				180	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		5.44921	
92268	2	41	34	180	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		3.86718
92269				180	45	.		.	ENGA	.	.	.	.	.	.	.	.		5.44921	
92270				180	45	.		.	ENGA	.	.	.	.	.	.	.	.			3.86718
92271				180	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		5.44921	
92272	2	41	38	180	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		3.86718
92273				180	45	.		.	ENGA	.	.	.	.	.	.	.	.		5.44921	
92274				180	45	.		.	ENGA	.	.	.	.	.	.	.	.			3.86718
92275				180	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		5.44921	
92276	2	41	42	180	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		3.86718
92277				180	45	.		.	ENGA	.	.	.	.	.	.	.	.		5.44921	
92278				180	45	.		.	ENGA	.	.	.	.	.	.	.	.			3.86718
92279				180	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		5.44921	
92280	2	41	46	180	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		3.86718
92281				180	45	.		.	ENGA	.	.	.	.	.	.	.	.		5.44921	
92282				180	45	.		.	ENGA	.	.	.	.	.	.	.	.			3.86718
92283				180	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		8.26171	
92284	2	41	50	180	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		14.7656
92285				180	45	.		.	ENGA	.	.	.	.	.	.	.	.		20.9179	
92286				180	45	.		.	ENGA	.	.	.	.	.	.	.	.			20.3906
92287				180	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		22.8515	
92288	2	41	54	180	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		20.3906
92289				180	45	.		.	ENGA	.	.	.	.	.	.	.	.		24.7851	
92290				180	45	.		.	ENGA	.	.	.	.	.	.	.	.			22.1484
92291				184	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		24.7851	
92292	2	41	58	180	45	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		22.1484
92293				184	45	.		.	ENGA	.	.	.	.	.	.	.	.		24.7851	
92294				184	45	.		.	ENGA	.	.	.	.	.	.	.	.			22.1484
92295				184	45	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		24.7851	
92296	2	42	2	188	45	.		.	ENGA	.	.	.	.	.	ENGA	.	.	T/O		22.1484
92297				188	45	.		.	ENGA	.	.	.	.	.	ENGA	.	.		30.7617	
92298				188	45	.		.	ENGA	.	.	.	.	.	ENGA	.	.			32.6953
92299				188	45	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		37.4414	
92300	2	42	6	192	45	.		.	ENGA	.	.	.	.	.	ENGA	.	.	T/O		37.2656
92301				192	45.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.		40.4296	
92302				192	49.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			39.1992
92303				196	56	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		45.1757	
92304	2	42	10	196	61	.		.	ENGA	.	.	.	.	.	ENGA	.	.	T/O		44.2968
92305				196	65	.		.	ENGA	.	.	.	.	.	ENGA	.	.		46.4062	
92306				196	70	.		.	ENGA	.	.	.	.	.	ENGA	.	.			45.1757
92307				200	75.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		46.4062	
92308	2	42	14	200	78.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	T/O		45.7031
92309				200	83.5	.		.	ENGA	.	.	.	.	.	.	.	.		46.4062	
92310				200	89	.		.	ENGA	.	.	.	.	.	.	.	.			45.7031
92311				200	93	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92312	2	42	18	200	97.5	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		45.7031
92313				204	101	.		.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92314				204	106.5	.		.	ENGA	.	.	.	.	.	.	.	.			45.7031
92315				204	109.5	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92316	2	42	22	204	115.5	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		45.7031
92317				204	119.5	.		.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92318				204	123.5	.		.	ENGA	.	.	.	.	.	.	.	.			45.7031
92319				208	127.5	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92320	2	42	26	208	131.5	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		45.7031
92321				208	135.5	.		.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92322				208	139	.		.	ENGA	.	.	.	.	.	.	.	.			45.7031
92323				204	142.5	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92324	2	42	30	204	146	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		45.7031
92325				196	150	.		.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92326				192	152	.		.	ENGA	.	.	.	.	.	.	.	.			45.7031
92327				192	155.5	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92328	2	42	34	196	159	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		45.7031
92329				208	162	.		.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92330				220	165.5	.		.	ENGA	.	.	.	.	.	.	.	.			45.7031
92331				240	167.5	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92332	2	42	38	268	169.5	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		45.7031
92333				300	171.5	.		.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92334				328	172	.		.	ENGA	.	.	.	.	.	.	.	.			45.7031
92335				364	173	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92336	2	42	42	400	174	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		45.7031
92337				440	174.5	.		.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92338				480	176	.		.	ENGA	.	.	.	.	.	.	.	.			45.7031
92339				512	176.5	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92340	2	42	46	548	177	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		45.7031
92341				584	178	.		.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92342				616	178.5	.		.	ENGA	.	.	.	.	.	.	.	.			45.7031
92343				652	179	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92344	2	42	50	688	178.5	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		45.7031
92345				720	179.5	.		.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92346				756	179.5	.		.	ENGA	.	.	.	.	.	.	.	.			45.7031
92347				792	180	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92348	2	42	54	832	180	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		45.7031
92349				868	181	.		.	ENGA	.	.	.	.	.	.	.	.		46.2304	

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	MASTER CAUTION (0-WARN 1-.)	EFIS SEL SW CAPT (0-LEFT 1-RIGHT)	V/S MODE FCC (0-. 1-ENGA)	A/T ENGA (0-. 1-ENGA)	A/T GA (0-. 1-ENGA)	A/T LIMIT (0-. 1-LIMIT)	A/T MAN DISC (0-DISC 1-.)	A/T MCP SPEED (0-. 1-ENGA)	A/T MIN SPEED (0-. 1-ENGA)	A/T N1 (0-. 1-ENGA)	A/T RETARD (0-. 1-ENGA)	A/T WARN (0-WARN 1-.)	N1 LIMIT MODE A/T (0-NOCODE 1-CODED)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)
92350				904	180.5	.		.	ENGA	.	.	.	.	.	.	.	.			45.7031
92351				940	181.5	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92352	2	42	58	976	181	.		.	ENGA	.	.	.	.	.	.	.	.	T/O		45.7031
92353				1016	181.5	.		.	ENGA	.	.	.	.	.	.	.	.		46.2304	

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	MASTER CAUTION (0-WARN 1-.)	EFIS SEL SW CAPT (0-LEFT 1-RIGHT)	V/S MODE FCC (0-. 1-ENGA)	A/T ENGA (0-. 1-ENGA)	A/T GA (0-. 1-ENGA)	A/T LIMIT (0-. 1-LIMIT)	A/T MAN DISC (0-DISC 1-.)	A/T MCP SPEED (0-. 1-ENGA)	A/T MIN SPEED (0-. 1-ENGA)	A/T N1 (0-. 1-ENGA)	A/T RETARD (0-. 1-ENGA)	A/T WARN (0-WARN 1-.)	N1 LIMIT MODE A/T (0-NOCODE 1-CODED)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)
92354				1052	181.5	.		.	ENGA	.	.	.	.	.	.	.	.			45.7031
92355				1096	183	.	LEFT	.	ENGA	.	.	.	.	.	.	.	.		46.2304	
92356	2	43	2	1136	183	.		.	ENGA	.	.	.	.	.	ENGA	.	.	T/O		45.7031
92357				1180	184	.		.	ENGA	.	.	.	.	.	ENGA	.	.		46.2304	
92358				1220	184	.		.	ENGA	.	.	.	.	.	ENGA	.	.			45.5273
92359				1268	184	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		44.8242	
92360	2	43	6	1312	184	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.7695
92361				1352	183	.		.	ENGA	.	.	.	.	.	ENGA	.	.		44.2968	
92362				1396	184	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.5937
92363				1440	184	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		44.121	
92364	2	43	10	1484	183.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.5937
92365				1528	183	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92366				1576	183.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.5937
92367				1624	183	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92368	2	43	14	1668	182.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.4179
92369				1708	183	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92370				1748	183.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.4179
92371				1784	184.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92372	2	43	18	1816	185.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.4179
92373				1844	186.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92374				1868	187.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.2421
92375				1892	188.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92376	2	43	22	1912	190	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.2421
92377				1932	191.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92378				1948	193	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.2421
92379				1964	194.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92380	2	43	26	1980	196.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.4179
92381				2000	198.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92382				2020	200.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.4179
92383				2040	202	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92384	2	43	30	2064	203.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.4179
92385				2084	205	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92386				2112	206	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.5937
92387				2136	207.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92388	2	43	34	2168	208.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.5937
92389				2196	209	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92390				2224	210.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.5937
92391				2252	212	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92392	2	43	38	2284	213.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.5937
92393				2320	214.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92394				2352	215.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.4179
92395				2392	215.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92396	2	43	42	2432	216	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.4179
92397				2472	216.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92398				2520	216.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.2421
92399				2572	217	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92400	2	43	46	2624	216.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.2421
92401				2676	216.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92402				2728	216	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.2421
92403				2784	216.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.7695	
92404	2	43	50	2840	217	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.2421
92405				2892	217	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.7695	
92406				2948	216.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.2421
92407				3004	216.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92408	2	43	54	3064	216	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.2421
92409				3124	216	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92410				3188	214.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.2421
92411				3252	214	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92412	2	43	58	3320	213.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.2421
92413				3392	212	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92414				3468	209.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.2421
92415				3544	209.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92416	2	44	2	3624	207	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.2421
92417				3712	206	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92418				3796	204.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.2421
92419				3880	203	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92420	2	44	6	3964	201	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.2421
92421				4056	199	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92422				4136	196.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.2421
92423				4220	194.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92424	2	44	10	4308	195	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.0663
92425				4388	192	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92426				4460	190	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.0663
92427				4532	190	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92428	2	44	14	4600	188.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.0663
92429				4660	188	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92430				4720	187.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			42.8906
92431				4772	187	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92432	2	44	18	4824	186.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		42.8906
92433				4876	186	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92434				4920	185.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			42.8906
92435				4968	185.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92436	2	44	22	5008	185	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		42.7148
92437				5044	184.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92438				5076	185.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			42.7148
92439				5112	186	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92440	2	44	26	5144	186.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		42.7148
92441				5172	186	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92442				5204	186.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			42.7148
92443				5232	187	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92444	2	44	30	5260	187.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		42.7148
92445				5288	188.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92446				5320	189	.		.	ENGA	.	.	.	.	.	ENGA	.	.			42.7148
92447				5344	189.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92448	2	44	34	5372	191	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		42.7148
92449				5396	192	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92450				5420	193.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			42.7148
92451				5436	195	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92452	2	44	38	5452	196.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		42.7148
92453				5460	198.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92454				5464	200.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			42.7148
92455				5468	202.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92456	2	44	42	5460	205.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		42.7148
92457				5452	207.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92458				5432	209.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			42.7148
92459				5408	212	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92460	2	44	46	5380	215	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		42.7148
92461				5332	218.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92462				5276	222	.		.	ENGA	.	.	.	.	.	ENGA	.	.			42.7148
92463				5204	225.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.4179	
92464	2	44	50	5096	230.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		42.7148
92465				4972	236.5	WARN		.	ENGA	.	.	.	.	.	ENGA	.	.		43.5937	
92466				4816	244.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			42.7148
92467				4628	254	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		43.7695	
92468	2	44	54	4388	264.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		44.121
92469				4124	275.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.		43.9452	
92470				3820	289.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.			44.121
92471				3508	306.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		44.2968	
92472	2	44	58	3068	317.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		43.9452
92473				2640	334	.		.	ENGA	.	.	.	.	.	ENGA	.	.		44.6484	

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	MASTER CAUTION (0-WARN 1-.)	EFIS SEL SW CAPT (0-LEFT 1-RIGHT)	V/S MODE FCC (0-. 1-ENGA)	A/T ENGA (0-. 1-ENGA)	A/T GA (0-. 1-ENGA)	A/T LIMIT (0-. 1-LIMIT)	A/T MAN DISC (0-DISC 1-.)	A/T MCP SPEED (0-. 1-ENGA)	A/T MIN SPEED (0-. 1-ENGA)	A/T N1 (0-. 1-ENGA)	A/T RETARD (0-. 1-ENGA)	A/T WARN (0-WARN 1-.)	N1 LIMIT MODE A/T (0-NOCODE 1-CODED)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)
92474				2216	352	.		.	ENGA	.	.	.	.	.	ENGA	.	.			43.9452
92475				1748	368.5	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		31.289	
92476	2	45	2	1320	382.5	.		.	ENGA	.	.	.	.	.	ENGA	.	.	CLB		19.3359
92477				904	395	.		.	ENGA	.	.	.	.	.	ENGA	.	.		2.28515	

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	MASTER CAUTION (0-WARN 1-.)	EFIS SEL SW CAPT (0-LEFT 1-RIGHT)	V/S MODE FCC (0-. 1-ENGA)	A/T ENGA (0-. 1-ENGA)	A/T GA (0-. 1-ENGA)	A/T LIMIT (0-. 1-LIMIT)	A/T MAN DISC (0-DISC 1-.)	A/T MCP SPEED (0-. 1-ENGA)	A/T MIN SPEED (0-. 1-ENGA)	A/T N1 (0-. 1-ENGA)	A/T RETARD (0-. 1-ENGA)	A/T WARN (0-WARN 1-.)	N1 LIMIT MODE A/T (0-NOCODE 1-CODED)	THR LEVER ANGLE L (DEG)	THR LEVER ANGLE R (DEG)
92478				524	410	.		.	ENGA	.	.	.	.	.	ENGA	.	.			2.98828
92479				180	416	.	LEFT	.	ENGA	.	.	.	.	.	ENGA	.	.		5.27343	
92480																				

Flash Air B737-300 Accident
Preliminary Data Created: January 20 2004
MCA

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMP. AIRSPD (KNOTS)	MASTER CAUTION (0-WARN)	TO/GA FCC (0-. 1-ENGA)	L NAV ENGA FCC (1-ENGA)	NAV MODE SEL CAPT (1-SEL)	NAV MODE SEL F/O (1-SEL)	ALT HOLD FCC (1-ENGA)	A/T MIN SPEED (1-ENGA)	HDG SEFCC L (1-ENGA)	CMD A FCC (1-ENGA)	CMD B FCC (1-ENGA)	CWS A FCC (1-ENGA)	CWS B FCC (1-ENGA)	CWS ROLFCC L (1-ENGA)	SEL COURSE 1 (DEG)	SEL COURSE 2 (DEG)	SEL ALT FCC L (FEET)	SEL AIRSPD FCC L (KNOTS)	SEL MACH FCC L (MACH)	SEL HEADING FCC L (DEG)	A/P OFF FCC (1-OFF)	A/P WARN (0-WARN)	TRIM DN A/P (1-TRIM)
91864	2	34	50	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91865				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91866				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91867				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91868	2	34	54	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91869				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91870				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91871				216	45	.	.	.	.		.	.	.	.	.	.	.	.			12992				OFF	.	.
91872	2	34	58	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91873				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91874				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91875				216	45	.	.	.	.		.	.	.	.	.	.	.	.						219.814	OFF	.	.
91876	2	35	2	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91877				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91878				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91879				216	45	.	.	.	.		.	.	.	.	.	.	.	.	306.035						OFF	.	.
91880	2	35	6	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91881				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91882				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91883				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91884	2	35	10	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91885				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91886				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91887				216	45	.	.	.	.		.	.	.	.	.	.	.	.		306.123					OFF	.	.
91888	2	35	14	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91889				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91890				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91891				216	45	.	.	.	.		.	.	.	.	.	.	.	.					0.21		OFF	.	.
91892	2	35	18	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91893				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91894				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91895				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91896	2	35	22	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91897				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91898				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91899				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91900	2	35	26	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91901				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91902				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91903				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91904	2	35	30	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91905				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91906				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91907				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91908	2	35	34	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91909				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91910				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91911				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91912	2	35	38	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91913				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91914				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91915				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91916	2	35	42	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91917				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91918				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91919				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91920	2	35	46	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91921				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91922				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91923				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91924	2	35	50	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91925				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91926				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91927				216	45	.	.	.	.		.	.	.	.	.	.	.	.				140			OFF	.	.
91928	2	35	54	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91929				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91930				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91931				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91932	2	35	58	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91933				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91934				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91935				216	45	.	.	.	.		.	.	.	.	.	.	.	.			12992				OFF	.	.
91936	2	36	2	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91937				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91938				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91939				216	45	.	.	.	.		.	.	.	.	.	.	.	.						359.912	OFF	.	.
91940	2	36	6	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91941				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91942				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91943				216	45	.	.	.	.		.	.	.	.	.	.	.	.	359.912						OFF	.	.
91944	2	36	10	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91945				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91946				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91947				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91948	2	36	14	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91949				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91950				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91951				216	45	.	.	.	.		.	.	.	.	.	.	.	.		306.123					OFF	.	.
91952	2	36	18	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMP. AIRSPD (KNOTS)	MASTER CAUTION (0-WARN)	TO/GA FCC (0-. 1-ENGA)	L NAV ENGA FCC (1-ENGA)	NAV MODE SEL CAPT (1-SEL)	NAV MODE SEL F/O (1-SEL)	ALT HOLD FCC (1-ENGA)	A/T MIN SPEED (1-ENGA)	HDG SEFCC L (1-ENGA)	CMD A FCC (1-ENGA)	CMD B FCC (1-ENGA)	CWS A FCC (1-ENGA)	CWS B FCC (1-ENGA)	CWS ROLFCC L (1-ENGA)	SEL COURSE 1 (DEG)	SEL COURSE 2 (DEG)	SEL ALT FCC L (FEET)	SEL AIRSPD FCC L (KNOTS)	SEL MACH FCC L (MACH)	SEL HEADING FCC L (DEG)	A/P OFF FCC (1-OFF)	A/P WARN (0-WARN)	TRIM DN A/P (1-TRIM)
91953				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91954				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91955				216	45	.	.	.	.		.	.	.	.	.	.	.	.					0.21		OFF	.	.
91956	2	36	22	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91957				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91958				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91959				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91960	2	36	26	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91961				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91962				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91963				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91964	2	36	30	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91965				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91966				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91967				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91968	2	36	34	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91969				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91970				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91971				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91972	2	36	38	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91973				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91974				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91975				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91976	2	36	42	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91977				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91978				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91979				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91980	2	36	46	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91981				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91982				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91983				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91984	2	36	50	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91985				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91986				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91987				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91988	2	36	54	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91989				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91990				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91991				216	45	.	.	.	.		.	.	.	.	.	.	.	.				140			OFF	.	.
91992	2	36	58	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91993				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91994				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91995				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
91996	2	37	2	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91997				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
91998				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
91999				216	45	.	.	.	.		.	.	.	.	.	.	.	.			12992				OFF	.	.
92000	2	37	6	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92001				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92002				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92003				216	45	.	.	.	.		.	.	.	.	.	.	.	.						219.814	OFF	.	.
92004	2	37	10	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92005				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92006				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92007				216	45	.	.	.	.		.	.	.	.	.	.	.	.	306.035						OFF	.	.
92008	2	37	14	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92009				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92010				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92011				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92012	2	37	18	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92013				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92014				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92015				216	45	.	.	.	.		.	.	.	.	.	.	.	.		306.123					OFF	.	.
92016	2	37	22	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92017				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92018				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92019				216	45	.	.	.	.		.	.	.	.	.	.	.	.					0.21		OFF	.	.
92020	2	37	26	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92021				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92022				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92023				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92024	2	37	30	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92025				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92026				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92027				216	45	WARN	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92028	2	37	34	216	45	WARN	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92029				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92030				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92031				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92032	2	37	38	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92033				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92034				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92035				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92036	2	37	42	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92037				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92038				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92039				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92040	2	37	46	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92041				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92042				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92043				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92044	2	37	50	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92045				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92046				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92047				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMP. AIRSPD (KNOTS)	MASTER CAUTION (0-WARN)	TO/GA FCC (0-. 1-ENGA)	L NAV ENGA FCC (1-ENGA)	NAV MODE SEL CAPT (1-SEL)	NAV MODE SEL F/O (1-SEL)	ALT HOLD FCC (1-ENGA)	A/T MIN SPEED (1-ENGA)	HDG SEFCC L (1-ENGA)	CMD A FCC (1-ENGA)	CMD B FCC (1-ENGA)	CWS A FCC (1-ENGA)	CWS B FCC (1-ENGA)	CWS ROLFCC L (1-ENGA)	SEL COURSE 1 (DEG)	SEL COURSE 2 (DEG)	SEL ALT FCC L (FEET)	SEL AIRSPD FCC L (KNOTS)	SEL MACH FCC L (MACH)	SEL HEADING FCC L (DEG)	A/P OFF FCC (1-OFF)	A/P WARN (0-WARN)	TRIM DN A/P (1-TRIM)
92048	2	37	54	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92049				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92050				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92051				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92052	2	37	58	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92053				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92054				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92055				216	45	.	.	.	.		.	.	.	.	.	.	.	.				140			OFF	.	.
92056	2	38	2	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92057				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92058				216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92059				216	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92060	2	38	6	216	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92061				216	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92062				212	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92063				216	45	.	.	.	.		.	.	.	.	.	.	.	.			12992				OFF	.	.
92064	2	38	10	212	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92065				212	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92066				212	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92067				212	45	.	.	.	.		.	.	.	.	.	.	.	.						359.912	OFF	.	.
92068	2	38	14	212	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92069				212	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92070				212	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92071				212	45	.	.	.	.		.	.	.	.	.	.	.	.	359.912						OFF	.	.
92072	2	38	18	212	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92073				212	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92074				212	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92075				212	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92076	2	38	22	212	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92077				208	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92078				208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92079				208	45	.	.	.	.		.	.	.	.	.	.	.	.		306.123					OFF	.	.
92080	2	38	26	208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92081				208	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92082				208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92083				208	45	.	.	.	.		.	.	.	.	.	.	.	.					0.21		OFF	.	.
92084	2	38	30	208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92085				208	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92086				208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92087				208	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92088	2	38	34	208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92089				208	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92090				208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92091				208	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92092	2	38	38	208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92093				208	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92094				208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92095				208	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92096	2	38	42	208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92097				208	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92098				208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92099				208	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92100	2	38	46	208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92101				208	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92102				208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92103				204	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92104	2	38	50	204	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92105				204	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92106				204	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92107				204	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92108	2	38	54	204	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92109				204	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92110				208	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92111				204	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92112	2	38	58	204	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92113				204	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92114				204	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92115				204	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92116	2	39	2	204	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92117				204	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92118				204	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92119				204	45	.	.	.	.		.	.	.	.	.	.	.	.				140			OFF	.	.
92120	2	39	6	204	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92121				204	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92122				204	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92123				204	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92124	2	39	10	204	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92125				204	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92126				204	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92127				204	45	.	.	.	.		.	.	.	.	.	.	.	.			14000				OFF	.	.
92128	2	39	14	204	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92129				204	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92130				200	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92131				204	45	.	.	.	.		.	.	.	.	.	.	.	.						219.814	OFF	.	.
92132	2	39	18	200	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92133				200	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92134				200	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92135				200	45	.	.	.	.		.	.	.	.	.	.	.	.	306.035						OFF	.	.
92136	2	39	22	200	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92137				200	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92138				200	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92139				200	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92140	2	39	26	200	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92141				200	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92142				200	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMP. AIRSPD (KNOTS)	MASTER CAUTION (0-WARN)	TO/GA FCC (0-. 1-ENGA)	L NAV ENGA FCC (1-ENGA)	NAV MODE SEL CAPT (1-SEL)	NAV MODE SEL F/O (1-SEL)	ALT HOLD FCC (1-ENGA)	A/T MIN SPEED (1-ENGA)	HDG SEFCC L (1-ENGA)	CMD A FCC (1-ENGA)	CMD B FCC (1-ENGA)	CWS A FCC (1-ENGA)	CWS B FCC (1-ENGA)	CWS ROLFCC L (1-ENGA)	SEL COURSE 1 (DEG)	SEL COURSE 2 (DEG)	SEL ALT FCC L (FEET)	SEL AIRSPD FCC L (KNOTS)	SEL MACH FCC L (MACH)	SEL HEADING FCC L (DEG)	A/P OFF FCC (1-OFF)	A/P WARN (0-WARN)	TRIM DN A/P (1-TRIM)
92143				196	45	.	.	.	.		.	.	.	.	.	.	.	.		306.123					OFF	.	.
92144	2	39	30	196	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92145				196	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92146				196	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92147				196	45	.	.	.	.		.	.	.	.	.	.	.	.					0.21		OFF	.	.
92148	2	39	34	196	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92149				196	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92150				196	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92151				196	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92152	2	39	38	196	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92153				196	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92154				196	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92155				192	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92156	2	39	42	192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92157				196	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92158				192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92159				192	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92160	2	39	46	192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92161				192	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92162				192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92163				192	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92164	2	39	50	192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92165				192	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92166				192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92167				192	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92168	2	39	54	192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92169				192	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92170				192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92171				192	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92172	2	39	58	192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92173				192	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92174				192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92175				192	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92176	2	40	2	192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92177				192	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92178				192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92179				192	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92180	2	40	6	192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92181				188	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92182				192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92183				192	45	.	.	.	.		.	.	.	.	.	.	.	.				140			OFF	.	.
92184	2	40	10	192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92185				188	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92186				192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92187				192	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92188	2	40	14	188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92189				192	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92190				188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92191				188	45	.	.	.	.		.	.	.	.	.	.	.	.			14000				OFF	.	.
92192	2	40	18	188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92193				188	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92194				188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92195				188	45	.	.	.	.		.	.	.	.	.	.	.	.						359.912	OFF	.	.
92196	2	40	22	188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92197				188	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92198				188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92199				188	45	.	.	.	.		.	.	.	.	.	.	.	.	359.912						OFF	.	.
92200	2	40	26	188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92201				188	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92202				188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92203				188	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92204	2	40	30	188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92205				188	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92206				188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92207				188	45	.	.	.	.		.	.	.	.	.	.	.	.		306.123					OFF	.	.
92208	2	40	34	188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92209				188	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92210				188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92211				188	45	.	.	.	.		.	.	.	.	.	.	.	.					0.21		OFF	.	.
92212	2	40	38	188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92213				188	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92214				188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92215				184	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92216	2	40	42	188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92217				188	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92218				188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92219				188	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92220	2	40	46	188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92221				188	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92222				184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92223				188	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92224	2	40	50	188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92225				184	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92226				184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92227				184	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92228	2	40	54	184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92229				184	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92230				184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92231				184	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92232	2	40	58	184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92233				184	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92234				184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92235				184	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92236	2	41	2	184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92237				184	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMP. AIRSPD (KNOTS)	MASTER CAUTION (0-WARN)	TO/GA FCC (0-. 1-ENGA)	L NAV ENGA FCC (1-ENGA)	NAV MODE SEL CAPT (1-SEL)	NAV MODE SEL F/O (1-SEL)	ALT HOLD FCC (1-ENGA)	A/T MIN SPEED (1-ENGA)	HDG SEFCC L (1-ENGA)	CMD A FCC (1-ENGA)	CMD B FCC (1-ENGA)	CWS A FCC (1-ENGA)	CWS B FCC (1-ENGA)	CWS ROLFCC L (1-ENGA)	SEL COURSE 1 (DEG)	SEL COURSE 2 (DEG)	SEL ALT FCC L (FEET)	SEL AIRSPD FCC L (KNOTS)	SEL MACH FCC L (MACH)	SEL HEADING FCC L (DEG)	A/P OFF FCC (1-OFF)	A/P WARN (0-WARN)	TRIM DN A/P (1-TRIM)
92238				184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92239				184	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92240	2	41	6	184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92241				184	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92242				184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92243				184	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92244	2	41	10	184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92245				184	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92246				184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92247				184	45	.	.	.	.		.	.	.	.	.	.	.	.				140			OFF	.	.
92248	2	41	14	184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92249				184	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92250				184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92251				184	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92252	2	41	18	184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92253				184	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92254				184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92255				184	45	.	.	.	.		.	.	.	.	.	.	.	.			14000				OFF	.	.
92256	2	41	22	184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92257				184	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92258				184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92259				180	45	.	.	.	.		.	.	.	.	.	.	.	.						219.814	OFF	.	.
92260	2	41	26	180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92261				180	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92262				180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92263				180	45	.	.	.	.		.	.	.	.	.	.	.	.	306.035						OFF	.	.
92264	2	41	30	180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92265				180	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92266				180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92267				180	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92268	2	41	34	180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92269				180	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92270				180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92271				180	45	.	.	.	.		.	.	.	.	.	.	.	.		306.123					OFF	.	.
92272	2	41	38	180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92273				180	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92274				180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92275				180	45	.	.	.	.		.	.	.	.	.	.	.	.					0.21		OFF	.	.
92276	2	41	42	180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92277				180	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92278				180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92279				180	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92280	2	41	46	180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92281				180	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92282				180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92283				180	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92284	2	41	50	180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92285				180	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92286				180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92287				180	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92288	2	41	54	180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92289				180	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92290				180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92291				184	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92292	2	41	58	180	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92293				184	45	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92294				184	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92295				184	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92296	2	42	2	188	45	.	ENGA	.			.	.	.	.	.	.	.	.							OFF	.	.
92297				188	45	.	ENGA	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92298				188	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92299				188	45	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92300	2	42	6	192	45	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92301				192	45.5	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92302				192	49.5	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92303				196	56	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92304	2	42	10	196	61	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92305				196	65	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92306				196	70	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92307				200	75.5	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92308	2	42	14	200	78.5	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92309				200	83.5	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92310				200	89	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92311				200	93	.	.	.	.		.	.	.	.	.	.	.	.				140			OFF	.	.
92312	2	42	18	200	97.5	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92313				204	101	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92314				204	106.5	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92315				204	109.5	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92316	2	42	22	204	115.5	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92317				204	119.5	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92318				204	123.5	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92319				208	127.5	.	.	.	.		.	.	.	.	.	.	.	.			14000				OFF	.	.
92320	2	42	26	208	131.5	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92321				208	135.5	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92322				208	139	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92323				204	142.5	.	.	.	.		.	.	.	.	.	.	.	.						359.912	OFF	.	.
92324	2	42	30	204	146	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92325				196	150	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92326				192	152	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92327				192	155.5	.	.	.	.		.	.	.	.	.	.	.	.	359.912						OFF	.	.
92328	2	42	34	196	159	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92329				208	162	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92330				220	165.5	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92331				240	167.5	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92332	2	42	38	268	169.5	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMP. AIRSPD (KNOTS)	MASTER CAUTION (0-WARN)	TO/GA FCC (0-. 1-ENGA)	L NAV ENGA FCC (1-ENGA)	NAV MODE SEL CAPT (1-SEL)	NAV MODE SEL F/O (1-SEL)	ALT HOLD FCC (1-ENGA)	A/T MIN SPEED (1-ENGA)	HDG SEFCC L (1-ENGA)	CMD A FCC (1-ENGA)	CMD B FCC (1-ENGA)	CWS A FCC (1-ENGA)	CWS B FCC (1-ENGA)	CWS ROLFCC L (1-ENGA)	SEL COURSE 1 (DEG)	SEL COURSE 2 (DEG)	SEL ALT FCC L (FEET)	SEL AIRSPD FCC L (KNOTS)	SEL MACH FCC L (MACH)	SEL HEADING FCC L (DEG)	A/P OFF FCC (1-OFF)	A/P WARN (0-WARN)	TRIM DN A/P (1-TRIM)
92333				300	171.5	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92334				328	172	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92335				364	173	.	.	.	.		.	.	.	.	.	.	.	.		306.123					OFF	.	.
92336	2	42	42	400	174	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92337				440	174.5	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92338				480	176	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92339				512	176.5	.	.	.	.		.	.	.	.	.	.	.	.					0.21		OFF	.	.
92340	2	42	46	548	177	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92341				584	178	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92342				616	178.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92343				652	179	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92344	2	42	50	688	178.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92345				720	179.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92346				756	179.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92347				792	180	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92348	2	42	54	832	180	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92349				868	181	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92350				904	180.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92351				940	181.5	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92352	2	42	58	976	181	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92353				1016	181.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92354				1052	181.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92355				1096	183	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92356	2	43	2	1136	183	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92357				1180	184	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92358				1220	184	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92359				1268	184	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92360	2	43	6	1312	184	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92361				1352	183	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92362				1396	184	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92363				1440	184	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92364	2	43	10	1484	183.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92365				1528	183	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92366				1576	183.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92367				1624	183	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92368	2	43	14	1668	182.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92369				1708	183	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92370				1748	183.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92371				1784	184.5	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92372	2	43	18	1816	185.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92373				1844	186.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92374				1868	187.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92375				1892	188.5	.	.	.	.		.	.	ENGA	.	.	.	.	.				219			OFF	.	.
92376	2	43	22	1912	190	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92377				1932	191.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92378				1948	193	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92379				1964	194.5	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92380	2	43	26	1980	196.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92381				2000	198.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92382				2020	200.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92383				2040	202	.	.	.	.		.	.	ENGA	.	.	.	.	.			14000				OFF	.	.
92384	2	43	30	2064	203.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92385				2084	205	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92386				2112	206	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92387				2136	207.5	.	.	.	.		.	.	ENGA	.	.	.	.	.						106.875	OFF	.	.
92388	2	43	34	2168	208.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92389				2196	209	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92390				2224	210.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92391				2252	212	.	.	.	.		.	.	ENGA	.	.	.	.	.	306.035						OFF	.	.
92392	2	43	38	2284	213.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92393				2320	214.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92394				2352	215.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92395				2392	215.5	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92396	2	43	42	2432	216	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92397				2472	216.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92398				2520	216.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92399				2572	217	.	.	.	.		.	.	ENGA	.	.	.	.	.		306.123					OFF	.	.
92400	2	43	46	2624	216.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92401				2676	216.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92402				2728	216	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92403				2784	216.5	.	.	.	.		.	.	ENGA	.	.	.	.	.					0.35		OFF	.	.
92404	2	43	50	2840	217	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92405				2892	217	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92406				2948	216.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92407				3004	216.5	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92408	2	43	54	3064	216	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92409				3124	216	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92410				3188	214.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92411				3252	214	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92412	2	43	58	3320	213.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92413				3392	212	.	.	.		.	.	.	ENGA	ENGA	.	.	.	ENGA							ON	.	.
92414				3468	209.5	.	.	.			.	.	.	ENGA	.	.	.	ENGA							ON	.	.
92415				3544	209.5	.	.	.	.		.	.	.	ENGA	.	.	.	ENGA							ON	.	.
92416	2	44	2	3624	207	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92417				3712	206	.	.	.		.	.	.	.	.	.	.	.	.							OFF	WARN	.
92418				3796	204.5	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92419				3880	203	.	.	.	.		.	.	.	.	.	.	.	.							OFF	.	.
92420	2	44	6	3964	201	.	.	.			.	.	.	.	.	.	.	.							OFF	.	.
92421				4056	199	.	.	.		.	.	.	.	.	.	.	.	.							OFF	.	.
92422				4136	196.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92423				4220	194.5	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92424	2	44	10	4308	195	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92425				4388	192	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92426				4460	190	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92427				4532	190	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMP. AIRSPD (KNOTS)	MASTER CAUTION (0-WARN)	TO/GA FCC (0-. 1-ENGA)	L NAV ENGA FCC (1-ENGA)	NAV MODE SEL CAPT (1-SEL)	NAV MODE SEL F/O (1-SEL)	ALT HOLD FCC (1-ENGA)	A/T MIN SPEED (1-ENGA)	HDG SEFCC L (1-ENGA)	CMD A FCC (1-ENGA)	CMD B FCC (1-ENGA)	CWS A FCC (1-ENGA)	CWS B FCC (1-ENGA)	CWS ROLFCC L (1-ENGA)	SEL COURSE 1 (DEG)	SEL COURSE 2 (DEG)	SEL ALT FCC L (FEET)	SEL AIRSPD FCC L (KNOTS)	SEL MACH FCC L (MACH)	SEL HEADING FCC L (DEG)	A/P OFF FCC (1-OFF)	A/P WARN (0-WARN)	TRIM DN A/P (1-TRIM)
92428	2	44	14	4600	188.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92429				4660	188	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92430				4720	187.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92431				4772	187	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92432	2	44	18	4824	186.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92433				4876	186	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92434				4920	185.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92435				4968	185.5	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92436	2	44	22	5008	185	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92437				5044	184.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92438				5076	185.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92439				5112	186	.	.	.	.		.	.	ENGA	.	.	.	.	.				220			OFF	.	.
92440	2	44	26	5144	186.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92441				5172	186	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92442				5204	186.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92443				5232	187	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92444	2	44	30	5260	187.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92445				5288	188.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92446				5320	189	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92447				5344	189.5	.	.	.	.		.	.	ENGA	.	.	.	.	.			14000				OFF	.	.
92448	2	44	34	5372	191	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92449				5396	192	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92450				5420	193.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92451				5436	195	.	.	.	.		.	.	ENGA	.	.	.	.	.						84.9023	OFF	.	.
92452	2	44	38	5452	196.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92453				5460	198.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92454				5464	200.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92455				5468	202.5	.	.	.	.		.	.	ENGA	.	.	.	.	.	306.035						OFF	.	.
92456	2	44	42	5460	205.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92457				5452	207.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92458				5432	209.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92459				5408	212	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92460	2	44	46	5380	215	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92461				5332	218.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92462				5276	222	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92463				5204	225.5	.	.	.	.		.	.	ENGA	.	.	.	.	.		306.123					OFF	.	.
92464	2	44	50	5096	230.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92465				4972	236.5	WARN	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92466				4816	244.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92467				4628	254	.	.	.	.		.	.	ENGA	.	.	.	.	.					0.36		OFF	.	.
92468	2	44	54	4388	264.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92469				4124	275.5	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92470				3820	289.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92471				3508	306.5	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92472	2	44	58	3068	317.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92473				2640	334	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92474				2216	352	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92475				1748	368.5	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.
92476	2	45	2	1320	382.5	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92477				904	395	.	.	.		.	.	.	ENGA	.	.	.	.	.							OFF	.	.
92478				524	410	.	.	.			.	.	ENGA	.	.	.	.	.							OFF	.	.
92479				180	416	.	.	.	.		.	.	ENGA	.	.	.	.	.							OFF	.	.

Flash /
Prelimi
MCA

Time (seconds)	TRIM UP A/P (1-TRIM)
91864	.
91865	.
91866	.
91867	.
91868	.
91869	.
91870	.
91871	.
91872	.
91873	.
91874	.
91875	.
91876	.
91877	.
91878	.
91879	.
91880	.
91881	.
91882	.
91883	.
91884	.
91885	.
91886	.
91887	.
91888	.
91889	.
91890	.
91891	.
91892	.
91893	.
91894	.
91895	.
91896	.
91897	.
91898	.
91899	.
91900	.
91901	.
91902	.
91903	.
91904	.
91905	.
91906	.
91907	.
91908	.
91909	.
91910	.
91911	.
91912	.
91913	.
91914	.
91915	.
91916	.
91917	.
91918	.
91919	.
91920	.
91921	.
91922	.
91923	.
91924	.
91925	.
91926	.
91927	.
91928	.
91929	.
91930	.
91931	.
91932	.
91933	.
91934	.
91935	.
91936	.
91937	.
91938	.
91939	.
91940	.
91941	.
91942	.
91943	.
91944	.
91945	.
91946	.
91947	.
91948	.
91949	.
91950	.
91951	.
91952	.

Time (seconds)	TRIM UP A/P (1-TRIM)
91953	.
91954	.
91955	.
91956	.
91957	.
91958	.
91959	.
91960	.
91961	.
91962	.
91963	.
91964	.
91965	.
91966	.
91967	.
91968	.
91969	.
91970	.
91971	.
91972	.
91973	.
91974	.
91975	.
91976	.
91977	.
91978	.
91979	.
91980	.
91981	.
91982	.
91983	.
91984	.
91985	.
91986	.
91987	.
91988	.
91989	.
91990	.
91991	.
91992	.
91993	.
91994	.
91995	.
91996	.
91997	.
91998	.
91999	.
92000	.
92001	.
92002	.
92003	.
92004	.
92005	.
92006	.
92007	.
92008	.
92009	.
92010	.
92011	.
92012	.
92013	.
92014	.
92015	.
92016	.
92017	.
92018	.
92019	.
92020	.
92021	.
92022	.
92023	.
92024	.
92025	.
92026	.
92027	.
92028	.
92029	.
92030	.
92031	.
92032	.
92033	.
92034	.
92035	.
92036	.
92037	.
92038	.
92039	.
92040	.
92041	.
92042	.
92043	.
92044	.
92045	.
92046	.
92047	.

Time (seconds)	TRIM UP A/P (1-TRIM)
92048	.
92049	.
92050	.
92051	.
92052	.
92053	.
92054	.
92055	.
92056	.
92057	.
92058	.
92059	.
92060	.
92061	.
92062	.
92063	.
92064	.
92065	.
92066	.
92067	.
92068	.
92069	.
92070	.
92071	.
92072	.
92073	.
92074	.
92075	.
92076	.
92077	.
92078	.
92079	.
92080	.
92081	.
92082	.
92083	.
92084	.
92085	.
92086	.
92087	.
92088	.
92089	.
92090	.
92091	.
92092	.
92093	.
92094	.
92095	.
92096	.
92097	.
92098	.
92099	.
92100	.
92101	.
92102	.
92103	.
92104	.
92105	.
92106	.
92107	.
92108	.
92109	.
92110	.
92111	.
92112	.
92113	.
92114	.
92115	.
92116	.
92117	.
92118	.
92119	.
92120	.
92121	.
92122	.
92123	.
92124	.
92125	.
92126	.
92127	.
92128	.
92129	.
92130	.
92131	.
92132	.
92133	.
92134	.
92135	.
92136	.
92137	.
92138	.
92139	.
92140	.
92141	.
92142	.

Time (seconds)	TRIM UP A/P (1-TRIM)
92143	.
92144	.
92145	.
92146	.
92147	.
92148	.
92149	.
92150	.
92151	.
92152	.
92153	.
92154	.
92155	.
92156	.
92157	.
92158	.
92159	.
92160	.
92161	.
92162	.
92163	.
92164	.
92165	.
92166	.
92167	.
92168	.
92169	.
92170	.
92171	.
92172	.
92173	.
92174	.
92175	.
92176	.
92177	.
92178	.
92179	.
92180	.
92181	.
92182	.
92183	.
92184	.
92185	.
92186	.
92187	.
92188	.
92189	.
92190	.
92191	.
92192	.
92193	.
92194	.
92195	.
92196	.
92197	.
92198	.
92199	.
92200	.
92201	.
92202	.
92203	.
92204	.
92205	.
92206	.
92207	.
92208	.
92209	.
92210	.
92211	.
92212	.
92213	.
92214	.
92215	.
92216	.
92217	.
92218	.
92219	.
92220	.
92221	.
92222	.
92223	.
92224	.
92225	.
92226	.
92227	.
92228	.
92229	.
92230	.
92231	.
92232	.
92233	.
92234	.
92235	.
92236	.
92237	.

Time (seconds)	TRIM UP A/P (1-TRIM)
92238	.
92239	.
92240	.
92241	.
92242	.
92243	.
92244	.
92245	.
92246	.
92247	.
92248	.
92249	.
92250	.
92251	.
92252	.
92253	.
92254	.
92255	.
92256	.
92257	.
92258	.
92259	.
92260	.
92261	.
92262	.
92263	.
92264	.
92265	.
92266	.
92267	.
92268	.
92269	.
92270	.
92271	.
92272	.
92273	.
92274	.
92275	.
92276	.
92277	.
92278	.
92279	.
92280	.
92281	.
92282	.
92283	.
92284	.
92285	.
92286	.
92287	.
92288	.
92289	.
92290	.
92291	.
92292	.
92293	.
92294	.
92295	.
92296	.
92297	.
92298	.
92299	.
92300	.
92301	.
92302	.
92303	.
92304	.
92305	.
92306	.
92307	.
92308	.
92309	.
92310	.
92311	.
92312	.
92313	.
92314	.
92315	.
92316	.
92317	.
92318	.
92319	.
92320	.
92321	.
92322	.
92323	.
92324	.
92325	.
92326	.
92327	.
92328	.
92329	.
92330	.
92331	.
92332	.

Time (seconds)	TRIM UP A/P (1-TRIM)
92333	.
92334	.
92335	.
92336	.
92337	.
92338	.
92339	.
92340	.
92341	.
92342	.
92343	.
92344	.
92345	.
92346	.
92347	.
92348	.
92349	.
92350	.
92351	.
92352	.
92353	.
92354	.
92355	.
92356	.
92357	.
92358	.
92359	.
92360	.
92361	.
92362	.
92363	.
92364	.
92365	.
92366	.
92367	.
92368	.
92369	.
92370	.
92371	.
92372	.
92373	.
92374	.
92375	.
92376	.
92377	.
92378	.
92379	.
92380	.
92381	.
92382	.
92383	.
92384	.
92385	.
92386	.
92387	.
92388	.
92389	.
92390	.
92391	.
92392	.
92393	.
92394	.
92395	.
92396	.
92397	.
92398	.
92399	.
92400	.
92401	.
92402	.
92403	.
92404	.
92405	.
92406	.
92407	.
92408	.
92409	.
92410	.
92411	.
92412	.
92413	.
92414	.
92415	.
92416	.
92417	.
92418	.
92419	.
92420	.
92421	.
92422	.
92423	.
92424	.
92425	.
92426	.
92427	.

Time (seconds)	TRIM UP A/P (1-TRIM)
92428	.
92429	.
92430	.
92431	.
92432	.
92433	.
92434	.
92435	.
92436	.
92437	.
92438	.
92439	.
92440	.
92441	.
92442	.
92443	.
92444	.
92445	.
92446	.
92447	.
92448	.
92449	.
92450	.
92451	.
92452	.
92453	.
92454	.
92455	.
92456	.
92457	.
92458	.
92459	.
92460	.
92461	.
92462	.
92463	.
92464	.
92465	.
92466	.
92467	.
92468	.
92469	.
92470	.
92471	.
92472	.
92473	.
92474	.
92475	.
92476	.
92477	.
92478	.
92479	.

Flash Air B737-300 Accident
Preliminary Data Created: January 20 2004
MCA

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
91864	2	34	50	216	45										
91865				216	45										
91866				216	45										
91867				216	45										
91868	2	34	54	216	45			0							
91869				216	45										
91870				216	45										
91871				216	45										
91872	2	34	58	216	45					0					
91873				216	45										
91874				216	45										
91875				216	45										
91876	2	35	2	216	45										
91877				216	45										
91878				216	45										
91879				216	45										
91880	2	35	6	216	45		0.26								
91881				216	45										
91882				216	45										
91883				216	45										
91884	2	35	10	216	45				0.44						
91885				216	45										
91886				216	45										
91887				216	45										
91888	2	35	14	216	45						0.12				
91889				216	45										
91890				216	45										
91891				216	45										
91892	2	35	18	216	45										
91893				216	45										
91894				216	45										
91895				216	45										
91896	2	35	22	216	45							0			
91897				216	45										
91898				216	45										
91899				216	45										
91900	2	35	26	216	45									0	
91901				216	45										
91902				216	45										
91903				216	45										
91904	2	35	30	216	45								0		

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
91905				216	45										
91906				216	45										
91907				216	45										
91908	2	35	34	216	45										2
91909				216	45										
91910				216	45										
91911				216	45										
91912	2	35	38	216	45										
91913				216	45										
91914				216	45										
91915				216	45										
91916	2	35	42	216	45										
91917				216	45										
91918				216	45										
91919				216	45										
91920	2	35	46	216	45										
91921				216	45										
91922				216	45										
91923				216	45										
91924	2	35	50	216	45										
91925				216	45										
91926				216	45										
91927				216	45										
91928	2	35	54	216	45	0.36									
91929				216	45										
91930				216	45										
91931				216	45										
91932	2	35	58	216	45			3.2							
91933				216	45										
91934				216	45										
91935				216	45										
91936	2	36	2	216	45					0.74					
91937				216	45										
91938				216	45										
91939				216	45										
91940	2	36	6	216	45										
91941				216	45										
91942				216	45										
91943				216	45										
91944	2	36	10	216	45		0.3								
91945				216	45										
91946				216	45										
91947				216	45										
91948	2	36	14	216	45				0.22						
91949				216	45										
91950				216	45										
91951				216	45										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
91952	2	36	18	216	45						0.08				
91953				216	45										
91954				216	45										
91955				216	45										
91956	2	36	22	216	45										
91957				216	45										
91958				216	45										
91959				216	45										
91960	2	36	26	216	45							0			
91961				216	45										
91962				216	45										
91963				216	45										
91964	2	36	30	216	45									0	
91965				216	45										
91966				216	45										
91967				216	45										
91968	2	36	34	216	45								0		
91969				216	45										
91970				216	45										
91971				216	45										
91972	2	36	38	216	45										2
91973				216	45										
91974				216	45										
91975				216	45										
91976	2	36	42	216	45										
91977				216	45										
91978				216	45										
91979				216	45										
91980	2	36	46	216	45										
91981				216	45										
91982				216	45										
91983				216	45										
91984	2	36	50	216	45										
91985				216	45										
91986				216	45										
91987				216	45										
91988	2	36	54	216	45										
91989				216	45										
91990				216	45										
91991				216	45										
91992	2	36	58	216	45	0.06									
91993				216	45										
91994				216	45										
91995				216	45										
91996	2	37	2	216	45			0.3							
91997				216	45										
91998				216	45										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
91999				216	45										
92000	2	37	6	216	45					0.1					
92001				216	45										
92002				216	45										
92003				216	45										
92004	2	37	10	216	45										
92005				216	45										
92006				216	45										
92007				216	45										
92008	2	37	14	216	45		0.32								
92009				216	45										
92010				216	45										
92011				216	45										
92012	2	37	18	216	45				0.38						
92013				216	45										
92014				216	45										
92015				216	45										
92016	2	37	22	216	45						0.1				
92017				216	45										
92018				216	45										
92019				216	45										
92020	2	37	26	216	45										
92021				216	45										
92022				216	45										
92023				216	45										
92024	2	37	30	216	45							100			
92025				216	45										
92026				216	45										
92027				216	45										
92028	2	37	34	216	45									0	
92029				216	45										
92030				216	45										
92031				216	45										
92032	2	37	38	216	45								0		
92033				216	45										
92034				216	45										
92035				216	45										
92036	2	37	42	216	45										2
92037				216	45										
92038				216	45										
92039				216	45										
92040	2	37	46	216	45										
92041				216	45										
92042				216	45										
92043				216	45										
92044	2	37	50	216	45										
92045				216	45										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
92046				216	45										
92047				216	45										
92048	2	37	54	216	45										
92049				216	45										
92050				216	45										
92051				216	45										
92052	2	37	58	216	45										
92053				216	45										
92054				216	45										
92055				216	45										
92056	2	38	2	216	45	0.04									
92057				216	45										
92058				216	45										
92059				216	45										
92060	2	38	6	216	45			0.12							
92061				216	45										
92062				212	45										
92063				216	45										
92064	2	38	10	212	45					0.04					
92065				212	45										
92066				212	45										
92067				212	45										
92068	2	38	14	212	45										
92069				212	45										
92070				212	45										
92071				212	45										
92072	2	38	18	212	45		0.38								
92073				212	45										
92074				212	45										
92075				212	45										
92076	2	38	22	212	45				0.24						
92077				208	45										
92078				208	45										
92079				208	45										
92080	2	38	26	208	45						0.14				
92081				208	45										
92082				208	45										
92083				208	45										
92084	2	38	30	208	45										
92085				208	45										
92086				208	45										
92087				208	45										
92088	2	38	34	208	45							0			
92089				208	45										
92090				208	45										
92091				208	45										
92092	2	38	38	208	45									0	

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
92093				208	45										
92094				208	45										
92095				208	45										
92096	2	38	42	208	45								0		
92097				208	45										
92098				208	45										
92099				208	45										
92100	2	38	46	208	45										2
92101				208	45										
92102				208	45										
92103				204	45										
92104	2	38	50	204	45										
92105				204	45										
92106				204	45										
92107				204	45										
92108	2	38	54	204	45										
92109				204	45										
92110				208	45										
92111				204	45										
92112	2	38	58	204	45										
92113				204	45										
92114				204	45										
92115				204	45										
92116	2	39	2	204	45										
92117				204	45										
92118				204	45										
92119				204	45										
92120	2	39	6	204	45	0.06									
92121				204	45										
92122				204	45										
92123				204	45										
92124	2	39	10	204	45			0.12							
92125				204	45										
92126				204	45										
92127				204	45										
92128	2	39	14	204	45					0.06					
92129				204	45										
92130				200	45										
92131				204	45										
92132	2	39	18	200	45										
92133				200	45										
92134				200	45										
92135				200	45										
92136	2	39	22	200	45		0.32								
92137				200	45										
92138				200	45										
92139				200	45										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
92140	2	39	26	200	45				0.16						
92141				200	45										
92142				200	45										
92143				196	45										
92144	2	39	30	196	45						0.1				
92145				196	45										
92146				196	45										
92147				196	45										
92148	2	39	34	196	45										
92149				196	45										
92150				196	45										
92151				196	45										
92152	2	39	38	196	45							0			
92153				196	45										
92154				196	45										
92155				192	45										
92156	2	39	42	192	45									0	
92157				196	45										
92158				192	45										
92159				192	45										
92160	2	39	46	192	45								0		
92161				192	45										
92162				192	45										
92163				192	45										
92164	2	39	50	192	45										2
92165				192	45										
92166				192	45										
92167				192	45										
92168	2	39	54	192	45										
92169				192	45										
92170				192	45										
92171				192	45										
92172	2	39	58	192	45										
92173				192	45										
92174				192	45										
92175				192	45										
92176	2	40	2	192	45										
92177				192	45										
92178				192	45										
92179				192	45										
92180	2	40	6	192	45										
92181				188	45										
92182				192	45										
92183				192	45										
92184	2	40	10	192	45	0.04									
92185				188	45										
92186				192	45										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
92187				192	45										
92188	2	40	14	188	45			0.14							
92189				192	45										
92190				188	45										
92191				188	45										
92192	2	40	18	188	45					0.1					
92193				188	45										
92194				188	45										
92195				188	45										
92196	2	40	22	188	45										
92197				188	45										
92198				188	45										
92199				188	45										
92200	2	40	26	188	45		0.24								
92201				188	45										
92202				188	45										
92203				188	45										
92204	2	40	30	188	45				0.28						
92205				188	45										
92206				188	45										
92207				188	45										
92208	2	40	34	188	45						0.1				
92209				188	45										
92210				188	45										
92211				188	45										
92212	2	40	38	188	45										
92213				188	45										
92214				188	45										
92215				184	45										
92216	2	40	42	188	45							0			
92217				188	45										
92218				188	45										
92219				188	45										
92220	2	40	46	188	45									0	
92221				188	45										
92222				184	45										
92223				188	45										
92224	2	40	50	188	45								0		
92225				184	45										
92226				184	45										
92227				184	45										
92228	2	40	54	184	45										0
92229				184	45										
92230				184	45										
92231				184	45										
92232	2	40	58	184	45										
92233				184	45										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
92234				184	45										
92235				184	45										
92236	2	41	2	184	45										
92237				184	45										
92238				184	45										
92239				184	45										
92240	2	41	6	184	45										
92241				184	45										
92242				184	45										
92243				184	45										
92244	2	41	10	184	45										
92245				184	45										
92246				184	45										
92247				184	45										
92248	2	41	14	184	45	0.04									
92249				184	45										
92250				184	45										
92251				184	45										
92252	2	41	18	184	45			0.12							
92253				184	45										
92254				184	45										
92255				184	45										
92256	2	41	22	184	45					0.1					
92257				184	45										
92258				184	45										
92259				180	45										
92260	2	41	26	180	45										
92261				180	45										
92262				180	45										
92263				180	45										
92264	2	41	30	180	45		0.24								
92265				180	45										
92266				180	45										
92267				180	45										
92268	2	41	34	180	45				0.16						
92269				180	45										
92270				180	45										
92271				180	45										
92272	2	41	38	180	45						0.1				
92273				180	45										
92274				180	45										
92275				180	45										
92276	2	41	42	180	45										
92277				180	45										
92278				180	45										
92279				180	45										
92280	2	41	46	180	45							0			

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
92281				180	45										
92282				180	45										
92283				180	45										
92284	2	41	50	180	45									0	
92285				180	45										
92286				180	45										
92287				180	45										
92288	2	41	54	180	45								0		
92289				180	45										
92290				180	45										
92291				184	45										
92292	2	41	58	180	45										0
92293				184	45										
92294				184	45										
92295				184	45										
92296	2	42	2	188	45										
92297				188	45										
92298				188	45										
92299				188	45										
92300	2	42	6	192	45										
92301				192	45.5										
92302				192	49.5										
92303				196	56										
92304	2	42	10	196	61										
92305				196	65										
92306				196	70										
92307				200	75.5										
92308	2	42	14	200	78.5										
92309				200	83.5										
92310				200	89										
92311				200	93										
92312	2	42	18	200	97.5	0.18									
92313				204	101										
92314				204	106.5										
92315				204	109.5										
92316	2	42	22	204	115.5			1.16							
92317				204	119.5										
92318				204	123.5										
92319				208	127.5										
92320	2	42	26	208	131.5					0.42					
92321				208	135.5										
92322				208	139										
92323				204	142.5										
92324	2	42	30	204	146										
92325				196	150										
92326				192	152										
92327				192	155.5										

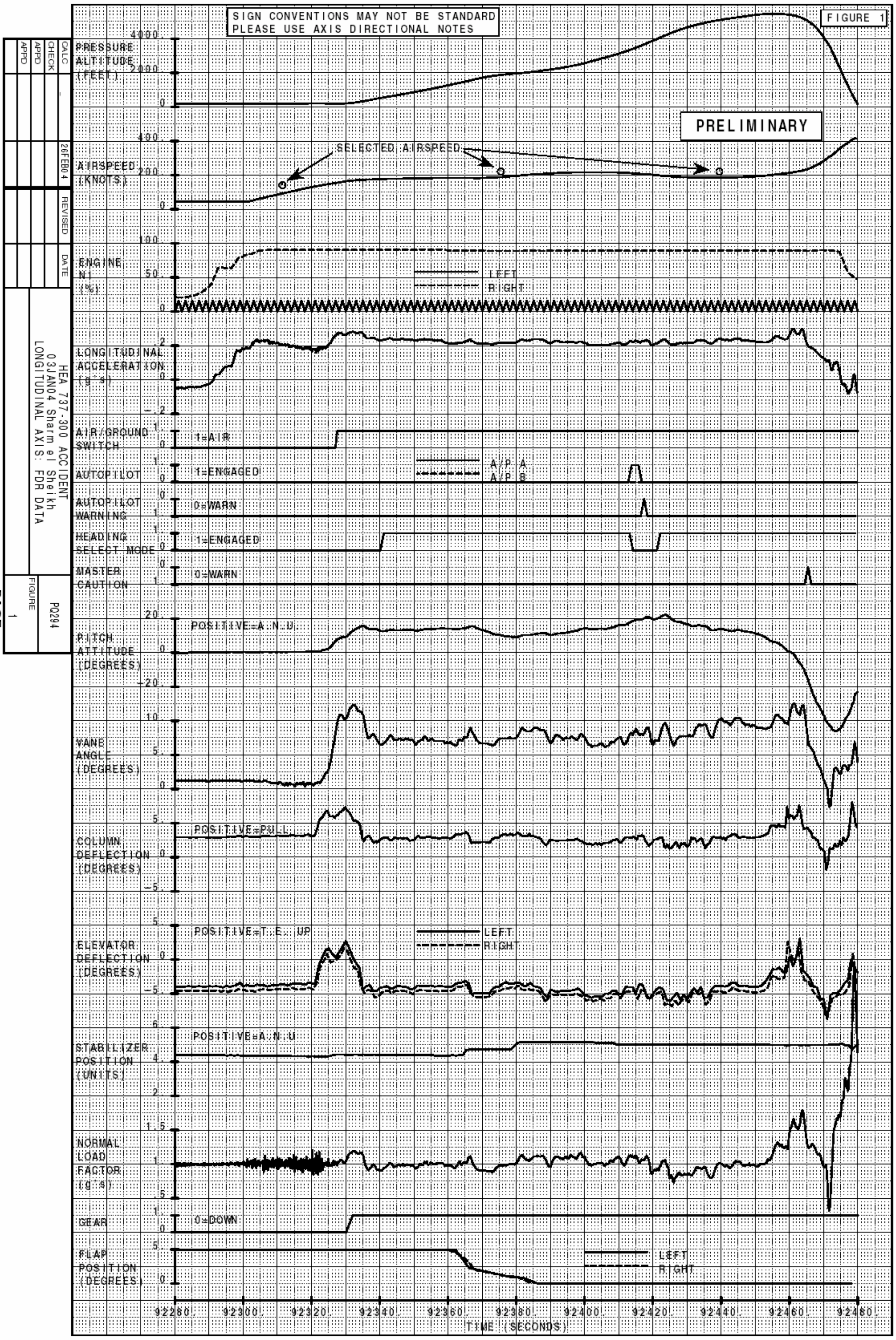
Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
92328	2	42	34	196	159		0.44								
92329				208	162										
92330				220	165.5										
92331				240	167.5										
92332	2	42	38	268	169.5				0.96						
92333				300	171.5										
92334				328	172										
92335				364	173										
92336	2	42	42	400	174						0.68				
92337				440	174.5										
92338				480	176										
92339				512	176.5										
92340	2	42	46	548	177										
92341				584	178										
92342				616	178.5										
92343				652	179										
92344	2	42	50	688	178.5							84			
92345				720	179.5										
92346				756	179.5										
92347				792	180										
92348	2	42	54	832	180									318	
92349				868	181										
92350				904	180.5										
92351				940	181.5										
92352	2	42	58	976	181								266		
92353				1016	181.5										
92354				1052	181.5										
92355				1096	183										
92356	2	43	2	1136	183										4
92357				1180	184										
92358				1220	184										
92359				1268	184										
92360	2	43	6	1312	184										
92361				1352	183										
92362				1396	184										
92363				1440	184										
92364	2	43	10	1484	183.5										
92365				1528	183										
92366				1576	183.5										
92367				1624	183										
92368	2	43	14	1668	182.5										
92369				1708	183										
92370				1748	183.5										
92371				1784	184.5										
92372	2	43	18	1816	185.5										
92373				1844	186.5										
92374				1868	187.5										

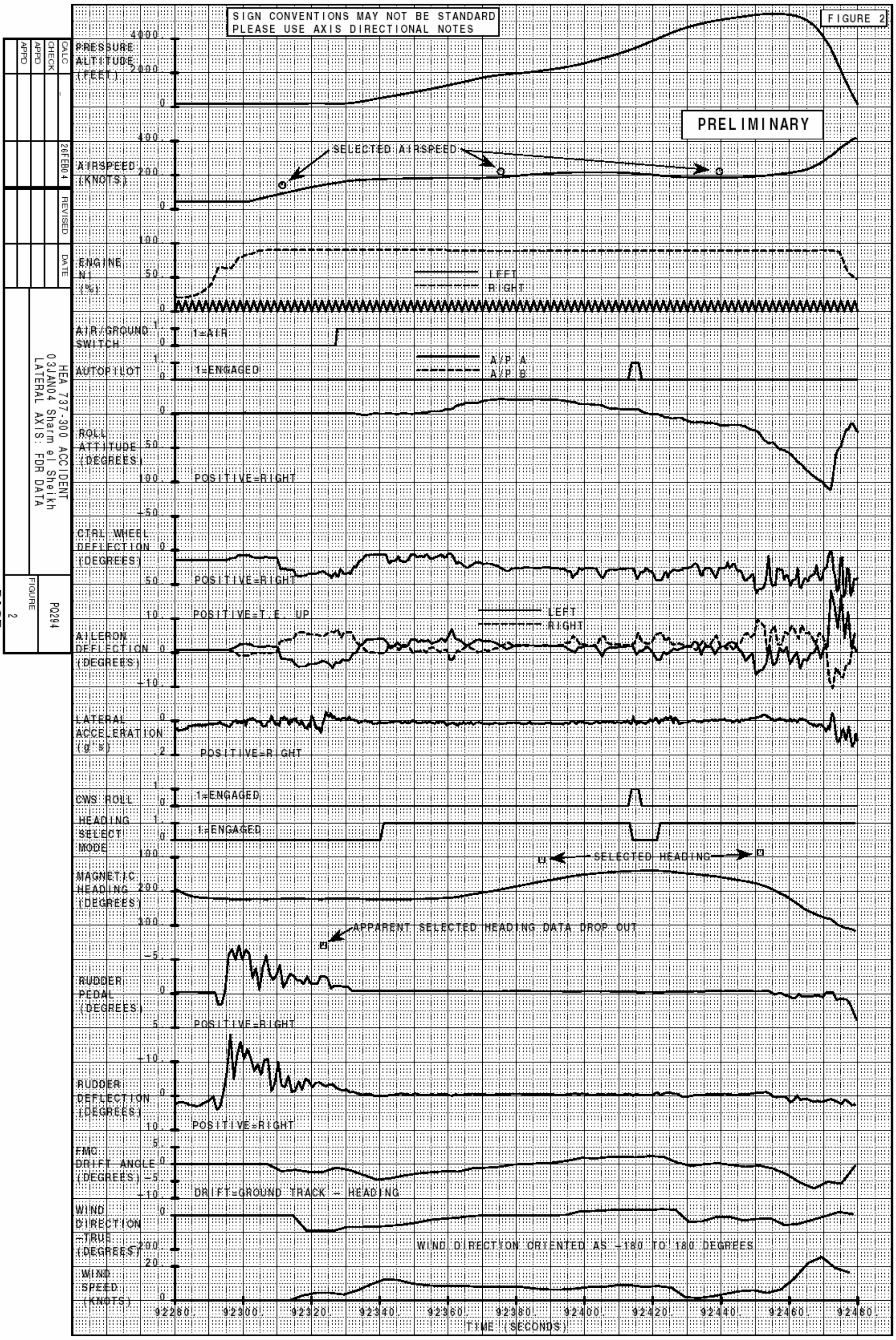
Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
92375				1892	188.5										
92376	2	43	22	1912	190	0.18									
92377				1932	191.5										
92378				1948	193										
92379				1964	194.5										
92380	2	43	26	1980	196.5			0.24							
92381				2000	198.5										
92382				2020	200.5										
92383				2040	202										
92384	2	43	30	2064	203.5					0.5					
92385				2084	205										
92386				2112	206										
92387				2136	207.5										
92388	2	43	34	2168	208.5										
92389				2196	209										
92390				2224	210.5										
92391				2252	212										
92392	2	43	38	2284	213.5		0.64								
92393				2320	214.5										
92394				2352	215.5										
92395				2392	215.5										
92396	2	43	42	2432	216				1						
92397				2472	216.5										
92398				2520	216.5										
92399				2572	217										
92400	2	43	46	2624	216.5						0.58				
92401				2676	216.5										
92402				2728	216										
92403				2784	216.5										
92404	2	43	50	2840	217										
92405				2892	217										
92406				2948	216.5										
92407				3004	216.5										
92408	2	43	54	3064	216							42			
92409				3124	216										
92410				3188	214.5										
92411				3252	214										
92412	2	43	58	3320	213.5									306	
92413				3392	212										
92414				3468	209.5										
92415				3544	209.5										
92416	2	44	2	3624	207								274		
92417				3712	206										
92418				3796	204.5										
92419				3880	203										
92420	2	44	6	3964	201										10
92421				4056	199										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
92422				4136	196.5										
92423				4220	194.5										
92424	2	44	10	4308	195										
92425				4388	192										
92426				4460	190										
92427				4532	190										
92428	2	44	14	4600	188.5										
92429				4660	188										
92430				4720	187.5										
92431				4772	187										
92432	2	44	18	4824	186.5										
92433				4876	186										
92434				4920	185.5										
92435				4968	185.5										
92436	2	44	22	5008	185										
92437				5044	184.5										
92438				5076	185.5										
92439				5112	186										
92440	2	44	26	5144	186.5	0.24									
92441				5172	186										
92442				5204	186.5										
92443				5232	187										
92444	2	44	30	5260	187.5			0.62							
92445				5288	188.5										
92446				5320	189										
92447				5344	189.5										
92448	2	44	34	5372	191					0.9					
92449				5396	192										
92450				5420	193.5										
92451				5436	195										
92452	2	44	38	5452	196.5										
92453				5460	198.5										
92454				5464	200.5										
92455				5468	202.5										
92456	2	44	42	5460	205.5		0.7								
92457				5452	207.5										
92458				5432	209.5										
92459				5408	212										
92460	2	44	46	5380	215				0.92						
92461				5332	218.5										
92462				5276	222										
92463				5204	225.5										
92464	2	44	50	5096	230.5						0.58				
92465				4972	236.5										
92466				4816	244.5										
92467				4628	254										
92468	2	44	54	4388	264.5										

Time (seconds)	GMT HOURS (HOURS)	GMT MINUTES (MINUTES)	GMT SECONDS (SECONDS)	ALTITUDE (29 92) (FEET)	COMPUTED AIRSPD (KNOTS)	CN1 TRACKED VIB L (SCALAR)	CN1 TRACKED VIB R (SCALAR)	CN2 TRACKED VIB L (SCALAR)	CN2 TRACKED VIB R (SCALAR)	TN1 TRACKED VIB L (SCALAR)	TN1 TRACKED VIB R (SCALAR)	FAN IMB ANGLE L (DEG)	FAN IMB ANGLE R (DEG)	LPT IMB ANGLE L (DEG)	LPT IMB ANGLE R (DEG)
92469				4124	275.5										
92470				3820	289.5										
92471				3508	306.5										
92472	2	44	58	3068	317.5							166			
92473				2640	334										
92474				2216	352										
92475				1748	368.5										
92476	2	45	2	1320	382.5									334	
92477				904	395										
92478				524	410										
92479				180	416										
92480															

Attachment 2, FDR Plots

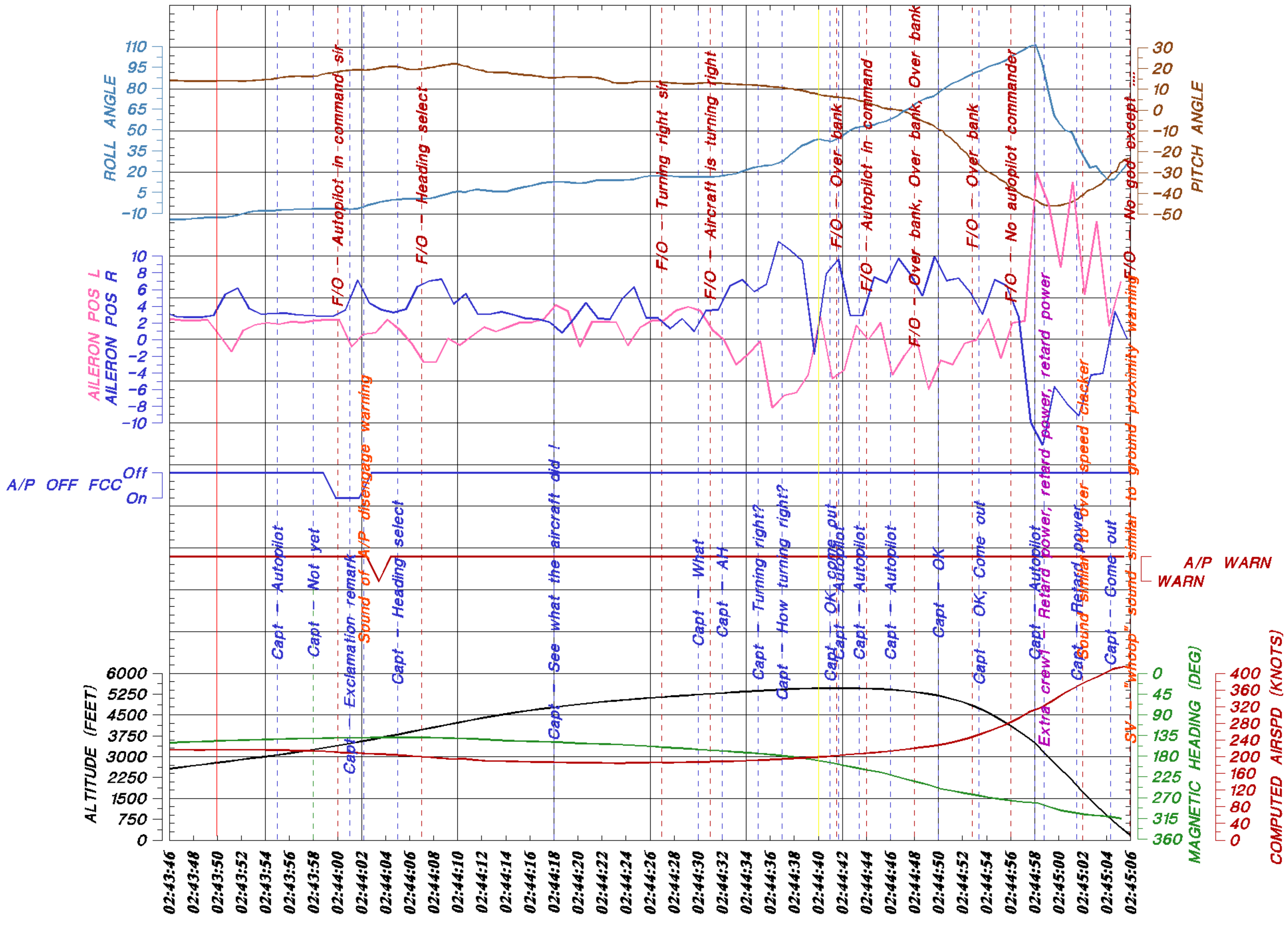

SIGN CONVENTIONS MAY NOT BE STANDARD
PLEASE USE AXIS DIRECTIONAL NOTES
FIGURE 1
PRELIMINARY
PRESSURE ALTITUDE (FEET)
AIRSPEED (KNOTS)
SELECTED AIRSPEED
ENGINE N1 (%)
LEFT
RIGHT
LONGITUDINAL ACCELERATION (g's)
AIR/GROUND SWITCH
1=AIR
AUTOPILOT
1=ENGAGED
A/P A
A/P B
AUTOPILOT WARNING
0=WARN
HEADING SELECT MODE
1=ENGAGED
MASTER CAUTION
0=WARN
PITCH ATTITUDE (DEGREES)
POSITIVE=A.N.U.
VANE ANGLE (DEGREES)
COLUMN DEFLECTION (DEGREES)
POSITIVE=PULL
ELEVATOR DEFLECTION (DEGREES)
POSITIVE=T.E. UP
LEFT
RIGHT
STABILIZER POSITION (UNITS)
POSITIVE=A.N.U
NORMAL LOAD FACTOR (g's)
GEAR
0=DOWN
FLAP POSITION (DEGREES)
LEFT
RIGHT
92280
92300
92320
92340
92360
92380
92400
92420
92440
92460
92480
TIME (SECONDS)
CALC
CHECK
APPD
APPD
26FEB04
REVISED
DATE
HEA 737-300 ACCIDENT
03JAN04 Sharm el Sheikh
LONGITUDINAL AXIS: FDR DATA
P0294
FIGURE 1
PAGE


SIGN CONVENTIONS MAY NOT BE STANDARD
PLEASE USE AXIS DIRECTIONAL NOTES
FIGURE 2
PRELIMINARY
PRESSURE ALTITUDE (FEET)
AIRSPEED (KNOTS)
SELECTED AIRSPEED
ENGINE N1 (%)
LEFT
RIGHT
AIR/GROUND SWITCH
1=AIR
AUTOPILOT
1=ENGAGED
A/P A
A/P B
ROLL ATTITUDE (DEGREES)
POSITIVE=RIGHT
CTRL WHEEL DEFLECTION (DEGREES)
POSITIVE=RIGHT
POSITIVE=T.E. UP
AILERON DEFLECTION (DEGREES)
LATERAL ACCELERATION (g's)
POSITIVE=RIGHT
CWS ROLL
1=ENGAGED
HEADING SELECT MODE
1=ENGAGED
SELECTED HEADING
MAGNETIC HEADING (DEGREES)
APPARENT SELECTED HEADING DATA DROP OUT
RUDDER PEDAL (DEGREES)
POSITIVE=RIGHT
RUDDER DEFLECTION (DEGREES)
POSITIVE=RIGHT
FMC DRIFT ANGLE (DEGREES)
DRIFT=GROUND TRACK - HEADING
WIND DIRECTION -TRUE (DEGREES)
WIND DIRECTION ORIENTED AS -180 TO 180 DEGREES
WIND SPEED (KNOTS)
92280
92300
92320
92340
92360
92380
92400
92420
92440
92460
92480
TIME (SECONDS)
CALC
CHECK
APPD
APPD
26FEB04
REVISED
DATE
HEA 737-300 ACCIDENT
03JAN04 Sharm el Sheikh
LATERAL AXIS: FDR DATA
P0294
FIGURE
2
PAGE

Attachment 3, five plots represent FDR and CVR correlation

FSH604

Flight Controls 1A/2004



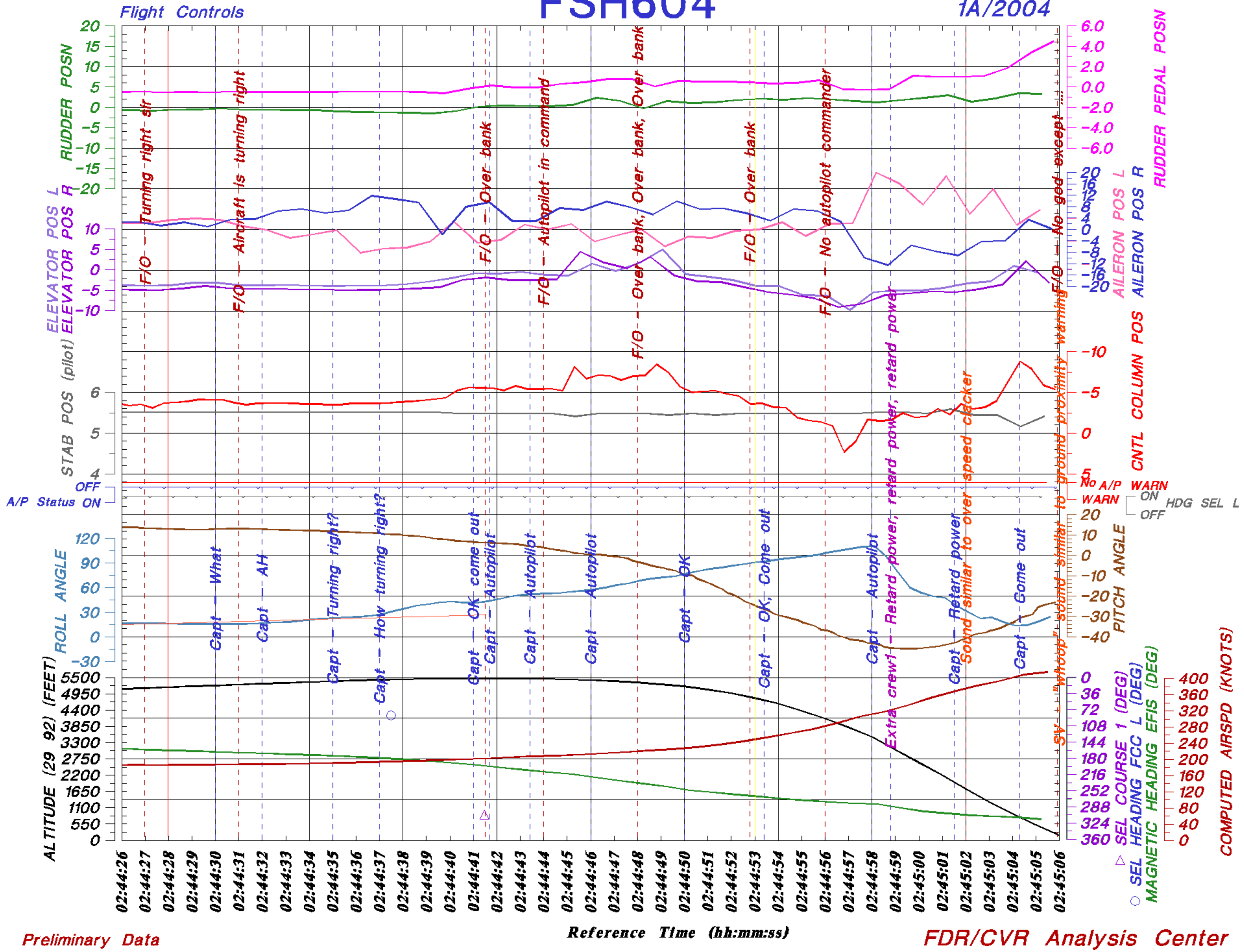
Preliminary Data

Created: October 21, 2004

FDR/CVR Analysis Center

Eng. Osama Mortada

FSH604



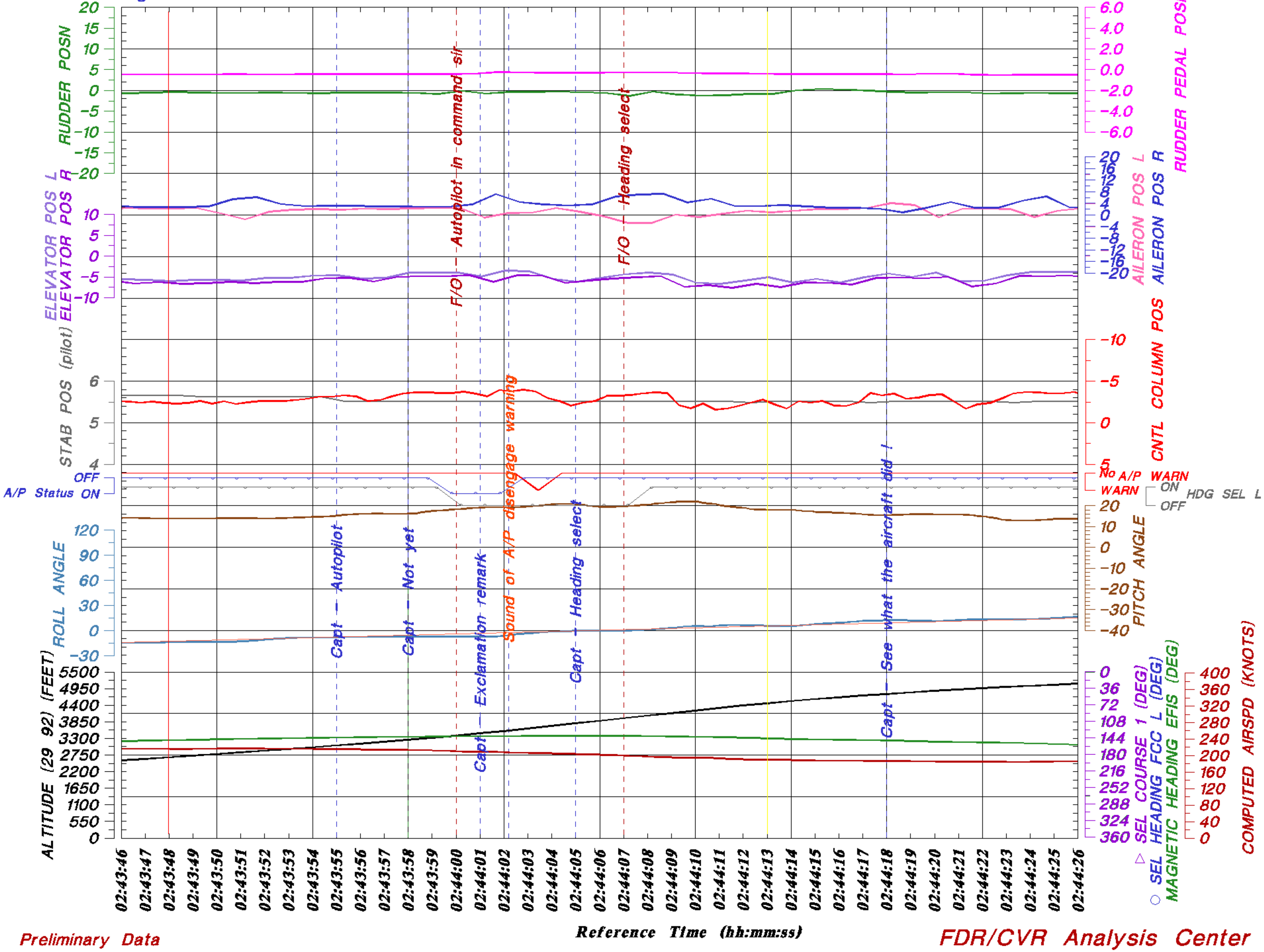
Preliminary Data
Created: October 21, 2004

FDR/CVR Analysis Center
Eng. Osama Mortada

FSH604

Flight Controls

1A/2004



Preliminary Data

Created: October 21, 2004

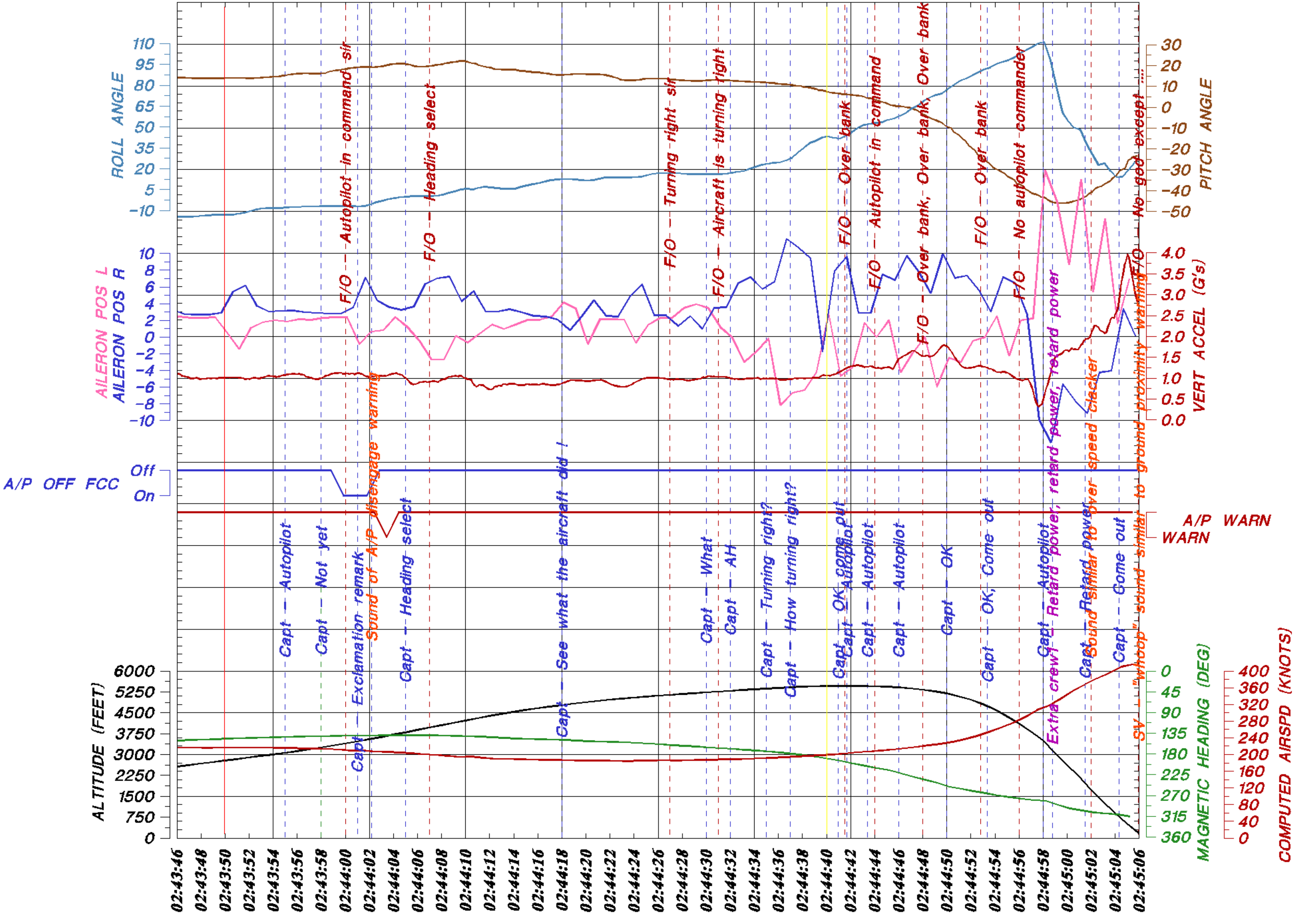
FDR/CVR Analysis Center

Eng. Osama Mortada

FSH604

Flight Controls

1A/2004



Preliminary Data

Created: October 21, 2004

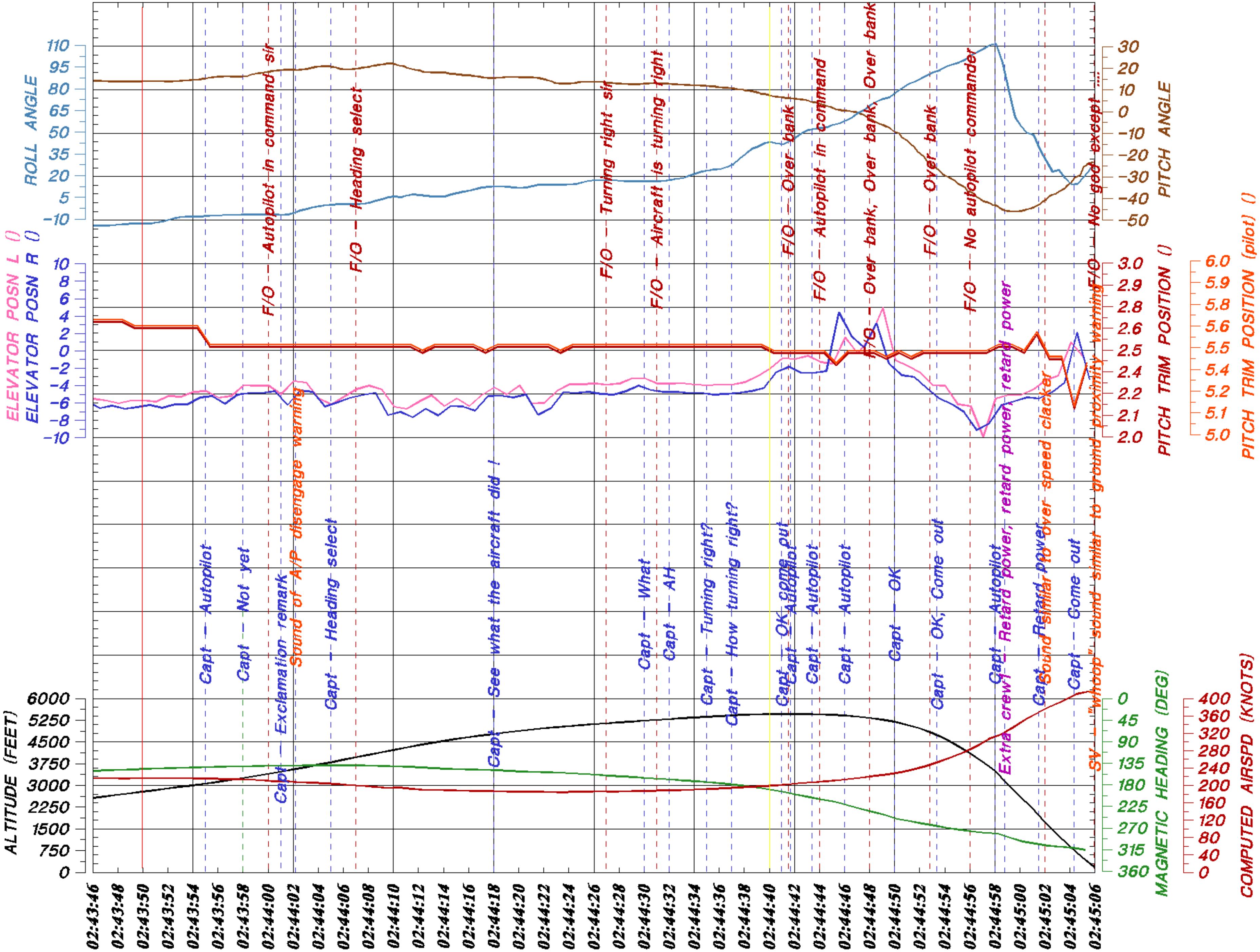
FDR/CVR Analysis Center

Eng. Osama Mortada

FSH604

Flight Controls

1A/2004



Preliminary Data

Created: October 21, 2004

FDR/CVR Analysis Center

Eng. Osama Mortada

Attachment 4: Summaries of previous flight(s) by accident crew

Refer to 1.17.3.25, all departures from SSH (accident aircraft)

Exhibit C

Cockpit Voice Recorder (CVR) Group Factual Report

Ministry of civil aviation
Accidents Department
Egypt, Cairo

October14, 2004

Group Chairman's Factual Report – Cockpit Voice Recorder

ACCIDENT

Location: Red Sea off Sharm el-Sheikh
Date: January3, 2004
Time: 2:45:06 GMT
Operator: Flash Airlines – Flight 604

The group convened at CVR/FDR laboratory at MCA headquarters - Cairo for retrieval of CVR conversation and aural sounds.

SUMMARY

On January 3, 2004, about 02:45:06 UTC, 04:45:06 Local time, Flash Airlines flight FSH604, a Boeing 737-300, Egyptian registration SU-ZCF, operated by Flash Airlines, crashed into the Red Sea shortly after takeoff from Sharm el-Sheikh International Airport (SSH) in South Sinai, Egypt. The flight was a passenger charter flight to Charles de Gaulle Airport (CDG), France with a stopover in Cairo international Airport (CAI) for refueling. Flight 604 departed from Sharm el-Sheikh airport with 2 pilots (Captain and First Officer), 1 observer, 4 cabin crew, 6 off-duty crew members and 135 passengers on board. The airplane was destroyed due to impact forces with the red sea with no survivals.

Details of Investigation

- The accident airplane's Cockpit Voice data recorder (CVR), Fairchild, Part no. 93-A100 – 80, serial no. 57994 was retrieved from the Red Sea on January17, 2004 by the French Navy. The CVR was immersed in water and sealed in an ice chest and transported to MCA, accident investigation laboratory at Cairo.

- Readout of the CVR was accomplished using the laboratory's playback hardware and software as follow:

Download Unit:
A100 CVR play back Deck - Store 4DS
Audio Analysis System:
MPL 1024 , 12 Channel Microphone Mixer – Samson
Filter : PCAP II (Samson)
Amplifier : Samson - Servo-550 Studio Amplifier
Software:
Vegas 4 – Sound Forge 6 –PCAP II

- The recorder consisted of four channels of audio information.

Channel One:	First officir hot mic.
Channel Two:	Area Mic.
Channel Three:	Observer hot Mic.
Channel Four:	Captain hot Mic.

- After the initial retrieved sound task was completed another effort was undertaken with the assistance of BEA expert as follows:

  - The output signal from the tape deck playback machine was too low compared to the recording on the same conditions in BEA. This problem was solved by increasing the output level when the screw of the adjustable gain control was turned clockwise.

  - The sensitivity of the acquisition audio card of the PC was not good enough to capture correctly the audio signal coming from the tape deck player. This problem was solved by changing the value of the "Variable Signal Levels" on the hardware setting of the audio card, from the manufacture value +4 to -10. The gain was increased and the input signal amplified.

  - The speed of the tape was not correct with an interference of the power (115 V, 400 Hz) measured at 375 Hz. It was not possible to adjust properly the speed of the tape with the device installed. This problem is solved by resembling the wave file with a correct ratio (400/375= 1.0665).

  - Some high frequencies were missing when doing the spectrum analysis. This problem was solved by using a sampling rate of 32000 kHz instead of 22000 kHz.

  - The alignment of the head installed on tape deck player was checked, adjusted and was found satisfactory prior to playback the tape.

A new copy of the CVR was performed. This recorded copy is satisfactory.

- Due to the effect of aircraft power (115 V, 400 Hz) on the tape speed, the data had been retrieved at a sample rate 34128 HZ. Recording time of the Subject CVR measured found 31 min. and 13.7 sec. and the frequency was 402 HZ

Comments

- Before start check list, below the line, Engine start, after start check list, and before Takeoff check list down to strobe lights are carried out.

- During flight control check at 02:37:40, two consecutive sounds had occurred, following at 02:37:41 the Captain had announced "turning to the right".

- Before the engine started, sound similar to Cockpit door operation was heard and no body other than the Captain, the First officer and the Extra crew1 was in the cockpit till the end of the CVR tape.

- At 02:42:43, the Captain requested for "Four Hundred Heading Select". One second later the First Officer acknowledged "Four Hundred Heading Select"

- At 02:42:484, the Captain had asked for "Level Change". One second later the First Officer repeated "Level Change".

- At 02:43:04 and at 02:43:11, the captain had announced "Left Turn". One second later the First Officer repeated " Left turn to establish Three Zero Six Sharm VOR"

- At 02:43:55, the Captain had asked for "Autopilot". At 02:44:00, The First officer announced "Autopilot in command" and at 02:44:02, the sound of autopilot disengages warning was heard.

- At 02:44:05, the Captain had asked for "Heading Select". At 02:44:07, the First Officer repeated "Heading Select"

- AT 02:44:27, the First Officer had announced "Turning right Sir" and again at 02:44:31, he confirmed "Aircraft is turning right".

- At time 2:44:35 Captain said "turning Right?"

- At time 2:44:37 Captain said "how turning right"

- At 02:44:41.7 and at 02:44:43.4, the Captain had asked for "Autopilot", and at 02:44:44 the First Officer replied "Autopilot in command"

- At 02:44:46, the Captain had asked for "Autopilot", and at 02:44:56, the First officer replied "No autopilot Commander" but again the Captain in command asked for "Autopilot".

- The phrase "Come out" was repeated three times by the captain at 02:44:41, 02:44:53.4 and 02: 45:04.3

- Extra crew 1 did not interfere during flight progress except at 02:44:58.8 when he had been announced "Retard Power, Retard Power, Retard Power"

Transcript of a Fairchild A-100 cockpit voice recorder (CVR), serial no. 57994 installed on a B-737-500, SU-GZF, which was involved in a descent and collision into the Read Sea near Sharm on Jan, 2004

UTC hh:mm:ss	Speaker	Content
02:13:53	ATC	Communication with Blue Panorama B757 (●●●) for 31 seconds
02:14:27	Extra crew1	طردوه ياعم مش عايزينه يقعد طول الليل هنا *They don't want him to stay here all night*
02:14:30	First officer	ممكن حضرتك علشان بيودوهم عند الهناجر *May be because they move them next to the hanger*
02:14:32	Extra crew1	لأ قالوه حيبعتوه للغردقة * *They told him they will send him to Hurgada*
02:14:43	First officer	بص خلاص علشان انا شايف يعنى الترافك بدأ يقل فى اليومين دول *The traffic started to decrease*
02:14:47	Extra crew1	والله *Really*
02:14:48	First officer	آه مش *yes*
02:14:49	Extra crew1	انا افتكرته عالى جداً *I thought it was still high*
02:14:50	First officer	لأ احنا نازلين حاضرتك امبارح مثلاً الساعة خمسة ومن خمسة لغاية ستة المطار زى كدة بالضبط *No we are decreasing*
02:14:59	Extra crew1	ياه *Really*

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:15:02	First officer	ده بالعكس كله دلوقتى بيبتدى بقى يسافر خلاص كله قضّى رأس السنة و الكريسماس *Every body is going back after Christmas & new year*
02:15:07	Extra crew1	آه *yes*
02:15:21	Extra crew1	بوينج سبعة وخمسين *Boeing seven five seven*
02:16:02	First officer	بقول لحضرتك كابتن عصام يعنى استاذى يعنى *I am telling you sir captain Essam is my teacher*
02:16:10	Extra crew1	والله !!! *Really*
02:16:13	First officer	حضرتك كان مسمينى حتى" مازو" على اسم ابنه الصغير لو حضرتك تعرفه على اساس كنت ابتديت الطيران صغير *He even calls me like his youngest son*
02:16:24	Extra crew1	ابتديت ازاى *How did you start*
02:16:26	First officer	انا ابتديت حضرتك خلصت تمنتاشر طبعا كوميرشيال وقعدت حوالى سنة ونصف ابتديت قبل العشرين كده *I started by finishing commercial at eighteen and stayed for a year and half and started before twenty*
02:16:35	Extra crew1	آه *yes*
02:16:43	First officer	احسن حاجة فادتنى طبعا ان انا ابتديت على الميتين يعنىالميتين ده مدرسة *The best benefit was my starting on the two hundred*

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:16:46	Extra crew1	آه دراسة يعنى مش حظ *Yes studying not luck*
02:16:47	First officer	الحمد لله يعنى *Thank god*
02:16:52	Extra crew1	انا عايش بره *I live abroad*
02:16:54	First officer	* حضرتك *you sir*
02:16:55	Extra crew1	ياه ماعندناش النظام ده خالص لازم تعمل ألفين ساعة قبل ما حد يبصلك يعنى *You must have two thousand hours before anyone looks at you*
02:17:04	First officer	فين حضرتك *where sir*
02:17:05	Extra crew1	اشتغل مدرب شوية اشتغل رش شوية اشتغل bush pilot *Work as instructor a bit and a bit as* bush pilot
02:17:10	First officer	بس كلها إكسبيرينس عالية *But it is all high experience level*
02:17:12	Extra crew1	اكسبيرينس بس بتشتغل على طيارات صغيرة وسنجل إنجين ، ما بتخدش الإكسبيرينس اللى هو يعنى تقعد انت خمس سنين كده بتضيعهم أونطة يعنى بس انا زيك انا كنت دفعة تسعة وثمانين حتى كان عندى تمنتاشر سنة حتى كان عندى يعنى كان لازم اجيب موافقة من بابا ومش عارف إيه *It is all experience but it is a waste of time*

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	**Speaker**	**content**
02:17:39	First officer	آه ما هوه بالضبط حصل معايا نفس الموضوع *Yes I passed through the same thing*
02:17:43		عدة اصوات منها فتح باب الكابينة Sound like cockpit door operation
02:18:10		صوت نقر على باب كابينة القيادة Knocking on cockpit door
02:18:11		أصوات sounds
02:18:13	Attendant	كابتن الركاب جت *Captain the passengers arrived*
02:18:14	Captain	اتفضلوا *let them in*
02:18:20	Extra crew2	السلام عليكم *Greeting*
02:18:21	Captain + extra crew1	وعليكم السلام ورحمة الله وبركاته *Response*
02:18:23	Extra crew2	انا حياتى جوه فى اوديت الفيران هنا *My life is in this rat room*
02:18:24		صوت ضحك عالى* Laughter

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:18:25	Captain	امشى اطلع بره *Go outside*
02:18:25		صوت ضحك laughter
02:18:26	First officer	انت طالع معانا *Are you coming with us*
02:18:27		(●●●) joking for 31 seconds
02:18:58	Captain	Before start check list
02:18:59	First officer	Flight deck preparation
02:19:00	Captain	Completed
02:19:01	First officer	light test
02:19:02	Captain	Checked
02:19:03	First officer	Oxygen
02:19:04	Captain	Push * hundred percent (sound similar to oxygen mask test)
02:19:05	First officer	Yaw damper
02:19:06	Captain	On
02:19:07	First officer	Instrument transfer switches
02:19:08	Captain	Ok normal , I R S was *
02:19:12	First officer	Fuel

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:19:14	Captain	On
02:19:16	First officer	Galley power
02:19:17	Captain	On
02:19:18	First officer	Emergency Exit light
02:19:19	Captain	Armed
02:19:20	First officer	Passenger signs
02:19:21	Captain	set
02:19:22	First officer	Window heat
02:19:23	Captain	On
02:19:24	First officer	Hydraulics
02:19:26	Captain	Normal
02:19:28	First officer	Air condition & Pressurization
02:19:30	Captain	Packs on , bleeds on , set at Cairo
02:19:33	First officer	Auto pilot
02:19:34	Captain	Disengaged
02:19:35	First officer	Instruments
02:19:36	Captain	Cross Checked
02:19:37	First officer	Anti-skid
02:19:38	Captain	On

UTC hh:mm:ss	Speaker	Content
02:19:39	First officer	Auto brake
02:19:40	Captain	RTO
02:19:40	First officer	Speed brake
02:19:41	Captain	Down
02:19:42	First officer	Parking brake
02:19:43	Captain	Set
02:19:45	First officer	Stabilizer trim cut out switches
02:19:46	Captain	Normal
02:19:47	First officer	Wheel well fire warning
02:19:48	Captain	Checked
02:19:49	First officer	Radio radar and transponder
02:19:50	Captain	Set
02:19:51	First officer	Rudder and aileron trim
02:19:52	Captain	Neutral
02:19:53	First officer	Gear pins
02:19:55	Captain	Removed
02:19:56	First officer	Briefing for emergencies
02:19:58	Captain	*
02:19:59	First officer	Papers

UTC hh:mm:ss	Speaker	Content
02:20:01	Captain	Aboard
02:20:02	First officer	F M C / C D U
02:20:03	Captain	0ne three four , 0ne three four , one four zero
02:20:06	First officer	N one and I A S ' bugs
02:20:07	Captain	None , ninety four set my sides
02:20:12	First officer	Flight director
02:20:13	Captain	Ok *
02:20:17	First officer	Before start check list complete down to the line
02:20:25	Extra crew1	طبعا انتو منزلتوش من الاوتيل خالص *Of course you didn't leave the hotel*
02:20:27	Extra crew2	آه *yes*
02:20:29	Extra crew2	لا هانروح فين عريانين *No where can we go without clothes*
02:20:33	Extra crew1	لا دول علشان شوناطهوم ضاعت *No that's because their bags are lost*
02:20:35	Captain	امبارح كنا جايين ساعة الغسق شمس و two two *Yesterday we were coming at dusk and the sun was* two two
02:20:43	Extra crew2	اه *yes*

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
O2:20:46	Captain	حسيت انه انا already شايف الممر بالعافية هو بيقول in sight قولتله in sight ايه *I felt I could hardly see the runway and he was* already *saying* in sight ….. *what* in sight
02:20:53	Extra crew1	سن بأه يا كابتن *Age sir*
02:20:55	Captain + extra crew2	احنا * دا مش in sight بالنسبة لك اوعى تقول in sight فى اللى انتا داخل عليه ده مش in sight خالص *This is not* in sight *never say* in sight *when you are entering like this*
02:20:59	Extra crew2	مش هو ده مش هو ده *This is not it*
02:21:00	Captain	مش باين لحد short انا يعنى انا بجيب الـ * اللى انا هو ده *It is not clear to the* short
02:21:05	First officer	ماهو الـ sunset ضارب مع الشمس مع haze *It is the* sunset *and the* haze
02:21:07	Captain	الشمس عمله haze مش ممكن *The sun is making* haze
02:21:07	First officer	عمله haze فظيع يعنى *It is making terrible* haze
02:21:10	Captain	لا عارف ارفع عنيا برة وبيقولى in sight * *I am unable to raise my eyes and he says* in sight
02:21:12		صوت ضحك * Laughter

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:21:13	Captain	فين in sight ده بيقولى اهو ياكابتن كابتن فى عينك *where* in sight ……
02:21:19	Captain	بقوله اذا كنت انا شايفه بالعافية ومحدده بالعافية تقولى in sight ازاى مستحيل تكون انتى شايفه *If I can hardly see it and he says* in sight *how ?*
02:21:26		*
02:21:27		ضحك Laughter
02:21:30	Captain	انتا عارف اصل ايه ال maneuver تبين الـ in sight وخاصة فى الجزء بتاع ال short final *You know the* maneuver *shows* in sight *specially on* short final
02:21:34	First officer	بالذات ال correction بتاع ال heading *Specially* heading correction
02:21:37	Captain	بالضبط * *Exactly*
02:21:40	Captain	ده انا قولتله اناشايفه بالعافية انا اقعدت ادور عليه علشان انزل عليه بالعافية ازاى يبقى in sight بالنسبة لك *I told him I searched for it to see it how* in sight *?*
02:21:52	Extra crew2	وخلاص يا كومندان مادققشى على الحاجات الصغيرة in sight *Simply* in sight
02:21:52	Captain	صوت ضحك وانزل على الممر الثانى Laughter ….. *Then land on the other runway*

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:21:52		(●●●) conversation about the lost bags of the crew for 83 seconds
02:23:40		صوت مماثل لحركة باب غرفة القيادة sound similar to cockpit door operation
O2:23:48	Captain	كام واحد كام راكب *How many Passengers?*
02:23:49	Station manager	ميه خمسة وتلاتين رأس One three five *heads*
02:23:51		(●●●) Joking + conversation of blue panorama eight three three amend their flight plan (For 150 seconds)
02:26:22	First officer	Sharm El Sheikh Flash Six Zero Four
02:26:29	ATC	Six Zero Four go ahead
02:26:31	First officer	weather Cairo أستأذن حضرتك لو فيه امكانية *Please* weather Cairo
02:26:34	ATC	ثوانى *seconds*
02:27:35	First officer	option ده *This is* option
02:27:36	Extra crew1	هه *what*
02:27:37	First officer	option فى *There is* option

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:27:40		*
02:28:05	First officer	حضرتك طلبت level عالى ليه *Sir why did you request a high* level*?*
02:28:08	Captain	System كده هنفذه لانه هيقلل من نسبة الـ consumption بتاعنا *For less* consumption
02:28:50	Extra crew1	عداد الـ center tank شغال *Is the* center tank *gauge operating?*
02:28:53	Captain	اه بس مشكوك فيه *Yes but not reliable*
02:28:57	Extra crew1	شغال يعنى هو zero فعلا *So it is* zero
02:28:58	Captain	أه *yes*
02:28:59	ATC	Flash Six Zero Four Sharm El Sheikh
02:29:02	First officer	Go ahead sir
02:29:03	ATC	Six Zero Four copy Cairo met condition time Zero Two double zero , Surface wind Two One Zero One Zero knots Visibility Six kilometers Clouds and Sky clear Temperature One Two ,dew point Zero One , QNH one zero one three
02:29:23	Captain	Clouds
02:29:24	First officer	And confirm dew point, Please

(●●●) IRRELEVANT CONVERSATION * WORDS NOT CLEAR
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:29:26	Captain	sky clear ماقلوش *They didn't say* sky clear
02:29:27	ATC	Dew point Zero One
02:29:30	First officer	Roger, copied next call when ready إنشاء الله يافندم *God willing*
02:29:33	Captain	قالوه clouds و sky clear ازاى يعنى الاثنين عكس بعض *They said* clouds *and* sky clear *how , the two are opposite*
02:29:34	Extra crew1	اسأله عن ceiling كده *Ask him about* ceiling*?*
02:29:35	First officer	ازاى يعنى *How?*
02:29:37	First officer	شوف بيقولك sky clear و cloud ازاى مش فاهم *See how* sky clear *and* clouds *I don't understand*
02:29:37	First officer	ماهو لخبطنى فيها علشان كده ماعرفتش اكتب اللى بعده *He mixed me up I didn't know how to write it*
02:29:41	Extra crew1	مادكاش ceiling فعلا *He didn't give* ceiling
02:29:42	Captain	One Zero One Three
02:29:43	First officer	One zero one

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:29:44	Captain	هه
02:29:45	First officer	One zero one three
02:29:46	Captain	أه و المتين وعشرة وعشرة knots يبقى الـ runway *And two hundred and ten and ten* knots *and* runway *is*
02:29:50	First officer	Runway two three
02:29:53	Extra crew1	ماداش (ceiling) *He didn't give ceiling*
02:29:54	First officer	لا مافيش ceiling و الـ sky clear و clouds *No* ceiling *and* ….. clouds *and* sky clear
02:30:01	Extra crew1	ممكن تبقى scattered مثلا *Maybe it is* scattered
02:30:02	First officer	ممكن يقصد scattered *Maybe he means* scattered
02:30:06		صوت خبط sound of knock
02:30:11	Extra crew1	بس برده لازم يبقى فيه ceiling *There should be* ceiling
02:30:14	First officer	اكيد *Definitely*

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	content
02:30:14	Extra crew1	نعرف هنخرج منه إمتى *How can we know when will we clear it*
02:30:16	First officer	أه *yes*
02:30:16	Ground engineer	ياصباح الجمال *Good morning*
02:30:18	Captain	يا صباح الهنا يا باشمهندس *Good morning engineer*
02:30:21	Captain	شوفت ده *Did you see it ?*
02:30:22	Ground engineer	أه انا كان فى امكانى اعمل بس لأ مش عاوز امد ايدى على حاجة دى *Yes I could do something but I don't want to touch this*
02:30:24	Captain	تخصصات كهربا *Electrical specially*
02:30:27	Ground engineer	أه *yes*
02:30:29	Captain	زى ماكان بيحصل *Like what used to happen*
02:30:30	Ground engineer	أه *yes*

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:30:30	Captain	فى الطيارات إياها التانية *In the other aircraft*
02:30:31	Ground engineer	ده صح *This is right*
02:30:32	Captain	بس هز Socket *Move* socket
02:30:33	Ground engineer	ايوه *yes*
02:30:36	Extra crew1	heavy landing لازم عمرو عمل *Probably Amr made a* heavy landing
02:30:37	Ground engineer	صوت ضحك laughter
02:30:39	Captain	راجل زى الفل *Good man*
02:30:41	Extra crew1	والله ما شاء الله *God's will*
02:30:48	Captain	لو نركز فى السن ده *If we concentrate at this age*
02:30:53	First officer + Extra crew1	عالطول ان شاء الله *Always god willing*

(●●●) IRRELEVANT CONVERSATION * WORDS NOT CLEAR
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:30:54	Captain	يافندم منتحرمش تحب تيجى معانا *Thank you would you like to come with us?*
02:30:56	Station manager	مين *Who?*
02:30:56	Ground engineer	نخطفه يا كابتن النهارده نخطفه *Lets steal him*
02:30:57	Station manager	ازاى بس اجى معاكم عندنا وارسو وعندنا * وعندنا * *How we have Warsaw and * and**
02:31:01	Captain	بلا وارسو بلا حاجة *Forget Warsaw*
02:31:03	Station manager	لأ النهاردة بالذات مش هاجى *No today I will not go with you*
02:31:05		صوت ضحك laughter
02:31:07	Station manager	مش قابل اجى يعنى عارف مش جاية مش قابلة *I can't make it , it can't be done*
02:31:10	Extra crew1	انتى نمت امبارح *Did you sleep last night*
02:31:11	Station manager	مين *Who?*

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	content
02:31:11	Extra crew1	انتى *you*
02:31:12	Station manager	انا منمتش امبارح خالص انا هاخدها نوم انا لازم انام *I didn't sleep at all I must sleep*
02:31:16	Captain	طيب اتوكل على الله ، اسحبولنا الحاجة *Ok rely on god pull equipment away*
02:31:21		صوت sound similar to cockpit door operation
02:31:26	Attendant	one three five كابتن *captain one three five*
02:31:28	Captain	One three five إنشاء الله , تمانية و عشرين و بقولك ايه خمسين دقيقة ولا اقل *Twenty eight and lets say fifty minutes , god willing* One three five
02:31:34	First officer	خمسين *fifty*
02:31:36	Captain	شكراً *thank you*
02:31:37	First officer	طب هو فين * *Ok where is he ?*
02:31:39	Captain	من هنا خمسين من هنا ستة و خمسين لكن إنشاء الله اقل إنشاء الله *From here fifty and from there fifty six but god willing less*

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:31:44	Attendant	أه أقفل الباب؟ *Yes close the door*
02:31:48	Attendant	بسرعة بسرعة علشان الكابتن بيقولى اقفل *Quickly the captain says close*
02:31:51		صوت قفل الباب Sound of door closing
02:31:52	First officer	Startup ياكوموندان Startup *commander*
02:31:53	Captain	اتفضل يا حبيبى *Please*
02:31:55	First officer	Sharm El Sheikh Tower Flash Six Zero four
02:32:00	ATC	Flash Six Zero Four Go ahead
02:32:02	First officer	On our stand, destination Cairo request startup clearance
02:32:05	ATC	Startup approved QNH One Zero One One , Runway Two Two Right
02:32:09	First officer	Startup approved for runway Two Two Right , Flash Six Zero Four thank you
02:32:13	First officer	Startup approved
02:32:19	Captain	Below the line
02:32:21	First officer	Doors
02:32:22	Captain	لسه *Not yet*
02:32:23	First officer	Air condition packs

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:32:24	Captain	Off
02:32:28	First officer	Start pressure
02:32:29	Captain	Sufficient
02:32:30	First officer	Anti collision light
02:32:31	Captain	On
02:32:31	First officer	Before start check list completed down to the after start
02:32:58	Extra crew3	يلا يا جماعة اتكلوا على الله *Come on fellows*
02:33:00	Attendant	Close two L Please
02:33:07		صوت خبطة (thump)
02:33:16	Captain	توكلنا على الله والحمد لله بسم الله الرحمن الرحيم *We rely on god , thank god , in the name of god*
02:33:20		اصوات خبطات Sounds
02:33:25	Attendant	Attention Cabin Crew doors in armed position and crosscheck
02:33:30		اصوات خبطات Sounds For 47 seconds (may be cockpit door , jump seat and unknown ratcheting sounds)
02:34:08	Captain	أيه ده بقى *What is this*

UTC hh:mm:ss	Speaker	content
02:34:09	First officer	بسم الله وتوكلنا على الله *In the name of god , we rely on god*
02:34:11	First officer	Duct pressure decrease start valve open
02:34:14	Captain	N two
02:34:25	Attendant	Ladies and Gentlemen, good morning on behalf of Captain Kheder and his crew members welcome you onboard Flash airlines, Boeing seven three seven three hundred Proceeding to Cairo, During our flight to Cairo we shall cover the distance at fifty minutes and altitude twenty seven thousand feet , you are kindly requested to fasten your seat belts and put the back of your seats in full up right position, and observe the no smoking sign during all the flight, thank you.
02:34:31	First officer	Oil pressure
02:34:48	First officer	Approaching forty six
02:34:50	First officer	Duct pressure normal start valve closed
02:34:51	Attendant	Cabin crew stand bye for demo.
02:35:06	Captain	number one توكلنا على الله *We rely on god*
02:35:08	First officer	Duct pressure decrease start valve open
02:35:10	Captain	N two
02:35:16	Captain	E G T تلاتاشر تسعتاشر كده لما دوّر تانى E G T *thirteen, nineteen when it starts again*
02:35:21	First officer	Approach *
02:35:22	Captain	N one E G T ok Normal

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**

ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:35:27	First officer	Maximum motoring
02:35:30	First officer	Oil pressure
02:35:48	Captain	Approach forty six start cut out pressure normal Start valve closed start cut out
02:36:04	Captain	Stabilized
02:36:13	Captain	To the line
02:36:14	First officer	Electrical
02:36:16	Captain	On bus
02:36:17	First officer	Pitot heat
02:36:17	Captain	on
02:36:18	First officer	Anti-ice
02:36:19	Captain	on
02:36:19	First officer	Air condition and pressurization
02:36:21	Captain	Packs on , flight
02:36:23	First officer	Isolation valve
02:36:24	Captain	Auto
02:36:25	First officer	A P U
02:36:29	Captain	ندوره هناك فى الجو مش مشكلة ربنا يسهل *Start there in flight no problem with god's help*
02:36:30	First officer	Start levers

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:36:32		*
02:36:33	Captain	Idle detent
02:36:34	First officer	Ground equipment
02:36:36	Captain	Clear
02:35:36	First officer	After start check list completed
02:35:37	Captain	Taxiing
02:36:39	First officer	Sharm El Sheikh Flash six zero four Ready to taxi out
02:36:48	ATC	Six Zero Four Taxi right Delta Alpha Hold short Two Two Right
02:36:53	First officer	Roger to the right via Delta Alpha to holding point runway Two Two Right flash Six Zero Four
02:36:59	First officer	To the right ان شاء الله Delta Alpha يا كومندار *Commander* Delta Alpha *god willing* to the right
02:37:02	Captain	ان شاء الله *God willing*
02:37:03	First officer	Holding point runway two two right and right side is clear
02:37:06		صوت sound
02:37:07	Captain	توكلنا على الله *We rely on god*
02:37:08	First officer	Shocks off zero two three *

(●●●) IRRELEVANT CONVERSATION * WORDS NOT CLEAR
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:37:09		صوت sound
02:37:09	Captain	هو ده مش شغال عادى *Is this not operating normally*
02:37:10		صوت sound
02:37:11		sound maybe parking brake release صوت ربما يكون الـ
02:37:14	First officer	One minute past for A P U
02:37:16	Captain	Off
02:37:18	First officer	A P U off sir
02:37:18		(six clicks) عدد ست اصوات متماثلين
02:37:23		(engine acceleration sound) صوت المحركات
02:37:26	Captain	Flaps five
02:37:28		Three sounds similar to flap handle صوت عدد ثلاث خبطات ربما تكون صوت حركة الـ
02:37:30	Captain	Rudder right neutral left
02:37:34		(high thump) صوت
02:37:35	Captain	Neutral
02:37:37	First officer	Flight control checked
02:37:40		Two consecutive sounds مجموعة أصوات متتالية

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:37:41	Captain	Turning to the right
02:37:43	First officer	إن شاء الله via Delta يا كمندار *God willing* via Delta *commander*
02:37:44	Captain	مش هيه دى Delta *Is this* Delta
02:37:45	First officer	ان شاء الله *God willing*
02:37:49	First officer	Straight ahead
02:37:52		صوت خبطة ربما تكون landing light Sound maybe landing light
02:38:01	ATC	Flash Six Zero Four Ready to copy
02:38:03	First officer	Go ahead Sir
02:38:05	ATC	Flash Six Zero Four Destination Cairo as filed, climb initially flight level One Four Zero , One Six Seven Three on the Squawk
02:38:15	First officer	Our clear to destination Cairo via flight plan route One Four Zero initially, One Six Seven Three on the Squawk , Flash Six Zero Four and we have total Passengers One Three Five , *god willing* إن شاء الله
02:38:25	ATC	One Three Five and confirm Sierra Uniform Zulu Charlie Foxtrot
02:38:28	First officer	I do confirm
02:38:30	ATC	Continue taxi via Alpha line up Two Two Right advice ready for departure
02:38:34	First officer	Roger, next call ready *god willing* إنشاء الله

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:38:37	First officer	One four zero initially , one six seven three
02:38:44	Captain	Before takeoff
02:38:45	First officer	Recall
02:38:46	Captain	Checked
02:38:46	First officer	Flight Controls
02:38:47	Captain	Checked
02:38:48	First officer	Flaps
02:38:49	Captain	Five Green light
02:38:49	First officer	Stabilizer trim
02:38:51	Captain	Five units
02:38:52	First officer	Cockpit doors
02:38:54	Captain	Ok closed علشان الباب ده بيفتح Ok closed *because this door opens*
02:38:57	Extra crew1	عاوز ايه *what do you want*
02:38:57	Captain	أه علشان * ادى ليه * *Yes because * give why **
02:38:58	Captain	لأ والله *No really*

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:39:01	First officer	Take off briefing
02:39:03	Captain	Standard briefing *god willing* انشاء الله
02:39:04	First officer	Before Check list completed down to the line *god willing* انشاء الله
O2:39:12		(series of sounds)صوت خبطات
02:39:55	Captain	To the line
02:40:01	First officer	Engine start switches
02:40:02	Captain	On
02:40:02	First officer	Transponder
02:40:04	Captain	On
02:40:05	First officer	Before take off check list completed down to strobe lights
02:40:07	Captain	Completed *god willing* إن شاء الله *
02:40:36	Captain	Ready for departure كده تسعين ونص take off حطها لى على الـ *Set it on* take off *ninety and half* ….ready for departure
02:40:38	First officer	Flash Six Zero Four Ready for departure
02:40:46	ATC	Flash Six Zero Four Surface wind Two Eight Zero One Three knots left turn to intercept Radial Three Zero Six, clear for takeoff Two Two Right
02:40:55	First officer	Clear for takeoff runway Two Two Right with left turn to establish Three Zero Six Sharm VOR our Flash Six Zero Four clear for takeoff

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:41:01		One Thump (door knock)
02:41:02	Captain	افتح لهم الباب left turn مش كده *It is* left turn…..*open the door*
02:41:04	First officer	ان شاء الله *God willing*
02:41:09	Attendant	Cabin is Clear: المضيفة
02:41:12	Captain	شكراً *Thank you*
02:41:12	First officer	Final is clear
02:41:13		One thump
02:41:15		Four similar thumps may be landing lights
02:41:19	First officer	Left turn to establish radial Three Zero Six
02:41:29	Captain	Initially One Four Zero ?
02:41:30	First officer	إن شاء الله *God willing*
02:41:34	Captain	confirm initially One Four Zero
02:41:35	First officer	And Flash Six Zero Four Confirm to the left to establish Three Zero Six
02:41:40	Captain	Initial One Four Zero

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:41:43	ATC	إن شاء الله *God willing*
02:41:44	First officer	And initially One Four Zero
02:41:46	ATC	إن شاء الله *God willing*
02:41:48	Captain	توكلنا على الله *We rely on god*
02:41:59		Sound similar to increase of engine r.p.m
02:42:00	First officer	Stabilized sir N one
02:42:10	First officer	Takeoff power set speed building up, eighty knots, throttle hold
02:42:11	Captain	Eighty knots (one thump sound)
02:42:26	First officer	V one rotate
02:42:33		One thump sound similar to gear retraction
02:42:33.8	First officer	** Positive rate
02:42:34.6	Captain	Heading select
02:42:36	Captain	Gears up
02:42:36	First officer	Ok
02:42:43	Captain	Four Hundred Heading select
02:42:44	First officer	Four Hundred Heading select sir

UTC hh:mm:ss	Speaker	Content
02:42:48	Captain	Level Change
02:42:49	First officer	Level Change, MCP speed, N1 Armed sir
02:42:59	First officer	One Thousand
02:43:00	Captain	N one Speed Two twenty Flaps one
02:43:04	Captain	Left turn
02:43:05	ATC	Flash Six Zero Four airborne time Four Four when you ready to the left to intercept Three Zero Six radial report on course إن شاء الله *God willing*
02:43:11	Captain	Left turn
02:43:12	First officer	Roger when ready *god willing* إن شاء الله
02:43:18	First officer	Left turn to establish Three Zero Six Sharm V O R
02:43:19	MSR227	Sharm Egypt air two two seven *greeting* السلام عليكم
02:43:22	First officer	Speed available
02:43:23	Captain	Flaps up
02:43:23	ATC	Egypt air two two seven go ahead *greeting* وعليكم السلام ورحمة الله
02:43:26	MSR227	Maintaing flight level one two zero four three D M E in-bound to Sharm el Sheikh and request descent
02:43:34	ATC	Egypt air double two seven clear Sierra Hotel Mike V O R , visual approach runway two two right pilot discretion descend four thousand feet QNH one zero one one

UTC hh:mm:ss	Speaker	Content
02:43:35	First officer	Flaps up no light
02:43:37	Captain	After take off checklist
02:43:45	MSR227	هو حضرتك دلوقت الـ wind أد إيه *How much is the* wind *sir*
02:43:48	ATC	Indicated two eight zero one zero knots
02:43:53	MSR227	طب حضرتك ما نشتغل runway zero four يا فندم *Can we use* runway zero four *sir*
02:43:55	Captain	Autopilot
02:43:56	MSR227	Right zero four
02:43:58	Captain	لسه *Not yet*
02:43:59	ATC	مفيش مشاكل Straight in ILS approach runway zero four left ان شاء الله report full establish QNH one zero one one *There is no problem* Straight in ILS approach runway zero four left *god willing* report full establish QNH one zero one one
02:44:00	First officer	Autopilot in command sir
02:44:01	Captain	اديله *Exclamation remark*
02:44:02		Sound of A/P disengage warning
02:44:05	Captain	Heading select
02:44:05	MSR227	Straight in approach runway zero four left, one zero one one , next call full establish Egypt air two two seven

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:44:07	First officer	Heading select
02:44:18	Captain	شوف الطياره عملت ايه *See what the aircraft did !*
02:44:27	First officer	Turning Right *sir* حضرتك
02:44:30	Captain	ايه *what*
02:44:31	First officer	Turning right الطياره *Aircraft is* turning right
02:44:32	Captain	أه *AH*
02:44:35	Captain	Turning right ?
02:44:37	Captain	Turning right ازاى *How* turning right
02:44:41	Captain	Ok come out
02:44:41.5	First officer	Over bank
02:44:41.7	Captain	Autopilot
02:44:43.4	Captain	Autopilot
02:44:44	First officer	Autopilot in command
02:44:46	Captain	Autopilot

(●●●) IRRELEVANT CONVERSATION *** WORDS NOT CLEAR**
ITALIC FONT : TRANSLATED FROM ARABIC

UTC hh:mm:ss	Speaker	Content
02:44:48	First Officer	tsk tsk
02:44:48	First Officer	Over bank, Over bank, Over bank
02:44:50	Captain	OK
02:44:52.8	First Officer	First Officer Over bank
02:44:53.4	Captain	OK
02:44:56	First Officer	Autopilot مافيش يا كوماندا *No* autopilot *commander*
02:44:58	Captain	Autopilot
02:44:58.8	Extra Crew 1	قلل باور ، قلل باور ، قلل باور *Retard power , retard power , retard power*
02:45:01.5	Captain	*Retard power* قلل باور
02:45:02		Sound similar to over speed clacker
02:45:04.3	Captain	Come out
02:45:05.9	First Officer	*No god except* ….
02:45:05	SV	"whoop" sound similar to ground proximity warning
02:45:06	End	End Of Recording

Exhibit C **CVR Group Factual Report**

Accident flight plan (copy of the flight plan referred to by ATC at 02:38:05 in the CVR transcript)

FLASH AIRLINES

Aerodrome

مطار

FLIGHT PLAN
PLAN DE VOL

برنامج رحلة

PRIORITY / Priorite: <<≡ FF →

ADDRESSEE(S) / Destinataire(S)

FILING TIME / Heure de depot

ORIGINATOR / Expediteur <<≡

SPECIFIC IDENTIFICATION OF ADDRESSEE(S) AND/OR ORIOGINATOR
Identification Precise du(des) destinataire (s) et/ou de l'expediteur

3 MESSAGE TYPE / Type de message: <<≡ FPL →

7 AIRCRAFT IDENTIFICATION / Identification de l'aeronef: FSH604

8 FLIGHT RULES / Regles de vol: — I

TYPE OF FLIGHT / Type de vol: N

9 NUMBER / Nombre: —

TYPE OF AIRCRAFT / Type of d' aeronef: B733

WAKE TURBULENCE CAT / Cat de turbulence de de sillage: / M

10 EQUIPMENT / Equipement: — S / C

13 DEPARTURE AERODROME / Aerodrome de depart: HESH

TIME / Heure: 0200 <<≡

15 CRUSISNG SPEED / Vitesse croisiere: — N0400

LEVEL / Niveau: F240

ROUTE / Route: → DCT SHM A411 KATIS DCT CVO

16 DESTINA TION AERODROME / Aerodrome de destination: — HECA

TOTAL EET / Duree totale estimee HR. MIN: 0050

ALTN AERODROME / Aerodrome de degagement: → HESH

2 ND.ALTN AERODROME / 2eme aerodrome de degagement: →

18 OTHER INFORMATION / Renseignements divers:
OPR/FLASH AIR
REG/SUZCF

SUPPLEMENTARY INFORMATION (NOT TO BE TRANSMITTED IN FPL MESSAGES)
Renseignements complementaires (a NE PAS TRANSMETTRE DANS LES MESSAGES DE PLAN DE VOL DEPOSE)

19 ENDURANCE / Autonomie HR. MIN: — E/ 0300

PERSONS ON BOARD / Personnes a bord: → P/ 0148

EMERGENCY RADIO / Radio de secours: UHF VHF ELBA → R/ U V E

SURVIVAL EQUIPMENT/Equipement de surive: → S; POLAR / Polaire P; DESERT / Desert D; MARITIME / Maritime M; JUNGLE / Gungle J

JACKETS/Gilets de sauvetage: → J; LIGHT / Lampes L; FLUORES / Fluores F; UHF U; VHF V

DINGHIES/Canots: NUMBER / Nombre; CAPACITY / Capacite; COVER / Couverture; COLOUR / Couleur
→ D 08 125 C YELLOW <<≡

AIRCRAFT COLOUR AND MARKINGS / Couleur et marques de l'aeronef: A/ WHITE

REMARKS / Remarques: → N/ <<≡

PILOT-IN-COMMAND / Pilote commandant de bord: → C/ KHEDR) <<≡

Signature of Pilot-in command or designated representative: [signature]

FILED BY/Depose par

SPACE RESERVED FOR ADDITIONAL REQUIREMENTS

Exhibit C CVR Group Factual Report

Spelling corrections

Two spelling corrections should be made:

- The phrase “02:34:25 Attendant: "on behalf of Captain Kheder" (in page 269)
- should read “02:34:25 Attendant: "on behalf of Captain Khedr"
- The phrase “advice ready for departure" (in page 273)should read " advise ready for departure "

Exhibit D

Airplane Performance Group
Factual Report

Ministry of civil aviation
Accidents Department
Egypt, Cairo

October14, 2004

Group Chairman's Factual Report - Performance

A. ACCIDENT

Location:	Red Sea off Sharm el-Sheikh
Date:	January3, 2004
Time:	2:45:06 GMT
Operator:	Flash Airlines – Flight 604

The group convened at MCA headquarters in Cairo from January15, 2004 for performance Factual Data collection

B. SUMMARY

On January 3, 2004, about 02:45:06 UTC, 04:45:06 Local time, Flash Airlines flight FSH604, a Boeing 737-300, Egyptian registration SU-ZCF, crashed into the Red Sea shortly after takeoff from Sharm el-Sheikh International Airport (SSH) in South Sinai, Egypt. The flight was a passenger charter flight to Charles de Gaulle Airport (CDG), France with a stopover in Cairo international Airport (CAI) for refueling. Flight 604 departed from Sharm el-Sheikh airport with 2 pilots (Captain and First Officer), 1 observer, 4 cabin crew, 6 off-duty crew members and 135 passengers on board. The airplane was destroyed due to impact forces with the Red Sea with no survivals.
The airplane had departed from Sharm el-Sheikh runway 22R and was air born at 02:42:33 UTC, approximately 2½ minutes prior to the crash, and had been cleared for a climbing left turn intercept the 306 radial from the Sharm el-Sheikh VOR station located just north of runway 22R. This climbing turn allows departing flights to gain sufficient altitude before proceeding over higher terrain located along the flight path to Cairo. Flight 604 was operating in Egyptian airspace as a charter flight operating under the provisions of Egyptian Civil Aviation Regulations Part 121

C. DETAILS OF THE INVESTIGATION

The purpose of the Aircraft Performance Group (ACPG) is to collect the factual information to determine and analyze the motion of the aircraft and the physical forces that produce that motion. In particular, the Group attempts to define the aircraft position and orientation throughout the flight, and determine its response to control inputs, system failures, external disturbances, or other factors that could affect its trajectory. The data the ACPG uses to obtain this information includes but is not limited to the following:

- Wreckage location and condition.
- Aircraft Surveillance Radar (ASR 12) Radar Data.
- Digital Flight Data Recorder (DFDR) data.
- Cockpit Voice Recorder (CVR) information.
- Weather information.
- Weight and Balance Data.
- Tests and Researches

C.1 Wreckage Location and Condition:

Refer to the Wreckage and Impact Factual Information

C.2 Radar Data

Sharm el-Sheikh Radar

- General Specifications:

ASR 12 Radar (Aircraft Surveillance Radar)
Secondary 250 nm
Primary 60 nm
15 Revolution Per minutes approximately (Scan time = 4.13 sec)
Radar site location: 2758.057n/ 03421.985e (Lat. 27.96762 Degree north, Long. 34.36642 Degree east)
Radar Elevation: 299.3 ft

- Radar data of accident flight

Ref Time 0 seconds at 02-44-00	Time	Flight Level	Target	Code	Target lat. Degree North	Target long. Degree East
27	02-44-27		275831n0342325e		27.971833	34.3875
29	02-44-29		275828n0342322e		27.971333	34.387
33	02-44-33		275816n0342306e		27.969333	34.384333
37	02-44-37		275808n0342257e		27.968	34.376167
41	02-44-41		275751n0342256e	airborn	27.9585	34.376
45	02-44-45	6	275751n0342256e	a	27.9585	34.376
49	02-44-49	10	275731n0342238e	a	27.955167	34.373
53	02-44-53	10	275721n0342231e	a	27.9535	34.371833
57	02-44-57	11	275711n0342221e	a	27.951833	34.370167
61	02-45-01	13	275700n0342209e	a	27.95	34.368167
65	02-45-05	15	275646n0342203e	a	27.941	34.367167
69	02-45-09	17	275621n0342208e	a	27.936833	34.368
73	02-45-13	17	275623n0342150e	a	27.937167	34.358333

77	02-45-17	18	275613n0342154e	a	27.9355	34.359
81	02-45-21	18	275605n0342154e	a	27.934167	34.359
85	02-45-25	20	275537n0342157e	a	27.922833	34.3595
89	02-45-29	21	275556n0342203e	a	27.926	34.367167
93	02-45-33	23	275509n0342211e	a	27.918167	34.3685
97	02-45-37	25	275501n0342219e	a	27.916833	34.369833
101	02-45-41	27	275442n0342220e	a	27.907	34.37
105	02-45-45	30	275431n0342237e	a	27.905167	34.372833
109	02-45-49	36	275412n0342243e	a	27.902	34.373833
113	02-45-53	36	275414n0342256e	a	27.902333	34.376
117	02-45-57	39	275353n0342307e	a	27.892167	34.3845
121	02-46-01	42	275340n0342315e	a	27.89	34.385833
125	02-46-05	44	275330n0342320e	a	27.888333	34.386667
129	02-46-09	47	275325n0342329e	a	27.8875	34.388167
133	02-46-13	50	275309n0342337e	a	27.884833	34.3895
137	02-46-17	50	275254n0342341e	a	27.875667	34.390167
141	02-46-21	51	275252n0342340e	a	27.875333	34.39
145	02-46-25	51	275228n0342346e	a	27.871333	34.391
149	02-46-29	53	275220n0342345e	a	27.87	34.390833
153	02-46-33	52	275202n0342336e	a	27.867	34.389333
157	02-46-37	51	275144n0342317e	a	27.857333	34.386167
159	02-46-39	46	275156n0342325e	a	27.859333	34.3875
161	02-46-41	46	275139n0342320e	a	27.8565	34.386667
165	02-46-45	46	275141n0342248e	a	27.856833	34.374667
167	02-46-47	46	275159n0342236e	n	27.859833	34.372667
169	02-46-49	46	275201n0342227e	n	27.866833	34.371167
173	02-46-53	46	275208n0342207e	n	27.868	34.367833
177	02-46-57	46	275222n0342153e	n	27.870333	34.358833
181	02-47-01	46	275231n0342143e	n	27.871833	34.357167
185	02-47-05	46	275242n0342115e	n	27.873667	34.3525
189	02-47-09	46	275255n0342100e	n ---- missing SSR code	27.875833	34.35
191	02-47-13		275307n0342037e	missing beacon	27.8845	34.3395
207	02-47-27		275319n0342032e	Disappearance	27.8865	34.338667

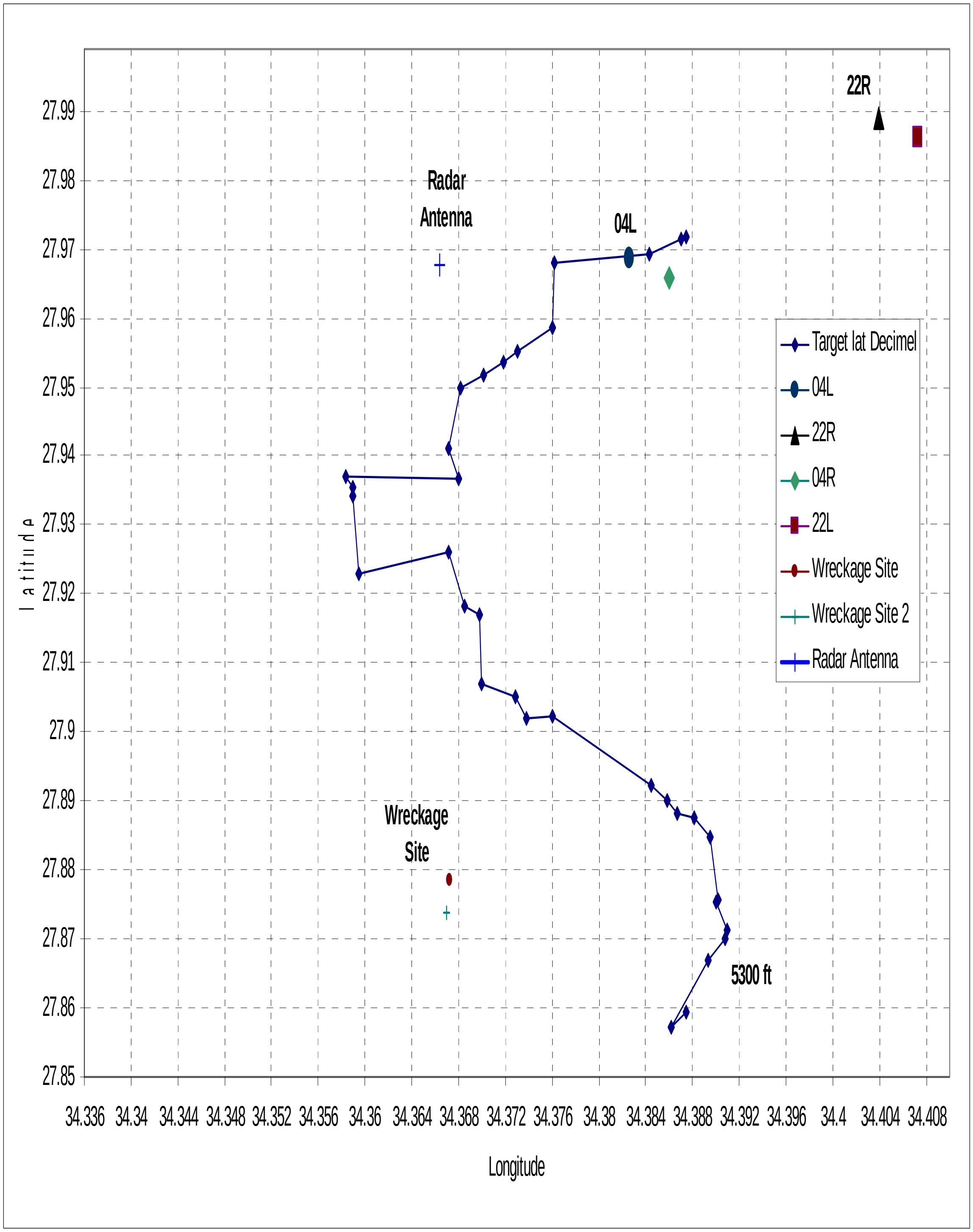


Figure C.2-1 Radar Data Plot, Sharm El Sheik Radar

Hurgada Radar

- General Specifications:

Radar site location: 2711.546N/03346.814E (Lat. 27.19243333 Degree north, Long. 33.78023 Degree east)

Radar Elevation: 176.344 ft

- Radar data of accident flight:

Ref Time 0 seconds at 02-44-00	Time	Events & Altitude	Coordinates	Code	Target lat. Degree North	Target long. Degree East
51	02 44 51	Initial Detection	275723N0342239E		34.37316667	27.95383333
53	02 44 53		275721N0342241E		34.3735	27.9535
57	02 44 57		275722N0342239E		34.37316667	27.95366667
61	02 45 01		275722N0342237E		34.37283333	27.95366667
65	02 45 05		275723N0342238E		34.373	27.95383333
69	02 45 09		275640N0342206E		34.36766667	27.94
72	02 45 12	1900ft	275616N0342159E	c	34.35983333	27.936
73	02 45 13	2000ft	275613N0342157E	c	34.3595	27.9355
77	02 45 17	2000ft	275605N0342150E	c	34.35833333	27.93416667
81	02 45 21	2100ft	275546N0342153E	c	34.35883333	27.92433333
85	02 45 25	2200ft	275538N0342159E	c	34.35983333	27.923
89	02 45 29	2300ft	275517N0342211E	c	34.3685	27.9195
93	02 45 33	2500ft	275506N0342213E	c	34.36883333	27.91766667
97	02 45 37	2700ft	275447N0342225E	c	34.37083333	27.90783333
101	02 45 41	2900ft	275434N0342231E	c	34.37183333	27.90566667
105	02 45 45	3200ft	275425N0342239E	c	34.37316667	27.90416667
109	02 45 49	3500ft	275407N0342246E	c	34.37433333	27.90116667
113	02 45 53	3800ft	275357N0342254E	c	34.37566667	27.89283333
117	02 45 57	4100ft	275345N0342304E	c	34.384	27.89083333
121	02 46 01	4300ft	275330N0342315E	a	34.38583333	27.88833333
125	02 46 05	4600ft	275328N0342318E	a	34.38633333	27.888
129	02 46 09	4900ft	275311N0342333E	a	34.38883333	27.88516667
133	02 46 13	5000ft	275257N0342341E	a	34.39016667	27.87616667
137	02 46 17	5100ft	275249N0342342E	a	34.39033333	27.87483333
141	02 46 21	5300ft	275232N0342353E	a	34.39216667	27.872
145	02 46 25	5300ft	275223N0342403E	a	34.4005	27.8705
148	02 46 28	Max. Alt.	275205N0342345E	a	34.39083333	27.8675

		5400ft				
149	02 46 29	5400ft	275206N0342357E	a	34.39283333	27.86766667
153	02 46 33	5300ft	275149N0342334E	a	34.389	27.85816667
157	02 46 37	5100ft	275143N0342317E	a	34.38616667	27.85716667
161	02 46 41	Descending 4600ft	275129N0342307E	a	34.3845	27.85483333
165	02 46 45	Still 4600ft	275136N0342254E	a	34.37566667	27.856
168	02 46 48	Still 4600ft	275123N0342234E	n	34.37233333	27.85383333
169	02 46 49	Still 4600ft	275125N0342235E	n	34.3725	27.85416667
173	02 46 53	Still 4600ft	275203N0342214E	n	34.369	27.86716667
177	02 46 57	Still 4600ft	275206N0342153E	n	34.35883333	27.86766667
181	02 47 01	Still 4600ft	275208N0342143E	n	34.35716667	27.868
185	02 47 05	Still 4600ft	275212N0342119E	n	34.35316667	27.86866667
188	02 47 08	Missing SSR&Still 4600ft	275213N0342105E	n	34.35083333	27.86883333

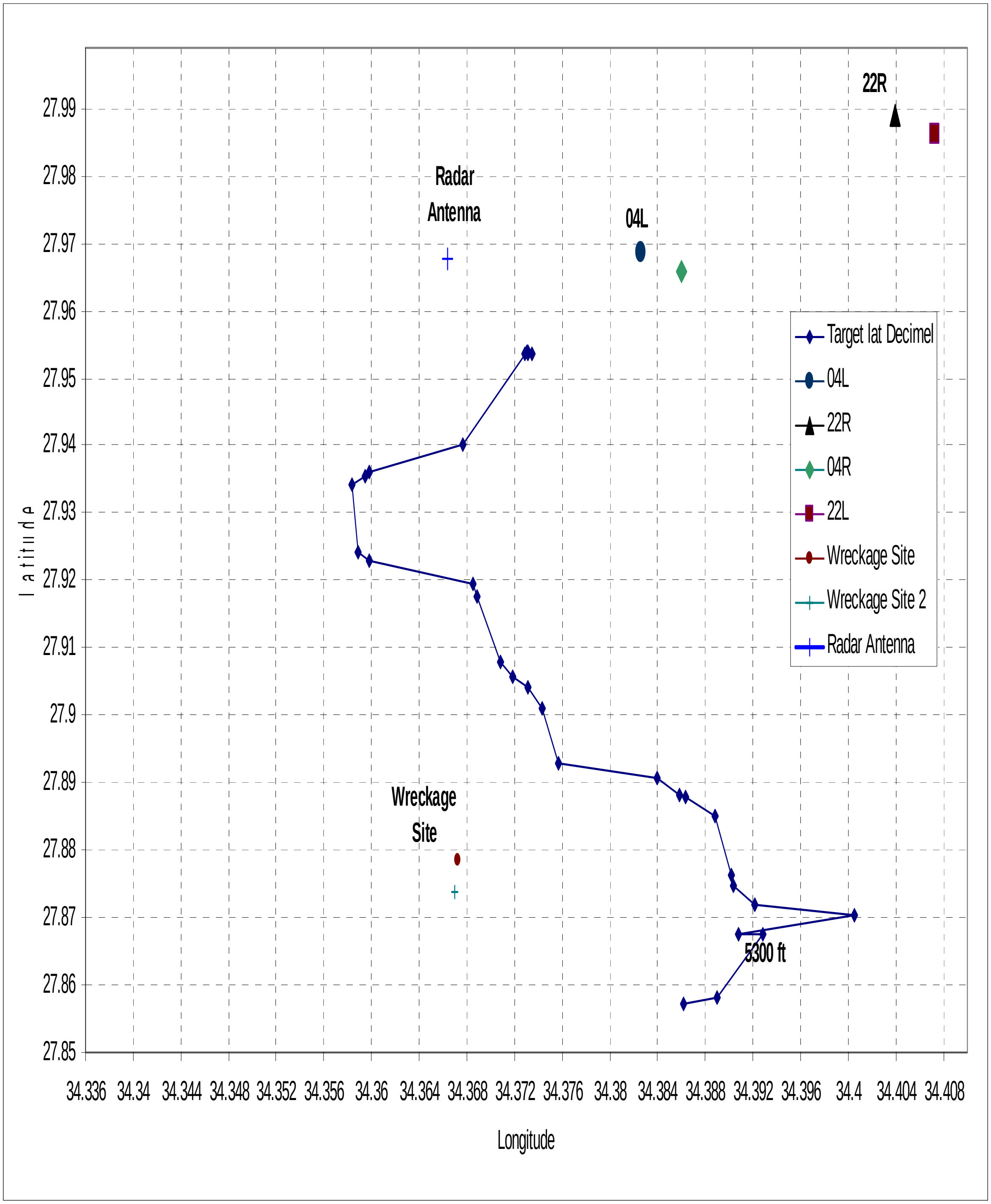


Figure C.2-2 Radar Data Plot, Hurgada Radar

ASR 12 Radar (Aircraft Surveillance Radar) Specifications :

Secondary 250 nm
Primary 60 nm
15 Revolution Per minutes approximately (Scan time = 4.13 sec)

Field	Valid Field Variables	Data Field Description
1	A-Z, 0-9	Aircraft flight identifier or callsign
2	#, *, +, or blank	Special processing indicator: # = track is inhibited from CA processing, either with another specified track or with all other tracks * = track is inhibited from MSAW processing + = track is inhibited from both CA and MSAW processing blank = track is subject to both CA and MSAW processing
3	H, M, or L	Aircraft wake indicator: H = heavy M = medium L = light
4	000-999 or ••••	Cleared level: NNN= assigned altitude in hundreds of feet •••• = altitude unavailable or less than sea level
5	T, ↑, ↓, or blank	Cleared level qualifier: T = temporary altitude ↑ = vertical movement of track - climbing ↓ = vertical movement of track - descending blank= permanent cleared level
6	000-999 or ••••	Reported altitude: NNN= reported altitude in hundreds of feet 999 = altitude greater than 99,900 feet •••• = altitude unavailable, altitude less than sea level or altitude has not been updated for approximately 15 seconds
7	a, C, E, e, N, n, or blank	Altitude transition indicator:

a = indicates altitude source is mode C, aircraft is below adapted transition level and altitude is in hundreds of feet above mean sea level

C = indicates altitude source is mode C, aircraft is above adapted transition level and altitude is in flight levels

E = indicates altitude source is manually entered, aircraft is above adapted transition level and altitude is in flight levels

e = indicates altitude source is manually entered, aircraft is below adapted transition level and altitude is in hundreds of feet above mean sea level

Field	Valid Field Variables	Data Field Description
7 (Cont.)	a, C, E, e, N, n, or blank	Altitude transition indicator: N = indicates mode C altitude has not been updated for approximately 7.5 seconds and is considered unreliable, aircraft is above adapted transition level and altitude is in flight levels n = indicates mode C altitude has not been updated for approximately 7.5 seconds and is considered unreliable, aircraft is below adapted transition level and altitude is in hundreds of feet above mean sea level blank= no data is available or altitude data has not been manually entered
8	0000-7777 (octal)	Reported code
9	0000-9999	Track ground speed in knots
10	0000-7777 (octal)	Assigned code
11	A-Z, 0-9	Aircraft type (field is blank for manually created sim tracks)
12	A-Z, 0-9	Destination aerodrome or last adapted point on flight plan route (XXXX)
13	A-Z, 0-9	Scratch pad note entered by controlling operator (XXXXXX)

C3. Digital Flight Data Recorder (DFDR) data.

Refer to FDR Factual Report

C4. Cockpit Voice Recorder (CVR) information.

Refer to FDR Factual Report

C5. Weather Information

Sharm El Sheikh does not provide Automatic Terminal Information Service (ATIS).

The SSH weather at 0200Z was reported as:
270 degrees at 06 knots, ceiling and visibility OK (CAVOK), temperature 17 degrees Celsius, dew point minus 6 degree Celsius, altimeter 1011 HectoPascals (hPa), No significant change (NOSIG).

The SSH weather at 0300Z was reported as:
280 degrees at 08 knots, ceiling and visibility OK (CAVOK), temperature 17 degrees Celsius, dew point minus 6 degree Celsius, altimeter 1011 HectoPascals (hPa), No significant change (NOSIG).

C6. Weight and Balance Data.

According to the Egyptian Civil Aviation Regulations, ECAR 91 Appendix H attachment 1 the aircraft has to be reweighed every three years. Furthermore, aircraft must be reweighed if the effect of modifications on the mass and balance is not accurately known. Flash Airlines aircraft was weighed last time on December 19, 2002 in Braathens SAFE, Stavangar, Norway and recalculated by Flash Airlines after the reinforced cockpit door modification installation on November 1st, 2003, and the results were as follows.

Empty Weight	:	70794 lbs
Moment	:	45921358.6 lb.in
% AMC	:	17.42%

The Flash Airlines weight and balance calculations provided to the flight crew contained the following information[1]:

	Weight (kilograms)	
Total Traffic Load	11,450[2]	
Dry Operating Mass	33,200	
Actual Zero Fuel Mass	44,650	
Maximum Zero Fuel Mass	47,627	
Takeoff Fuel	7,000	
Actual Takeoff Mass	51,650	
Maximum Takeoff Mass (Certificate Limi	63,276	
Landing Mass	49,650	
Maximum Landing Mass (Certificate Limi	51,709	

Zero Fuel Mass Center of Gravity (CG)	20.0%	
Zero Fuel Mass CG Limits[3]	8.0% Forward	28.4% Aft
Takeoff Mass CG	18.0%	
Takeoff Mass CG Limits[4]	6.7% Forward	27.9% Aft

[1] See attached Flash Airlines Load and Trim Sheet.

[2] A review of the Load and Trim Sheet indicated a low 100-kilogram error. The total cargo weight plus passenger mass (Total Traffic Load) should be 11,550 kilograms. Correspondingly, the Zero Fuel Mass, Takeoff Mass, and Landing Mass will be low in error by the same 100-kilogram Mass.

[3] Estimated Zero Fuel Mass CG limits were derived from Flash Airlines Load and Trim sheet index chart based upon a Zero Fuel Mass of 44,650 kilograms.

Stabilizer Trim settings for takeoff were:

Flaps 1 or 5 4 ¾ Units
Flaps 15 3 ¾ Units

According to the Flash Airlines Flight Operations Manual Chapter 6, Paragraph 6.1.8.3, Passenger and Baggage Masses, the following chart was published:

	Male	Female
All flights except	88kg	70kg
Holiday	83kg	69kg
Children	35kg	35kg

A review of the accident Load and Trim Sheet indicated a Passenger Mass of 9,450kg. If 350kg is removed for 10 children (10 x 35kg) the result is 9,100kg. Dividing the 125 adult passengers into the 9,100kg would give an average value of 72.8kg per adult passenger.

Using the table above, and assuming 50% Male and 50% Female adult passengers, the worst-case difference in weight calculation would be the following:

The average weight of male and female for all flights except would be 88kg + 70kg / 2 = 79kg per adult passenger.

79kg x 125 passengers = 9,875kg

The represents an increase in weight of 775kg.

Using this value for Load and Trim calculations provided the following information:

Takeoff CG 18.2%MAC
Zero Fuel Mass CG 20% MAC
Takeoff Trim (flaps 5) 4 ¾ Units

These worst-case differences in values for passenger weight still fall within structural and calculated limitations for the airplane.

[4] Estimated Takeoff Mass CG limits were derived from Flash Airlines Load and Trim sheet index chart based upon a Takeoff Mass of 51,650 kilograms.

DRY OPERATING MASS	33200	MAXIMUM MASSES FOR	ZERO FUEL 47027	TAKEOFF 62176	LANDING 51709	
Takeoff Fuel	7000	→	7000		Trip Fuel 2000	
		Allowed Mass for Takeoff Lowest of a.b.c	54027	62176	53709	
OPERATING MASS	40200	→			40200	
		Allowed Trafic Load			13509	
Notes: TTL PAX : 135 / PCS : 136		Total Trafic Load			11450	
TOTAL PSGR O/B		UNDERLOAD			2059	

TOTAL FUEL INDEX TABLE

MASS (KG)	Index units	MASS (KG)	Index units
500	-0.7	9000	+0.8
1000	-1.3	9111 ①	+0.7
1500	-1.7	9500	-0.1
2000	-2.1	10000	-0.7
2500	-2.4	10500	-1.5
3000	-2.7	11000	-2.3
3500	-3.0	11500	-3.0
4000	-3.2	12000	-3.8
4500	-3.4	12500	-4.6
5000	-3.6	13000	-5.3
5500	-3.7	13500	-6.1
6000	-3.7	14000	-6.9
6500	-3.6	14500	-7.6
7000	-3.4	15000	-8.4
7500	-3.0	15500	-9.2
8000	-2.1	16000	-10.2
8500	-1.0	16140 ②	-10.6

① TANKS 1 & 2 FULL
② TANKS 1, 2 & CTR TANK FULL

Dest	No of PSGR AD(s)	CH	I		TOTAL	FWD CARGO (1)	AFT CARGO (2)
				Tr			
CDG	125	10	0	B	2100	700	1400
				C			
				T			

Dest	No of PSGR AD(s)	CH	I		TOTAL	FWD CARGO 1	AFT CARGO 2
				Tr			
				B			
				C			
				T			

Total		
		2100
Passenger Mass	+	9450
TOTAL TRAFFIC LOAD	=	11450
Dry Operating Mass	+	33200
ZERO FUEL MASS Max 47027	=	44650
Takeoff Fuel	+	7000
TAKEOFF MASS Max 62176	=	51650
Trip Fuel		2000
LANDING MASS Max 51709	=	49650

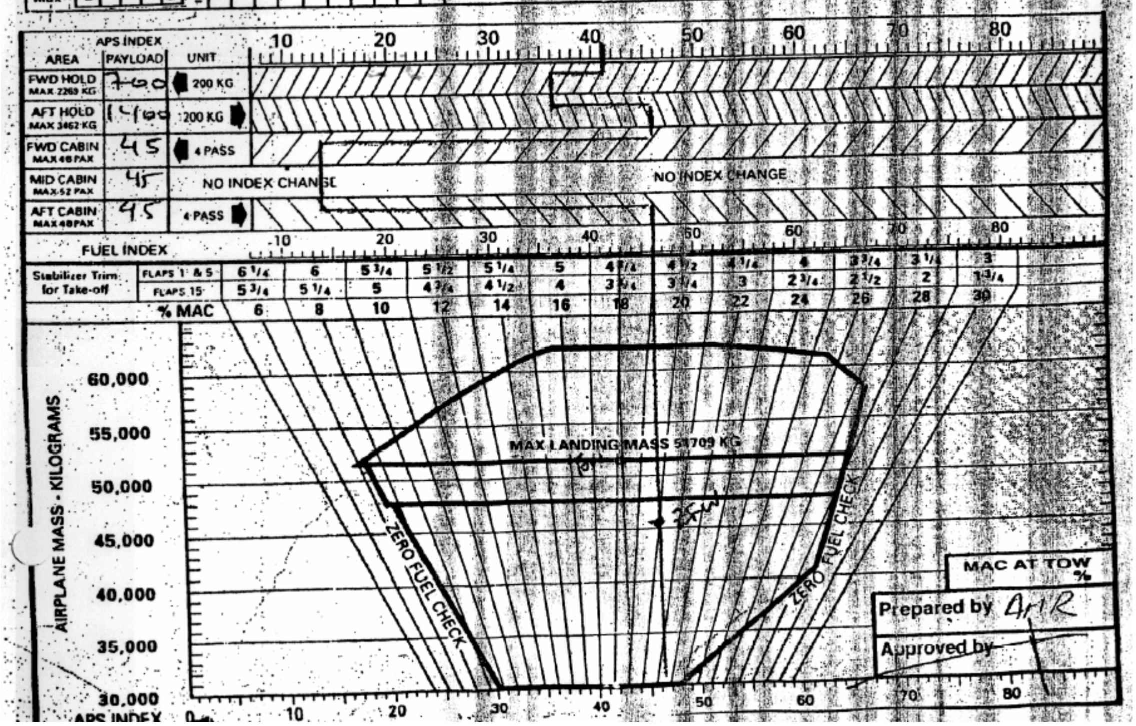
NOTES D.I 41,0 FT -3.6

BALANCE ARM - INCHES 200 300 400 500 600 700 800 900 1000 1100

FWD CABIN — MID CABIN — AFT CABIN

FWD HOLD — AFT HOLD

ALL MASSES IN KILOGRAMS



C7. Tests and Research

The FDR records the movements of the pilot's controls (e.g. control column, control wheel position and rudder pedals), the movement of the control surfaces (e.g. elevator, aileron and rudder) as well as motion of the airplane (e.g. pitch and roll attitude and heading angle). The performance evaluation was conducted to determine if the control surfaces were responding normally to the pilot's controls and if the airplane was responding normally to movement of the control surfaces.

In order to accomplish this work, Boeing's 737-300 aerodynamic simulation model was used to recreate the accident flight. The simulation calculates the response of the airplane to movement of the flight control surfaces – for example, it can calculate the roll rate resulting from a 10 degree deflection of the ailerons. The simulation has been verified by comparison against actual flight test data and was used for the design and certification of the 737-300 airplane. In addition, the simulation is the basis for 737-300 crew training simulators used around the world. It should be noted that the 737-300 simulation model is essentially a computer program that represents a nominal airplane with nominal engines. Small differences between the simulation and individual airplane's behavior are common and expected due to differences in control surface rigging, engine wear, and other normal tolerances.

Performance Evaluation

FDR data are recorded at relatively low sample rates and are recorded from different sources, some of which have inherent biases. Because of these issues, a kinematic consistency (KINCON) process was used to supplement the FDR data and calculate additional parameters to be used in the performance analysis. Kinematic consistency analysis is a general practice for processing flight data (either flight test data or FDR data) to ensure consistency of position, speed, and acceleration data.

C7.1 Baseline Simulation

A baseline simulation recreation of the accident flight was started just as the airplane turned onto the runway and the throttles were advanced, and the simulation was stopped at the end of the FDR data. Because the simulation can calculate the response of the airplane to control inputs, a set of control input time histories (column, wheel, and rudder movements) can be determined that results in the simulation following the same path as the accident airplane. It is important to note that this process does not use the control or surface position data recorded on the FDR, only the path information (e.g. accelerations, attitude and altitude).

Comparisons between the recorded FDR data and the simulation time history data are provided for longitudinal and lateral/directional data in Figures Figure C7-1 and Figure C7-2 respectively.

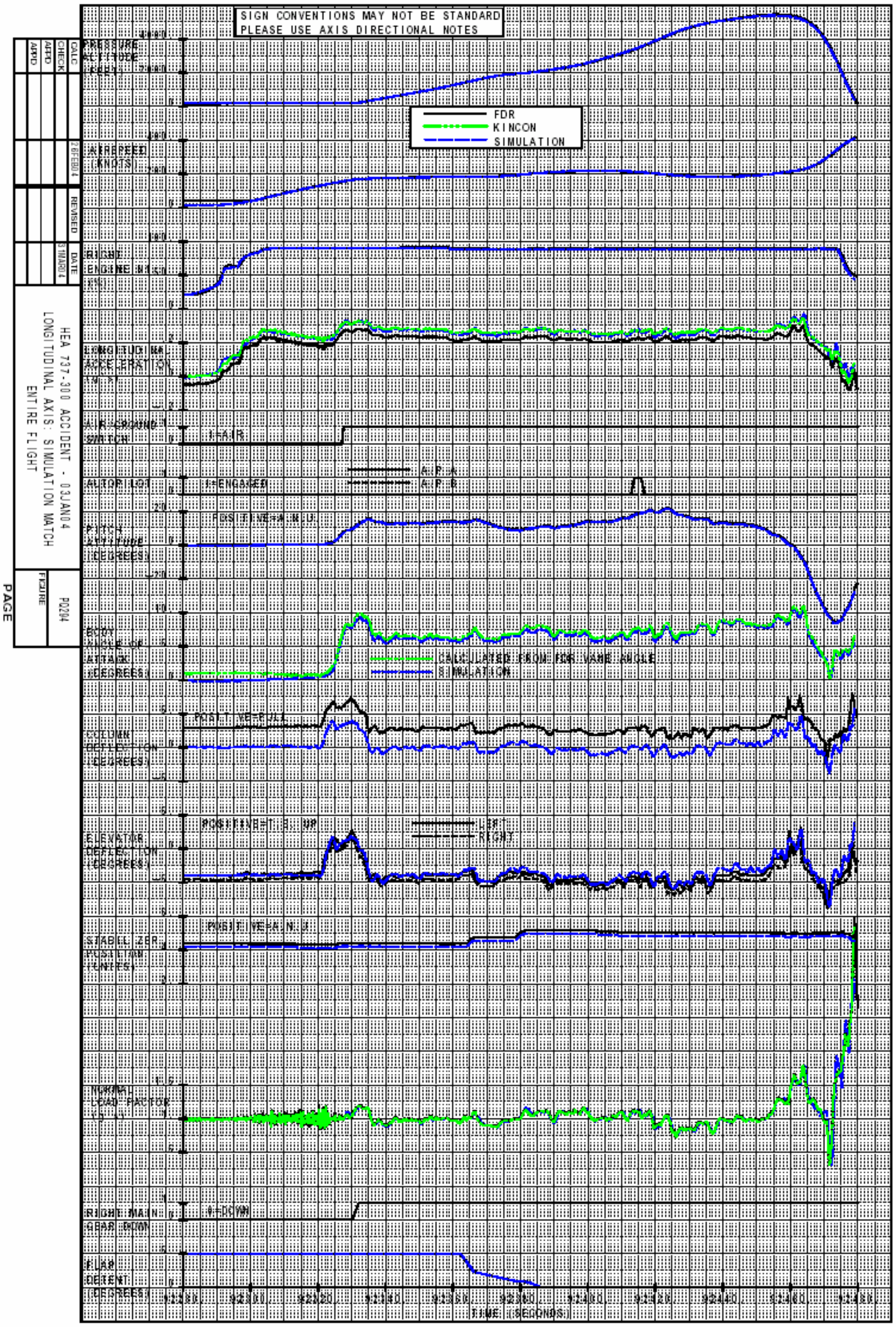


Figure C7-1 – FDR and Simulation Match Data – Longitudinal Axis

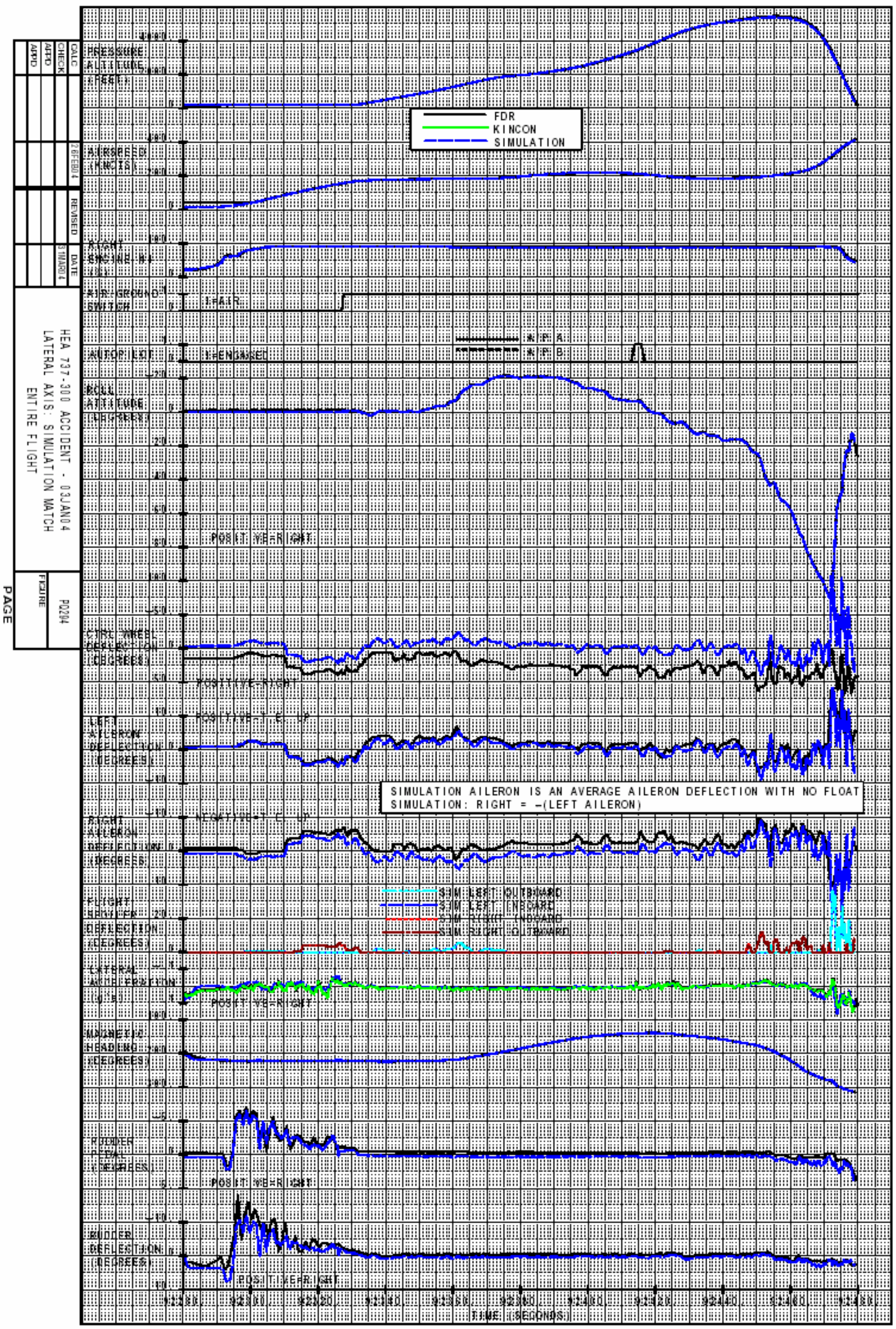


Figure C7-2 – FDR and Simulation Match Data – Lateral/Directional Axis

An examination of the baseline simulation revealed that the path of the accident airplane is consistent with the recorded motion of the control surfaces. Specifically, the extreme bank attitude that occurs towards the end of the flight is consistent with recorded motion of the ailerons.

The simulation also revealed that the motion of the control surfaces is consistent with the recorded motion of the control inputs, with the exception of control wheel

C7.2 Hypothetical Faults resulting in a rolling moment

Several hypothetical airplane system faults were examined to determine if any could have resulted in the right roll behavior recorded on the FDR. These faults included:

- Uncommanded deployment of the #1 slat
- Uncommanded spoiler deflection to full travel (hardover)
- A spoiler disconnected from its actuator (spoiler float)
- Flap asymmetry
- Thrust asymmetry
- Unrecorded rudder motion

The hypothetical faults listed above are similar in that they each create a rolling moment unrelated to the position of the ailerons that will cause the airplane to bank. That is to say, if one of these faults had occurred, the path of the airplane would have differed from that predicted by the recorded position of the ailerons.

Multi-Purpose Engineering Cab Simulator

Additional tests were conducted at Boeing's multi-purpose engineering cab simulator or M-Cab. The M-Cab is similar to a flight crew training simulator in that it consists of a realistic flight deck mounted on a movable base. The M-Cab includes a visual system providing out-the-window views to the flight crew. Because the M-Cab is used to simulate the flight deck of many different Boeing models, actual flight instruments are not used. Instead, a large LCD display is programmed to simulate the flight instrument displays. Examples of the M-Cab's flight instrument displays for the 737-300 are shown in section 1.6.2.

Major differences between the M-Cab and a typical flight crew training simulator are listed below.

- The M-Cab can simulate different model airplanes including 707, 727, 737, 747, 757, 767, and 777.
- The M-Cab can be reprogrammed to simulate a wide variety of hypothetical aircraft system faults.
- The M-Cab can be "backdriven" to reproduce recorded data, such as the simulation match to the accident flight discussed in section 1.16.2. In addition, the backdrive can be interrupted at any point with a transition to normal simulator operation at the current flight conditions. This capability (known as "breakout" allows pilots in the simulator to attempt to recover the airplane from various points in the accident profile.
- The operation of the M-Cab is recorded at a high sample rate

The M-Cab was used to recreate the accident flight as well as to study a number of hypothetical airplane system faults.

Tests conducted in the M-Cab

The M-Cab was used to examine some of the faults mentioned in section 1.16.3, as well as a number of other hypothetical faults affecting the lateral control system or the autopilot system. M-Cab tests included:

- Backdrive of FDR data
- Backdrive with breakout at 02:44:44
- Backdrive with breakout at 02:44:56
- Spoiler float
- Uncommanded aileron trim to full authority
- Uncommanded aileron trim to half authority
- Autopilot servo actuator hardover without force limiter engaged
- Autopilot servo actuator hardover with force limiter engaged
- Autopilot servo actuator hardover with pressure regulator and relief valve inoperative

The tests in the M-Cab were conducted with an out-the-window scene equivalent to that available to the accident pilots with the following exceptions:

1) The visibility conditions simulated (ceiling and visibility unlimited at night with no moon) were those reported at the airport at the time of the accident. Actual visibility conditions on the flight deck at the time of the accident are unknown.
2) The ground in the vicinity of Sharm el-Sheikh was depicted through the use of satellite photography taken during daylight hours. It did not represent the nighttime scene of street lights, building lights, etc. against an otherwise dark landscape.

Exhibit E

Site and Wreckage Group Factual Report

Site and Wreckage Group Report

1. Summary of the Accident

On 3 January 2004, Flash Airlines flight FSH604, a Boeing 737-300 registered as SU-ZCF, operating as a chartered flight from Sharm el-Sheikh, Egypt to Paris, France, via Cairo departed from Sharm el-Sheikh airport (SSH) at approximately 02:40 UTC. The airplane crashed into the Red Sea approximately 6 nautical miles southwest of the airport at approximately 02:44 UTC.

2. Scope of Site and Wreckage Group Field Notes

The scope of this report is the recovery operations that took place from 3 January 2004 through 28 January 2004 in the Red Sea off Sharm el-Sheikh, Egypt and initial inspection for the recovered parts. Recovery operations initially consisted of the recovery of floating wreckage elements only. Recovery of the underwater wreckage (including FDR and CVR) began when the first ship equipped with a suitable Remote Operated Vehicle (ROV), arrived at the accident scene on 11 January 2004.

This report provides a summary of the recovery operations and documents the wreckage that was identified and recovered.

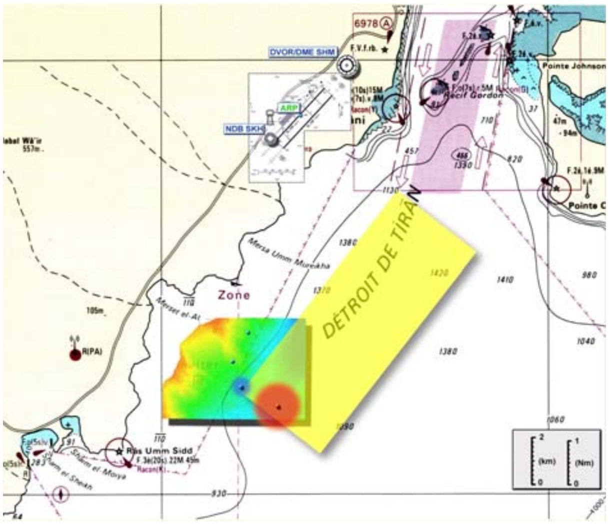
3. Recovery Operations

3.1 Survival aspects

The initial search for possible survivors and the recovery of bodies were priorities for the rescue and investigation teams. Rescue teams were on site minutes after the accident. They searched for survivors but due to the high energy impact of the aircraft with the sea surface, the depth of the water in this area, their efforts were unsuccessful in recovering any survivors.

Efforts were made to locate human remains by use of deep sea cameras and robots but were also not successful due to the location of the wreckage and the depth of more than 1000 meters.

3.2 Floating Wreckage



The floating wreckage which was recovered shortly after the crash was stored in a hangar in Sharm el-Sheikh airport. On 11 January 2004, the Site and Recovery Group met in the hangar for wreckage inspection. The wreckage was then identified (as much as possible), inspected, segregated (aircraft parts or personal effects). Later, the personal effects were transferred to the Egyptian Legal Authority in Sharm el-Sheikh. A database for the floating wreckage was created (including wreckage pictures).

3.3 Underwater Wreckage

Because of the depth of the Red Sea in the area where the accident occurred (approximately 1000 meters), specialized recovery resources were required for the submerged wreckage. The French vessels “Ile de Batz” and “Janus II” were contracted to conduct the underwater wreckage survey and recovery. Both vessels were equipped with deep water recovery capabilities consisting of submersible Remotely Operated Vehicles (ROV). The necessary support equipment to accurately locate and map the airplane wreckage was provided by the French Navy. An oceanographic vessel, the “Beautemps-Beaupré” was sent to the accident site to undertake a bathymetry (depth mapping) of the seabed and a survey of tidal currents.

3.4 FDR / CVR Recovery

The initial focus of the underwater recovery operation was finding and retrieving the protected recorders, the Cockpit Voice Recorder (CVR) and Flight Data Recorder (FDR) and mapping the searched areas. Each recorder is equipped with an acoustic transmitter, called a “pinger” that transmits a detection signal that can be used to locate the box. Based on the initial determination of pinger locations, the ROV from Ile de- Batz, Scorpio, began a visual search using its cameras to find the recorders. To refine the location of the pingers, a network of sonobuoys (GIB, GPS Intelligent Buoys), (see Exhibit E Attachment 4 for detailed description of this operation), was employed in a cooperative effort between the French and Egyptian Navies. This method produced a new pinger position accurate to within 10 meters and the ROV was moved to the new location. A visual search of a grid created around the new pinger location resulted in discovery of the FDR on 16 January 2004. The FDR was recovered by the ROV and taken onboard the Ile de Batz. Custody of the recorder was transferred to the Investigator in Charge (IIC) at the port of Sharm El Sheikh.

The pinger of the second recorder (CVR) was initially identified approximately 800 meters north of the first pinger. However, it was decided to continue the visual search using grids in the area where the first recorder was found. This search was successful and resulted in finding of the CVR on 17 January 2004 (approximately 24 hours after the FDR). It was also taken onboard the Ile de Batz and custody was transferred to the Investigator in Charge (IIC) at the port of Sharm El Sheikh.

FDR underwater Location: N27 52.3605, E34 22.0165.
CVR underwater Location: N27 52.3467, E34 22.0207.

The recorders were both sent to Cairo for read out and analysis.

The focus of the recovery operation then changed to detailed mapping of the wreckage and recovery of selected airplane equipment. In addition, the recovery operation included recovery of any equipment deemed important to the investigation based on the review of the FDR and CVR in Cairo.

3.5 Wreckage Mapping

During the structured search for the recorders, the position (latitude and longitude) and description of surveyed wreckage was recorded. Following recovery of the FDR and CVR, additional grids were defined for ROV operations. These grids were used to systematically survey and document the entire wreckage area. The positions of large pieces, such as the three landing gears and the cores of the two engines were identified.

Data from both ships involved in mapping and recovery were consolidated into a single listing of all surveyed wreckage, which is included herein as Exhibit E Attachment 5.

The distribution of wreckage is included within a rectangle of approximately 275 by 440 meters defined by the following corner point coordinates:

North corner:	N 27°52,559 E 34°21,933
East corner:	N 27°52,410 E 34°22,126
South corner:	N 27°52,294 E 34°22,022
West corner:	N 27°52,450 E 34°21,817

Multiple surveys of the area confirmed the containment of the wreckage within these established boundaries.

3.6 Recovered Wreckage

The investigation team developed a strategy for wreckage recovery based on the review of the FDR and CVR undertaken in Cairo. Flight control actuation components and flight deck systems were considered as a priority.

A system was developed for recording the description, external dimensions and the location, in latitude and longitude coordinates, of all recovered wreckage pieces. A database of recovered floating wreckage is included herein as Exhibit E Attachment 5. Another database documenting all wreckage recovered by Ile de Batz and Janus II is included as Exhibit E Attachment 5. Both databases reference digital images of all floating and recovered wreckage.

Recovered wreckage was stored aboard the ships in sea water until taken ashore and loaded onto trucks. All of the recovered wreckage is stored in a hangar at Sharm El Sheikh Airport and is under the control of the investigative authorities.

4. Partial list of the Recovered Wreckage

- Parts of the horizontal stabilizer central section structure (called “Texas Star”), elements of the elevator structure and components of the elevator control system, including both elevator PCU's (Power Control Unit), both autopilot actuators, the feel and centering unit including the feel actuator.
- Horizontal stabilizer jackscrew and actuator gearbox.

- Vertical stabilizer structure with rudder control system components, including the main rudder PCU and standby rudder PCU, the feel and centering mechanism and with the trim actuator.
- Aileron PCU, spoiler mixer and TBD spoiler actuators.

5. Initial observations

- The two engines were found approximately 24 meters apart
- The left and right main landing gear assemblies were found in between the two engines
- The recovered thrust reverser actuator was found retracted
- The recovered leading edge flap actuator was found retracted
- The recovered trailing edge flap jackscrew indicates that flaps were retracted
- The stabilizer jackscrew was measured at 7.5 inches between the flat of the ball nut and the flat of the end stop which corresponds to a stabilizer leading edge position between 2 and 3 degrees down or a trim unit setting between 5 and 6 pilot units.[1]

6. Wreckage Data bases and Photos

The full data base and photos of the wreckage are on a CD, which is available at the Egyptian Civil Aviation Ministry (MCA). This CD contains:

a. A folder with three Excel files for wreckage complete data base.
    i. Floating Wreckage data base.
    ii. Recovered Wreckage data base.
    iii. Underwater Surveyed Wreckage data base.

b. A folder for photos with four sub-folders
    i. Floating Wreckage Photos: 104 photos.
    ii. Recovered Wreckage Photos: 98 photos.
    iii. Underwater Surveyed Wreckage Photos: 330 photos.
    iv. Wreckage Recovery Process Photos: 25 photos

[1] B737-300 Aircraft Maintenance Manual 27-41-00

Exhibit E
Attachment 1

Water Depth at Sharm el-Sheikh

Water Depth at Sharm el-Sheikh

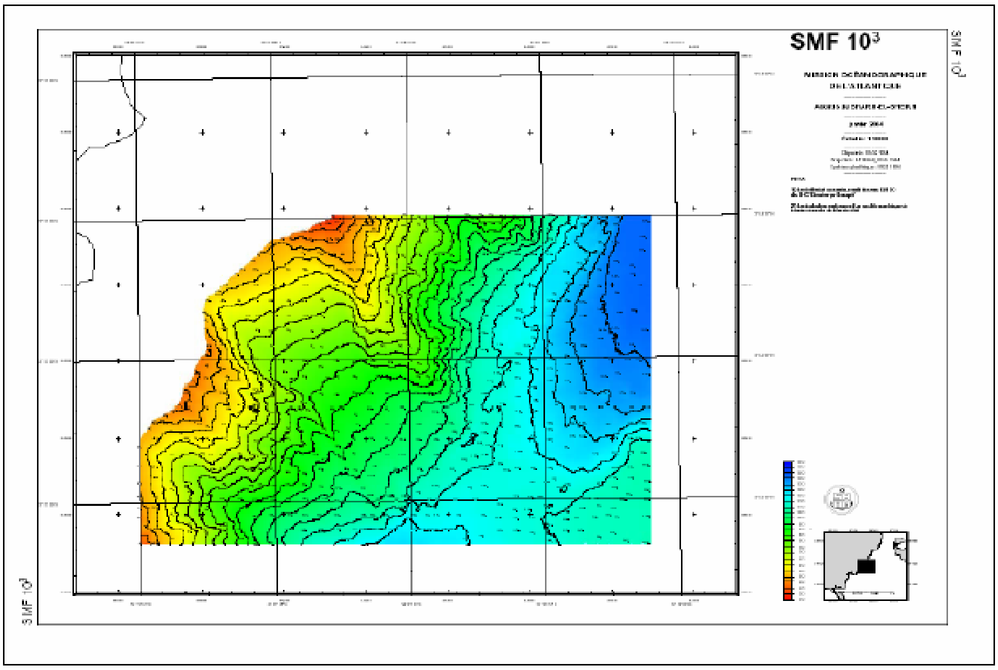
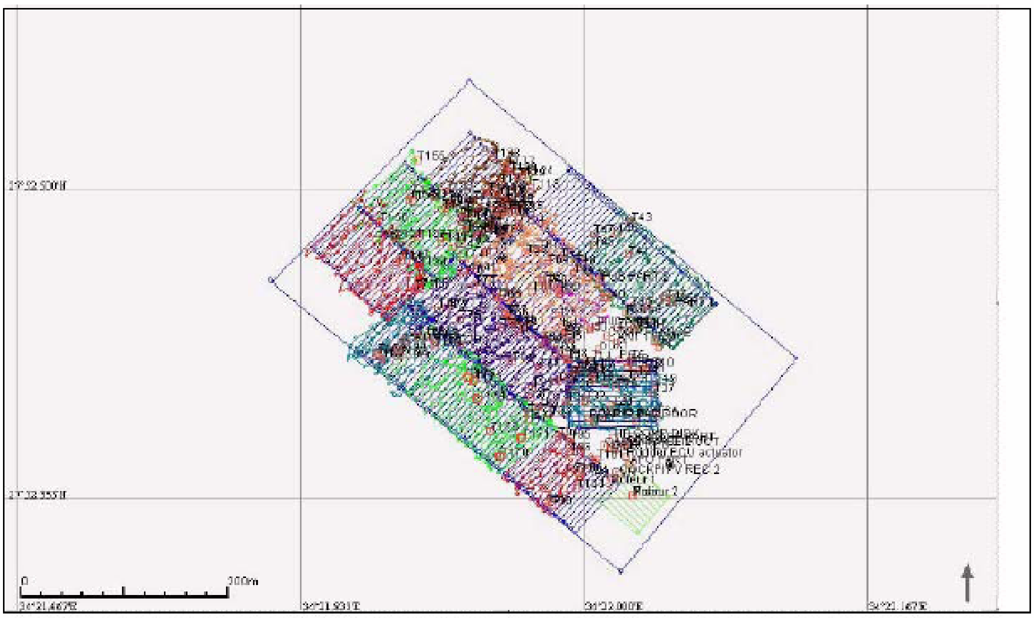


Exhibit E
Attachment 2

Search Areas

Search Areas



Total Search Areas with ROV Search Lines

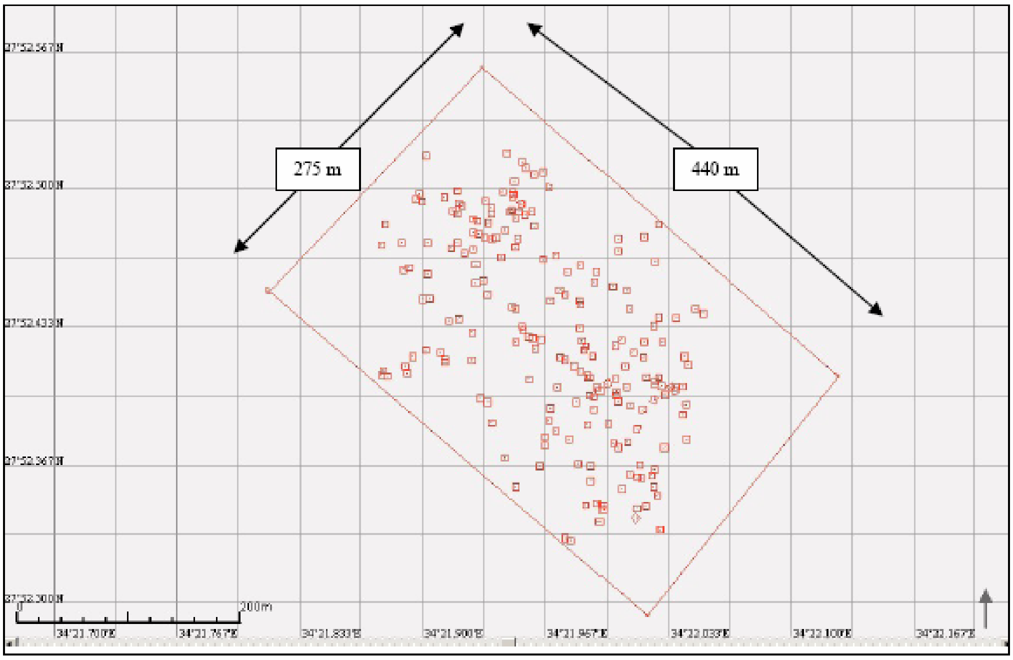


Exhibit E
Attachment 3

FDR and CVR Locations

FDR and CVR Locations

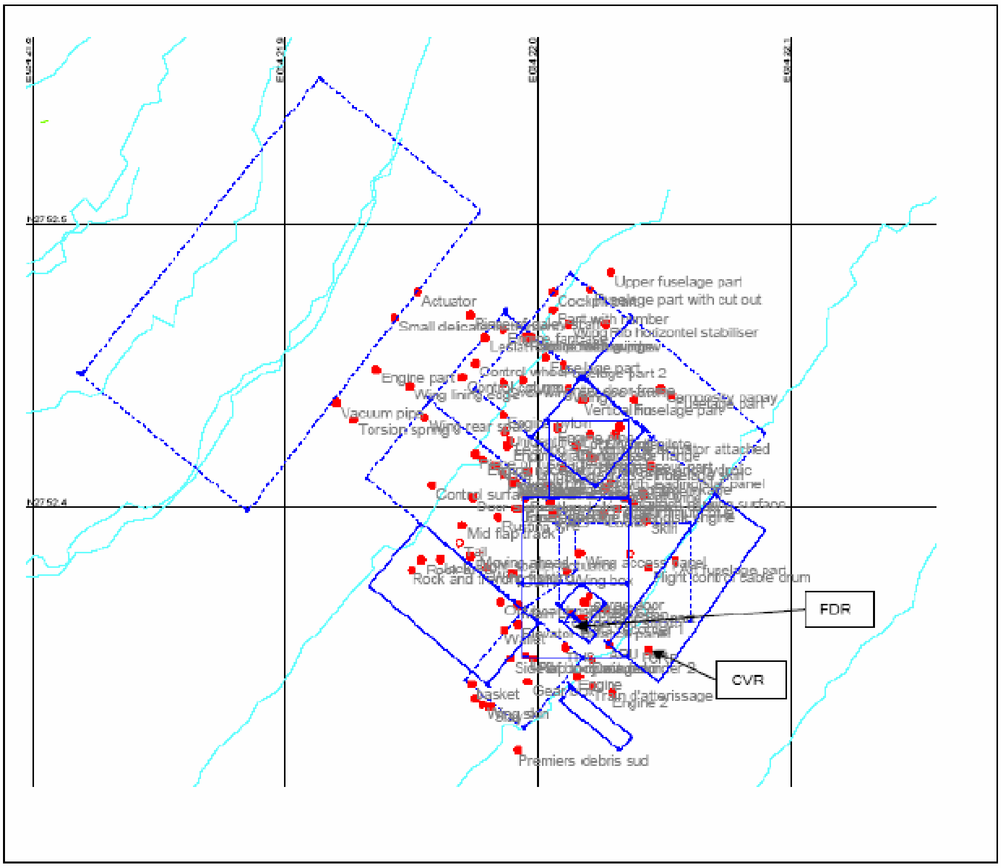


Exhibit E
Attachment 4

Use of a GIB System For Recorders Recovery

Use Of A GIB System For Recorders Recovery

A flight recorder immersed under water can be located by the signals (1 bip/second with 37,5 kHz (±1 kHz)) transmitted by the ULB beacon (pinger) attached to the recorder. This pinger starts as soon as it is in contact with water and is designed to transmit this signal for at least thirty days.

The French Navy used an acoustic detector assembled on a pole called "Helle" which tracks signals on frequencies ranging from 7 to 50 kHz. This detector has two reception antennae, one omni-directional and the other directional. It was connected to an audio system that controlled the frequencies and was coupled with a GPS positioning system.

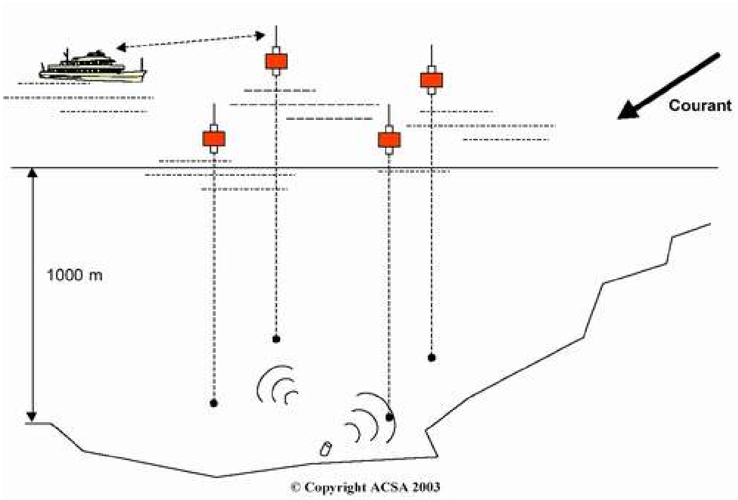
The first stage in the search consisted of checking signal transmissions and defining an general area using the omni-directional antenna. The seafloor being uncharted at that time, locating the beacons was complicated by possible reflections from the transmitted sound waves and possible secondary echoes. The next stage consisted of taking successive bearings using the directional antenna so to get a more precise fix.

This acoustic search determined two possible positions for the beacons: one to the south with a position considered as nominal since it could be picked up from all bearings, but which was transmitting more weakly than the one identified further north. The measurements and calculations performed gave an estimated depth of around one thousand meters.

To confirm these results, the USBL (ultra short base line - acoustic positioning) of the *Ile de Batz* (the first recovery ship on site) was later temporarily modified (in coordination with its manufacturer Sonardyne) and adapted to the reception of the signals transmitted by the southern pinger. These results confirmed the presence of a transmission source beneath the *Ile de Batz* which had been positioned directly above the estimated position.

To narrow the search area, the French Navy contracted ACSA to supply a GIB system (GPS Intelligent Buoys). They adapted a network of four acoustic receivers, combined with GPS information, to conduct a search at a depth of around one thousand meters .

The hydrophones, immersed 450 meters down around the initial identified position, drifted with the current while permanently transmitting information on their position and any signals received. An algorithm integrated all data to determine the recorder’s fixed position.



The ROV started searching for the recorders using its cameras based on an initial determination of the position of its beacon. This position was then refined by the ACSA system. That produced a theoretical position with a precision of plus or minus ten meters over one hundred meters.

Squares of twenty by twenty meters were systematically searched by the ROV.

The FDR was discovered on 16th January 2004 approximately twelve meters from the computed position.

On the basis of the initial analysis of wreckage distribution, it was decided to define a zone to the south of the position of the FDR. The CVR was found on 17th January 2004 in a nearby traced square.

Exhibit E
Attachment 5

Wreckage Database
(Floating, Recovered, Surveyed)

Ident. Tag No.	Item Description				ATA 2 digit	L/C/R	Length (in)	Width (in)	Description
	Exam Date	Nomenclature	Part No. "_"=unreadable "?"=uncertain digit	Serial No.					
FW1	10-Jan-04	Inboard Spoiler Panel	65-46452-62A	MA4836	27		48	20	
FW2	10-Jan-04	Fuselage Frame Segment	65C27018-1		53		28	20	Fuselage frame segment that includes ground stud GD03004D
FW3	10-Jan-04	Fuselage Frame Segment	69-35352-14		53		10	20	Fuselage frame segment with handwritten notation "400"
FW4	10-Jan-04	Spoiler Panel Fragment	65-46451-70A	MA15971	27		52	11	
FW5	10-Jan-04	Outbd Foreflap Section			27		39	11	Leading edge crushed
FW6	10-Jan-04	Aft flap segment	65-4_870-132		27		22	10	
FW7	10-Jan-04	TE Lower panel	65C25559-1?6		57		40	30	Rib P/N 65-52126-26
FW8	10-Jan-04	Outbd Spoiler	65-46451-70A	MA15970	27		26	21	
FW9	10-Jan-04	Inbd Spoiler			27		58	19	Bulb Seal P/N __-60754-23_
FW10	10-Jan-04	Aft flap segment	65-47870-15? Or -16?		27		33	16	
FW11	10-Jan-04	Aft outbd flap segment	65-46435-281	18__	27		35	14	
FW12	10-Jan-04	Aft flap segment	65-46435-282	1890	27		24	15	
FW13	10-Jan-04	Inbd flap segment	__-47870-154		27		30	17	
FW14	10-Jan-04	Outbd foreflap segment			27		20	8	
FW15	10-Jan-04	Spoiler panel segment			27	L?			Bulb seal P/N 10__0754-23?8 or -28?8 Actuator rod end shows signs of corrosion on a portion of the fracture surface
FW16	10-Jan-04	#3 Spoiler	65-46451-708	MA15952	27	L			Spoiler position determined by position transmitter fitting on inbd leading edge lower surface
FW17	10-Jan-04	Inbd foreflap segment	65-46430-134 (rib)		27				
FW18	10-Jan-04	Aft flap segment			27		39	17	
FW19	10-Jan-04	Aft flap segment			27				Possibly outboard
FW20	10-Jan-04	Outbd aft flap segment			27				
FW21	10-Jan-04	Spoiler			27				
FW22	10-Jan-04	Inbd spoiler segment			27				

Ident. Tag No.	Item Description				ATA 2 digit	L/C/R	Length (in)	Width (in)	Description
	Exam Date	Nomenclature	Part No. "_"=unreadable "?"=uncertain digit	Serial No.					
FW23	10-Jan-04	#6 spoiler segment			27				Segment of wing web stuck in spoiler direction of travel of wing piece forward and up relateive to spoiler
FW24	10-Jan-04	Spoiler fragment	65-46451-708	MA15973	27				
FW25	10-Jan-04	RH lower fin fairing	65-48249-24		55	R			
FW26	10-Jan-04	Outbd aft flap			27	L	84	18	
FW27	10-Jan-04	Elevator or aileron fragment with trim tab			27		31	22	
FW28	10-Jan-04	Aft flap fragment	______7870-90 (LE rib)		27		32	15	
FW29	10-Jan-04	Foreflap			27		36	12	
FW30	10-Jan-04	LH elevator upper surface	65C25746-147		27	L	20	14	
FW31	10-Jan-04	Inbd aft flap segment			27		24	12	
FW32	10-Jan-04	Trim tab segment	65C25797-18	135__	27		17	6	
FW33	10-Jan-04	Graphite trim tab			27		20	6	
FW34	10-Jan-04	Fixed TE wing upper panel			57		22	9	
FW35	10-Jan-04	Trailing edge structure			57		18	14	
FW36	10-Jan-04	Elevator segment			27		40	20	
FW37	10-Jan-04	Access Panel #910BL			57		28	14	
FW38	10-Jan-04	RH elevator trim tab	65C26384-26A	402347D	27		30	6	
FW39	10-Jan-04	Elevator TE segment			27		33	18	
FW40	10-Jan-04	Rudder fragment			27		33	17	
FW41	10-Jan-04	Elevator or aileron TE segment			27		29	25	
FW42	10-Jan-04	Elevator or aileron TE segment			27		24	19	
FW43	10-Jan-04	Wing LE lower access panel	65C26278-21		57		11	14	
FW44	10-Jan-04	Elevator TE panel			27		22	16	

Ident. Tag No.	Item Description				ATA	L/C/R	Length	Width	Description
	Exam Date	Nomenclature	Part No. "_"=unreadable "?"=uncertain digit	Serial No.	2 digit		(in)	(in)	
FW45	10-Jan-04	Rudder Fragments (many)			27				This item number describes a collection of many fragments, most about 12'x12' or less
FW46	10-Jan-04	TE Panel?	65C27482-44		57				
FW47	10-Jan-04	Wing body fairing fragment			53		22	21	
FW48	10-Jan-04	Slide bottle	64236-3 (Air Cruisers)		25				"ALT 749 855"
FW49	10-Jan-04	Slide bottle	D17851-31 (Air Cruisers)		25				
FW50	10-Jan-04	Slide bottle	630120 (BF Goodrich)		25				Structural Composites P/N 1270274
FW51	10-Jan-04	Slide bottle	D17977-3 (Air Cruisers)		25				"ALT 210A-6011" Structural Composites P/N 1270274
FW52	10-Jan-04	Oxy Bottle	__801307 and _0B50087		25				
FW53	10-Jan-04	Escape Slide (fwd)	10-61323-478	2206	25				Air Cruisers P/N D31591-478 Serial No. 2206
FW54	10-Jan-04	Life Vests (qty 13)			25				3 crew unfired squib 5 pax unfired squib 1 pax one squib fired, one unfired 4 pax without squib
FW55	10-Jan-04	Escape Slide (aft)	10-61323-?	726A	25				Air Cruisers P/N 61621-46

Ident. Tag No.	Item Description: Nomenclature	Part No. "xx"=unreadable or uncertain digit(s)	Serial No.	Length (in)	Width (in)	Height (in)	Description
RW1	Horizontal Stabilizer Jackscrew Actuator Gearbox	Forging 65-49964-6		28	10.5	9.5	Screw endstop spline exposed Ballscrew fractured at 0.75 in. from spline shoulder. Safety rod failed at 1.5 in. from spline shoulder.
RW2	Thrust Reverser Actuator	DR MO6118, WO9013550, 81205, 315A808-x, 315A1810-3		28.5	10	5	Ports with "RET" and "EXT"
RW3	Structure			8	5	2	
RW4	Flap Transmission	69-73301-1	8592	30.5	6.5	4.5	Dimension from nut flat to end stop of screw is 21 7/8 in. Dimension from end stop flat to end of part is 2 in.
RW5	Cable Quadrant with Cable	4308xx	0748	6.5	6	3.5	Attached cable is 1/8 inch diameter is 24 inches long.
RW6	Scavenge Pump Filter Module			9	3.5	6	Port text: "REAR SCAV IN", "FRONT SCAV IN", "TGB AGB SCAV IN"
RW7	Thrust Reverser Cowl Opening Actuator	1FA1401221		21	5	2	Dimension from shoulder of actuator to end of rod is 11.5 in. "Locked" text on rod
RW8	Hydraulic Component			7	6	6	ball bearing for shaft
RW9	Structure			15	8.5	2.5	
RW10	Hydraulic Component	65C26859x	SC144x	7	2	3	
RW11	Electric Part			4	3	3	
RW12	Hydraulic Actuator			16	5	5	Hydraulic ports with "Extend" and "Retract"
RW13	Hydraulic Actuator			11.5	6	4	
RW14	Engine Start Pad with Gear	104471-0	27494	8.5	8.5	7	
RW15	Horizontal Stabilizer center section rear beam			195	93	48	

Ident. Tag No.	Item Description						
	Nomenclature	**Part No.** "xx"=unreadable or uncertain digit(s)	**Serial No.**	**Length** (in)	**Width** (in)	**Height** (in)	**Description**
RW15	Left Elevator PCU	65-44761	10759A				
RW15	Right Elevator PCU	65-44761-21	0765A				
RW15	Elevator Feel Unit	65-44503-xx	771				
RW15	A/P Actuator - Lower	158300-101	5190				
RW15	A/P Actuator - Upper	158300-101	5173				
RW15	Elevator PCU Input Rod	65-455147-1					
RW15	Left Elevator Position Trasmitter	69-73373-2, Boeing: S250N104-5	87887				
RW15	Right Elevator Position Trasmitter	Boeing: S250N104-4	23315				
RW15	Mach Trim Actuator	81205 / 10-61369-7	A1163				
RW15	Mach Trim Trasducer	xxxxxxx	xxxxxx				
RW15	Elevator Balance Panels	65-C-26393-5					
RW16	Tube			32	12	5	
RW17	Electric Motor			5	5	5	Simmond Precision 400Hz Phase 3 High Speed Amps 12 Duty Cycle Intermittxx
RW18	Aileron PCU	65-44828-4 E4	8920	12	9	5	1.75 in. from sleeve endface to rod end flange face. PCU rod at other end sheared in endcap
RW19	Hydarulic Actuator	65-44552-4	952	14	4	4	End gland flat to far side of jam nut is 0.5 inch

Ident. Tag No.	Item Description			Length (in)	Width (in)	Height (in)	Description
	Nomenclature	**Part No.** "xx"=unreadable or uncertain digit(s)	**Serial No.**				
RW20	Spoiler Mixer	65-50856, 65-46358-1, 69-40296-4, 65-50xx6, 65-46369-4, 65-51633-6, 65-46359-14		14	16	5	
RW21	Fuel system part	66503-4034-33, 66503-4034-352, 66503 4455-056, 66503-4414-022	5624, 4294	11	6.5	4.5	
RW22	Flap Angle Gearbox	65-50585-15 Rev x		9	14	4	
RW23	Torque Tube with Splines			23	4	4.5	
RW24	Hydraulic Actuator Rod End With attached structure	69-73485-108, 65C26796-16revA, 65C36641-30revE		10	4	5	
RW25	Horizontal Stabilizer Jackscrew	Assy 65-51524-16		32.5	19	7	Dimension from the flat of the ball nut to the flat of the endstop is 7.5 inches.
RW26	Structure			15.5	8	7	
RW27	Force Transducer - Autopilot	10-61072-7 M	3284	4	2.5	2.5	
RW28	Flap transmission	xx27501-3	10902A	3.5	4	3.5	
RW29	Speedbrake Mechanism		80477	9	6	3.5	
RW30	Hydraulic Transfer Valve			10	2.5	2.5	
RW31	Elecrical component	311 13646 01	9212	5	3	2	
RW32	Fuel Timer	074327119M71607	GOS20184	7.5	6.5	3	3 tubes attached, the longest of which is 41 inch.
RW33	Spoiler Valve Manifold	65-44565-5	Wx9027307	7.5	7.5	3.5	
RW34	Section of vertical stabilizer With components			93	40	45	
RW34	Main Rudder PCU	65C37053-9	892x				Includes Jetpipe servo valve 75130-A3099 S/N 411171

Ident. Tag No.	Item Description: Nomenclature	Part No. "xx"=unreadable or uncertain digit(s)	Serial No.	Length (in)	Width (in)	Height (in)	Description
RW34	Rudder Pressure Reducer	Teijin Seiki 1704600-x	10xx				SCD No. 10-62255-xx, Includes Eaton Hydraulic Pressure Transducer Boeing PN 10-62254-1 Ser.No. 146451 Date of MFG 01/99. Includes Parker Solenoid valve P/N 881600-001 S/N 30708 SCD BAC 10-60811-13.
RW34	Feel and Centering Unit	Assy 65-51251-5					Assy date: MAY 11 1992, Bracket P/N 65C25410-5, Control Rod from F&C unit to input rod: Assy 69-37285-8 02/18/91
RW34	Actuator, rudder trim	10-62025-3 revU	C1412				MPC Products Corp. MFR 19710/U26B 81205 D/C 9218 FT 04-29-92
RW34	Standby Rudder PCU	Assy 1150	6005x				
RW35	Blade seal	65-48248-5, 1060754-770		29	15	4	42 in. long seal folded on itself
RW36	Flap Leading Edge	65-46430-129	1650	30	18	7	Flap leading edge with tube and roller assembly
RW37	Column cable quadrant	65-52995-11, 65-53592 4, Assy 6x-5359xx, 65C31007-xx		19	12	6	
RW38	First Officer's control wheel			12	8	3	
RW39	A4 Power Amplifier	641-8592-001		9	7	3	
RW40	Recognition Light	30-0906104MOD	601	9	7	6	
RW41	APU Turbine Disc			15	14	3	
RW42	Bellcrank with rod and flex cable	315A1897-5		26	10	5	
RW43	Control Surface with broken actuator	65C26633-27		21	13	9	

Ident. Tag No.	Item Description			Length (in)	Width (in)	Height (in)	Description
	Nomenclature	Part No. "xx"=unreadable or uncertain digit(s)	Serial No.				
RW44	Crank Assembly	69-20427-1, 69-20235-2, 65-25844-7, 65-25820-9		18.5	6	4	
RW45	Spoiler Actuator	65-44561-x	7048	23	24	8	
RW46	Drum	65-44065		9	7.5	1	
RW47	OUTBD Gnd Spoiler	65C26864-3	E-0376	23	19	8	
RW48	Spoiler Actuator Valve	65-44645		8	8	4	
RW49	Spoiler Actuator	65-44561-15	10275	43	10.5	14	
RW50	VOR / DME Indicator	N/A	N/A	4	3.5	4	
RW51	Cockpit Temprature Selector	N/A	N/A	5	2	2	
RW52	Frist Aid Kit	N/A	N/A	10	10	2.5	
RW53	Portable cylinder Pressure indicator.	N/A	N/A	2	1.5	1.75	
RW54	Clamp	2703-300.A	N/A	4.5	4	0.75	
RW55	Passenger Oxygen Mask	250054	N/A	5.5	5	4	
RW56	Wing Piece of Structure	N/A	N/A	55.5	14.5	10	

FSH604 Surveyed Wreckage Database
(Janus II)

T#	Lattitude	Longitude	Description	Janus II photo reference	Recovered Wreckage No.
n/a	52.4270	21.9890	Pile of electrical wires beside T54	2004-01-19-200844.JPG	
n/a	52.4160	21.9390	not ident.	2004-01-20-120103.JPG	
T1	52.4090	21.9915	Mid flap		
T2	52.4090	21.9900	MLG door mecanisme		
T3	52.4100	21.9900	Passager seat frame		
T4	52.4150	22.0440	Fuselage skin		
T5	52.4090	22.0280	Seat frame		
T6	52.4041	22.0103	Fuselage skin		
T7	52.4055	22.0258	Fuselage skin		
T8	52.4047	22.0293	Mechanism		
T9	52.4040	22.0369	Safety, life jacket and fuselage	2004-01-19-073927.JPG	
T10	52.4047	22.0409	Piece of wing surface		
T11	52.4025	22.0367	Aluminium with blue paint		
T12	52.4043	22.0343	Piece of wing		
T13	52.4070	22.0260	Piece of wing		
T14	52.4084	22.0044	Frame		
T15	52.4060	21.9998	Piece of passanger seat		
T16	52.4040	21.9951	Fuselage skin / windows		
T17	52.4022	22.0050	Windows frame		
T18	52.3975	22.0057	PSU		
T19	52.3960	22.0425	Skin		
T20	52.3983	22.0253	Lower skin		
T21	52.4002	22.0045	Fuselage skin		
T22	52.4025	21.9963	Seat frame		
T23	52.3997	21.9934	Fuselage Skin		
T24	52.4004	22.0312	Metal Disk (engine)		
T25	52.3954	22.0124	Composite piece. Belt and tissue		
T26	52.3937	22.0193	Metal Piece		
T27	52.3910	22.0410	Fuselage and windows		
T28	52.3936	21.9933	spoiler actuator attached to portion of the wing spar	2004-01-19-094158.JPG, 2004-01-20-170624.JPG, 2004-01-20-170615.JPG	
T29	52.3840	22.0161	Wing access panel		
T30	52.3750	22.0060	Composity panel		
T31	52.3861	21.9899	Rear part of fuselage		
T32	52.3865	22.0006	Pylon		
T33	52.3750	22.0310	Lower body skin		
T34	52.3788	22.0431	flt. cont. cable drum	2004-01-19-112045.JPG	
T35	52.4380	22.0280	Fuselage skin		
T36	52.4400	22.0520	Fuselage skin with "Cut here" indicated		
T37	52.4420	22.0480	Pile of debris	2004-01-19-132940.JPG, 2004-01-19-133012.JPG	
T38	52.4260	22.0300	Composite panel fixed te		
T39	52.4190	22.0420	skin with letters		
T40	52.4420	22.0120	Wing	2004-01-19-160043.JPG, 2004-01-19-155924.JPG	
T41	52.4650	22.0260	RIB horizontal stabilizer		
T42	52.4530	22.0030	Fuselage section with "FLASH" text	2004-01-19-162335.JPG, 2004-01-19-163724.JPG, 2004-01-19-163717.JPG	

FSH604 Surveyed Wreckage Database
(Janus II)

T#	Lattitude	Longitude	Description	Janus II photo reference	Recovered Wreckage No.
T43	52.4830	22.0280	Upper fuselage part		
T44	52.4550	21.9940	Forward entry door frame - 1L		
T45	52.4700	22.0060	Part with number		
T46	52.4770	22.0200	Fuselage part with a door cutout		
T47	52.4760	22.0060	Fuselage part "Brew handle must be in down position during taxi, take off,		
T48	52.4600	21.9950	Leading edge slat with part of wing	2004-01-19-193417.JPG	
T49	52.4120	21.9860	Lower wing scan with leading slat panel		
T50	52.4244	22.0042	Skin		
T51	52.4191	21.9929	Skin		
T52	52.4240	21.9890	Leading edge slat with one actuator attached	2004-01-19-195521.JPG	
T53	52.4146	21.9826	Nose landing gear assembly		
T54	52.4266	21.9869	Main Equipment Center skin door	2004-01-19-201051.JPG, 2004-01-19-201214.JPG	
T55	52.4220	21.9884	Engine diagonal brace		
T56	52.4329	21.9858	Engine pylon		
T57	52.4440	21.9860	Over wing escape hatch		
T58	52.4280	21.9600	Passenger seat recline actuator		
T59	52.4490	21.9780	No identify		
T60	52.4459	21.9856	not ident.	2004-01-19-230150.JPG, 2004-01-19-230124.JPG	
T61	52.4460	21.9700	control column	2004-01-19-232047.JPG	
T62	52.4510	21.9750	control wheel	2004-01-19-233054.JPG	
T63	52.4630	21.9860	Engin fancase		
T64	52.4600	21.9790	leading edge slat and portion of wing	2004-01-20-000743.JPG, 2004-01-20-000254.JPG	
T65	52.4420	21.9510	Engine fan case		
T66	52.4320	21.9550	Wing rear spar		
T67	52.4680	21.9730	passenger seat frame with spring	2004-01-20-010121.JPG, 2004-01-20-010033.JPG, 2004-01-20-010020.JPG, 2004-01-20-010020.JPG, 2004-01-20-005839.JPG, 2004-01-20-005834.JPG, 2004-01-20-005723.JPG, 2004-01-20-005721.JPG	
T68	52.4660	21.9660	Wing spar piece		
T69	52.4760	21.9520	spoiler actuator	2004-01-20-023738.JPG, 2004-01-20-023718.JPG, 2004-01-20-023627.JPG, 2004-01-20-023611.JPG, 2004-01-20-023523.JPG, 2004-01-20-023601.JPG	
T70	52.4545	21.9292	Eng VSV HPC		
T71	52.4673	21.9429	Small delicate instrument		
T72	52.4373	21.9200	Flap angle gearbox?		
T73	52.4468	21.9006	Wing center section structure		
T74	52.4490	21.9360	Engine part ?		
T75	52.4307	21.9273	Torsion spring		
T76	52.4432	21.9490	Wing leading edge Flap FSS394		

FSH604 Surveyed Wreckage Database
(Janus II)

T#	Lattitude	Longitude	Description	Janus II photo reference	Recovered Wreckage No.
T77	52.4337	21.9544	Wing rear spar station 286 and linkage		
T78	52.4173	21.9272	Cable drum and support	2004-01-20-114025.JPG, 2004-01-20-113958.JPG	
T79	52.4260	21.9510	Internal handle Passenger / service		
T80	52.4286	21.9579	Structural and skin		
T81	52.4273	21.9644	wires and some panel	2004-01-20-121606.JPG, 2004-01-20-121514.JPG	
T82	52.4229	21.9614	Outside passenger door - Left		
T83	52.4188	21.9751	Pieces of fuselage skin with cockpit window cutout		
T84	52.4080	21.9580	control surface with broken actuator	2004-01-20-131900.JPG	
T85	52.4175	21.9780	Engine Nacelle with pneumatic and hydraulic		
T86	52.4041	21.9738	Door support and skin 2x2m		
T87	52.3880	21.9690	Horizontal stabilizer center section with part of the left stab, elev. & tab	2004-01-20-141831.JPG, 2004-01-20-141650.JPG, 2004-01-20-141859.JPG, 2004-01-20-141908.JPG, 2004-01-20-143558.JPG, 2004-01-20-144151.JPG, 2004-01-20-142138.JPG, 2004-01-20-142144.JPG, 2004-01-20-142035.JPG, 2004-01-20-142301.JPG, 2004-01-20-143410.JPG, 2004-01-20-142215.JPG, 2004-01-20-141924.JPG	RW15
	52.3880	21.9690	Hydraulic tube ~1m (Raised with RW15)		RW16
T88	52.4100	21.9900	trailing edge flap control linkage	2004-01-20-155813.JPG, 2004-01-20-161009.JPG	
T89	52.3970	21.9840	Brusting Tyre		
T90	52.4000	21.9910	Uper Fuselage skin		
T91	52.3940	21.9700	Mid Flap Track		
T92	52.3830	21.9730	Flight spoiler actuator valve	2004-01-20-171655.JPG	
T93	52.3790	21.9800	Wing fitting		
T94	52.3670	21.9850	Outboard Mid Flap		
T95	52.3660	21.9920	Main LG Support Beam		
T96	52.3590	21.9920	Elevator balance panel	2004-01-20-184651.JPG	
T97	52.3470	21.9890	Side of body Wing skin		
T98	52.3310	21.9780	Wing skin		
T99	52.3300	21.9810	slide (?) + ??	2004-01-20-193955.JPG	
T100	52.3480	21.9950	Lug		
T101	52.3551	22.0078	No identify		
T102	52.3450	21.9980	Hydraulic		
T103	52.3390	21.9960	Gear box		
T104	52.3470	21.9980	Flap Torque Tube		
T105	52.4877	21.9560	Floor pannel with structure		
T106	52.4890	21.9477	ELEC WIRING		
T107	52.4899	21.9487	PERSO EFFECT		

FSH604 Surveyed Wreckage Database
(Janus II)

T#	Lattitude	Longitude	Description	Janus II photo reference	Recovered Wreckage No.
T108	52.4861	21.9510	Human remain		
T109	52.4766	21.9402			
T110	52.4758	21.9382	small electronic box		
T111	52.4803	21.9452	unknow small part		
T112	52.4890	21.9530	wiring and insulation		
T113	52.5008	21.9692	Valve		
T114	52.4820	21.9610	Stil ring		
T115	52.4892	21.9597	control wheel stering force sensor (recovered)		RW27
T116	52.4985	21.9495			
T117	52.4965	21.9492	Engine insulation		
T118	52.4974	21.9497	Electric Motor		
T119	52.4928	21.9538	Engine case		
T120	52.4785	21.9309	floor panel with structure		
T121	52.4769	21.9339	elec motor		
T122	52.4838	21.9362	Bracket		
T123	52.4930	21.9540	belly skin and stucture		
T124	52.5083	21.9658	personal effect		
T125	52.4879	21.9380	miscelaneous structure		
T126	52.4910	21.9378	side of body structure with wiring		
T127	52.5036	21.9503	personal effect		
T128	52.5102	21.9564	Crank arm		
T129	52.5070	21.9610	sit & personal effect		
T130	52.4987	21.9439	electric motor		
T131	52.4845	21.9300	wing structure		
T132	52.5131	21.9545	bleed air duct		
T133	52.4943	21.9346	unknow electrical part		
T134	52.4856	21.9281	unknow linkage		
T135	52.4790	21.9281	miscellanious metal structure		
T136	52.4932	21.9200	oxygen bottle		
T137	52.4993	21.9191	hydraulic activator		
T138	52.5176	21.9464	hydraulic tube		
T139	52.4977	21.8986	oxygen bottle		
T140	52.4635	21.9294	part of wheel mecanism (recovered)		RW28
T141	52.4557	21.9332	control command base		
T142	52.4688	21.9230	personal effect		
T143	52.4710	21.9280	Speed bracke lever		RW29
T144	52.4713	21.9157	T/R cowl opening actuator		
T145	52.4740	21.9190	engine part fuel pump		
T146	52.4880	21.9190	Engine part Link		
T147	52.4620	21.8930	Engine part oil pressure switch		
T148	52.4920	21.9220	Oxygen bottle		
T149	52.4895	21.9166	Engine part gear box		
T150	52.4960	21.9120	Engine part Gear box		
T151	52.4740	21.8890	Engine part Compressor Disk		
T152	52.4730	21.8780	Toilet system AC motor		
T153	52.4950	21.8970	Transfer valve		RW30
T154	52.4940	21.9000	Landing gear component		
T155	52.5160	21.9020	? Electronic		RW31
T156	52.4830	22.0250	Engine part Fuel Timer		RW32
T157	52.4740	21.9030	Engine part		
T158	52.4610	21.8900	Engine part pressure switch (T147)		

FSH604 Surveyed Wreckage Database
(Janus II)

T#	Lattitude	Longitude	Description	Janus II photo reference	Recovered Wreckage No.
T159	52.4590	21.9030	Engine part TIR Cowl hold open actuator		
T160	52.4470	21.9040	Landing gear support		
T161	52.4290	21.8930	Debris structure		
T162	52.4090	21.8810	Hydraulic component		
T163	52.4110	21.8930	Hydraulic component		
T164	52.4370	21.9160	Structure		
T165	52.4100	21.8930	Structure		
T166	52.4200	21.9030	Coupler		
T167	52.4200	21.9040	Spoiler valve manifold		RW33
T168	52.4170	21.9130	Flight spoiler		
T169	52.4180	21.9100	Hydraulic fuse		
T170	52.3560	21.9510	Engine part Disk		
T171	52.3660	21.9640	Electric wires		
T172	52.3800	21.9670	Electronic Box		RW39
T173	52.3700	21.9450	Engine part		
T174	52.3870	21.9380	Engine part		
T175	52.3970	21.9360	Unidentified		
T176	52.3990	21.9320	LV Cover		
T177	52.3760	21.9670	Push Pull cable		RW42
T178	52.4480	21.9940	Electronic Box		RW40

FSH604 Surveyed Wreckage Database
(Ile de Batz)

T#	Time	Lattitude	Longitude	Description	Date	Recovered Wreckage No.
	9:54:02	52.4192	22.0207	Skin	12-Jan-04	
	10:00:04	52.4165	22.0190	white skin 1.5x1m	12-Jan-04	
	10:02:21	52.4185	22.0182	STA600 left side escape hatch 4.5m skin	12-Jan-04	
	10:30:08	52.4205	22.0172	skin	12-Jan-04	
	10:41:50	52.4205	22.0183	skin, maybe lap splice, no paint	12-Jan-04	
	10:45:57	52.4214	22.0190	stringers & skin	12-Jan-04	
	11:01:17	52.4249	22.0285	skin section	12-Jan-04	
	11:05:23	52.4185	22.0215	engine case with stator vane	12-Jan-04	
	11:12:42			window frame	12-Jan-04	
	11:13:40	52.4085	22.0108	Possible wing skin 6in.x3ft.	12-Jan-04	
	11:49:58	52.4361	22.0348	fuselage piece 1x2m	12-Jan-04	
	11:56:30	52.4237	22.0233	Fuselage skin 3x4m	12-Jan-04	
	12:35:05	52.4410	22.0462	belly skin 1x1m, dark paint	12-Jan-04	
	13:04:04	52.4086	22.0011	buttt splice	12-Jan-04	
	13:52:20	52.4142	22.0096	fuselage skin with 1.5 window frames	12-Jan-04	
	14:25:00	52.4212	22.0100	two pieces of skin, 1x1m, 1x2m	12-Jan-04	
	14:31:36	52.4187	22.0126	737 Airplane Flight Manual (AFM)	12-Jan-04	
	15:20:25	52.4217	22.0149	ring/strip of cap sealed fasteners with adjacent wing?	12-Jan-04	
	15:40:38	52.4384	22.0369	fuselage sking 4x2m, white	12-Jan-04	
	15:49:40	52.4444	22.0364	Instrument panel?	12-Jan-04	
	15:53:12	52.4388	22.0309	fuselage skin, 7 stringers x 2 frames @ lap, no structure attached, dark & light paint	12-Jan-04	
	16:03:49	52.4306	22.0189	fuselage sking 4x2m, possibly part of logo arrow above windows	12-Jan-04	
	16:05:19	52.4259	22.0152	ballscrew	12-Jan-04	
	16:25:23	52.4175	22.0063	ball of loose tangled wires	12-Jan-04	
	16:35:40	52.4305	22.0197	skin fragment, sect 43, ~STA 460	12-Jan-04	
	16:50:50	52.4429	22.0312	skin 2x1m	12-Jan-04	
	17:11:32	52.4067	21.9965	portion of floor beam & seat track	12-Jan-04	
	17:13:00	52.4104	21.9967	wing lower surface	12-Jan-04	
	13:40:07	xxx	xxx	fuselage skin fragment, 1 or 2 windows with possible door cutout	13-Jan-04	
	5:57:00	xxx	xxx	magnetic tape(?)	14-Jan-04	
	6:18:00	xxx	xxx	skin	14-Jan-04	
	10:04:00	xxx	xxx	VHF antenna	14-Jan-04	
	10:23:00	xxx	xxx	fuselage skin	14-Jan-04	
	11:10:00	xxx	xxx	compressor part	14-Jan-04	
	12:54:00	xxx	xxx	white box	14-Jan-04	
	15:20:46	xxx	xxx	compressor flange	14-Jan-04	
	15:42:39	xxx	xxx	fuselage part	14-Jan-04	
	17:13:14	52.4129	21.9963	wing lower skin, 4 access panels, 3mx1m, +front spar +leading edge, reg.mark "SU-Z", ~STA600	14-Jan-04	
	17:40:50	52.4416	22.0194	front spar of vertical stabilizer skin, 2-3m long spar, ref SRM 55-30-10	14-Jan-04	
	17:55:12	52.4726	22.0062	skin 0.5mx20cm	14-Jan-04	
	17:58:15	52.4247	22.0048	Metal duct, 1mx10cm	14-Jan-04	
	18:07:20	52.4157	21.9993	Frame and skin, 1m	14-Jan-04	

FSH604 Surveyed Wreckage Database
(Ile de Batz)

T#	Time	Lattitude	Longitude	Description	Date	Recovered Wreckage No.
	18:16:05	52.4161	21.9972	skin, 1x2m composite	14-Jan-04	
	18:19:20	52.4204	21.9962	skin, white, 1mx30cm	14-Jan-04	
	19:20:38	52.4321	22.0352	skin and stringers, 1x4m, white paint	14-Jan-04	
	19:53:01	52.4516	22.0116	skin with three windows, external paint scheme identifies this as ~STA500, 3x3m	14-Jan-04	
	20:06:08	52.4419	22.0128	concrete block with cable through center, used by French Navy for depth measurement	14-Jan-04	
	20:26:36	52.4324	22.0322	skin, 1.5x1.5m, window frame, white paint	14-Jan-04	
	20:30:39	52.4292	22.0363	skin, no paint, 0.5x0.5m with light insulation	14-Jan-04	
	20:53:50	52.4332	22.0250	skin, 1x0.5m, partial blue letter?	14-Jan-04	
	20:56:15	52.4379	22.0194	spar with eliptical holes, vertical stab skin	14-Jan-04	
	21:22:14	52.4476	21.9976	skin, 2x3m, doublers, chem mill waffle pattern	14-Jan-04	
	21:31:55	52.4411	22.0143	concrete block, French Navy Bathymetry device	14-Jan-04	
	22:02:21	52.4233	22.0360	Emergency light battery tray	14-Jan-04	
	22:41:02	52.4241	22.0306	possible LRU handle 4x1.5in., black	14-Jan-04	
	23:23:16	52.4248	22.0221	possible LRU handle	14-Jan-04	
	23:29:07	52.4200	22.0304	white exterior 2x1m	14-Jan-04	
	23:54:09	52.4207	22.0215	fuselage skin 1x2m	14-Jan-04	
	3:23:00	52.3645	22.0266	Fan case fragment	16-Jan-04	
	3:39:00	52.3664	22.0179	HP compressor disk	16-Jan-04	
	3:46:00	52.3664	22.0179	Front engine mount	16-Jan-04	
	4:03:00	52.3782	22.0105	Wing Box Fragment	16-Jan-04	
	16:50:30	52.3585	22.0230	Fuselage Skin White/Blue	16-Jan-04	
	16:54:32	52.3600	22.0186	Flight Data Recorder (FDR)	16-Jan-04	FDR
	5:48:00	52.3621	22.0121	Box Structure w/Blue skin	17-Jan-04	
	5:53:10	52.3650	22.0080	Fuselage Skin, 1x1m	17-Jan-04	
	5:57:41	52.3660	22.0150	Floor Section, 2x3m	17-Jan-04	
	6:26:13	52.3590	22.0200	Cargo Door Section, >1x2m	17-Jan-04	
	6:57:10	52.3590	22.0170	Floor Frames, Side of Body Center Section, 2x0.5m	17-Jan-04	
	7:19:20	52.3700	22.0220	Nose tire	17-Jan-04	
	7:22:29	52.3710	22.0226	Fuselage skin, 1x1.5m	17-Jan-04	
	7:30:12	52.3670	22.0290	Section of entry door, "Automatic Slide Armed", 1x0.5m	17-Jan-04	
	7:34:34	52.3610	22.0290	Nose wheel hub	17-Jan-04	
	7:42:20	52.3690	22.0250	Flat bulkhead/pressure deck, 1x1.5m	17-Jan-04	
	7:55:50	52.3545	22.0150	Part of fin/torque tube, possible rudder mechanism attached, 2x0.5m	17-Jan-04	
	8:12:45	52.3612	22.0149	Vertical fin trailing edge beam lower structure(?), >1x1m	17-Jan-04	
	8:22:29	52.3522	22.0289	Empennage/APU firewall section, 1x1.5m	17-Jan-04	
	8:44:57	52.3524	22.0167	Skin APU/Floor Beam, wing spar side of body	17-Jan-04	

FSH604 Surveyed Wreckage Database
(Ile de Batz)

T#	Time	Lattitude	Longitude	Description	Date	Recovered Wreckage No.
	9:08:08	52.3585	22.0194	Galley parts, cargo liner, floor beam, blue skin (large pile mixed debris), 2X2m	17-Jan-04	
	9:28:28	52.3577	22.0121	Vertical, right side lower by logo, access door 9529 (Standby Rudder PCU door), 1x2m	17-Jan-04	
	10:03:00	52.3587	21.9861	Elevator control surface with balance panel, graphite, "65C26393-5" & "69-41307-20"	17-Jan-04	
	10:19:04	52.3649	21.9909	Main Landing Gear Beam - Right	17-Jan-04	
	11:41:36	52.3638	21.9930	Wing skin, 1x2ft.	17-Jan-04	
	12:22:39	52.3526	22.0263	Skin with vortex generators and APU firewall	17-Jan-04	
	13:07:44	52.3659	22.0181	Thrust reverser cascade vanes	17-Jan-04	
	13:56:35	52.3644	22.0224	APU oil fill access door, P/N 65-76712-509, 1x1m	17-Jan-04	
	14:17:10	52.3639	22.0236	Panel, honecomb w/ white paint & blade seal, 1x3m	17-Jan-04	
	14:43:39	52.3759	22.0158	Section of tire, MLG(?)	17-Jan-04	
	15:04:08	52.3734	22.0262	Tailcone with strobe position light, 1x1m	17-Jan-04	
	15:04:08	52.3734	22.0262	Skin with text "sta… do not plug", static port @ STA 420	17-Jan-04	
	15:57:34	52.3510	22.0268	APU fragment	17-Jan-04	
	16:09:58	52.3507	22.0256	Thrust reverser cowl fragment, 0.25x0.1m	17-Jan-04	
	16:23:30	52.3557	22.0128	Thrust reverser block door	17-Jan-04	
	16:54:30	52.3618	22.0102	Aft flap actuating mechanism pull cable	17-Jan-04	
	16:58:33	52.3608	22.0123	Engine Starter Casing	17-Jan-04	
	17:05:10	52.3608	22.0169	Flap carriage spindle (?)	17-Jan-04	
	17:26:10	52.3571	22.0135	Wing spar 1.5x0.3m	17-Jan-04	
	18:28:09	52.3454	22.0160	Cockpit Voice Recorder (CVR)	17-Jan-04	CVR
	18:28:09	52.3454	22.0160	Nose landing gear retract actuator, extended (corresponding to gear-up)	17-Jan-04	
	18:28:09	52.3454	22.0160	Toothed gear and support, gear diameter ~6in.	17-Jan-04	
	16:06:47	52.3369	22.0153	Engine Core, combustion chamber to exhaust, engine axis vertical with fuel nozzles at bottom and crushed exhaust at the top	18-Jan-04	
	17:32:00	52.3403	22.0222	Left and Right main landing gear assemblies	18-Jan-04	
	17:52:54	52.3342	22.0176	Flap support w/ transmission	18-Jan-04	
	18:38:36	52.3340	22.0279	Engine Core, combustion chamber to exhaust, engine axis vertical with fuel nozzles at bottom and exhaust at the top	18-Jan-04	
	18:38:36	52.3340	22.0279	two wheels (MLG?…viewed from engine)	18-Jan-04	

FSH604 Surveyed Wreckage Database
(Ile de Batz)

T#	Time	Lattitude	Longitude	Description	Date	Recovered Wreckage No.
	18:38:36	52.3340	22.0279	Main Engine Control (beside engine) P/N 66503-6063-215, S/N WYG80008	18-Jan-04	
	19:17:34	52.3377	22.0298	Main Landing Gear beam	18-Jan-04	
	23:00:00	52.4185	21.9335	Fuselage upper skin just above entry door	20-Jan-04	
	5:10:00	52.4600	21.9970	Fuselage skin at least 5 passenger windows and the "FLASH" logo	21-Jan-04	
	5:43:00	51.8541	25.5599	skin panel	21-Jan-04	
	6:32:00	52.4436	22.0179	Low pressure compressor case	21-Jan-04	
	0:11:46	52.3814	22.0543	skin, aft crown w/ blue lettering from "FLASH AIRLINES", 1x4m	22-Jan-04	
	5:18:00	52.3616	22.0444	Tire	22-Jan-04	
	6:30:00	52.3483	22.0271	Wing panels	22-Jan-04	
	6:38:00	52.3519	22.0266	APU shroud	22-Jan-04	
	9:13:20	52.3505	22.0192	Hydraulic Actuator	22-Jan-04	RW13
	9:22:53	52.3403	22.0227	Flap track with transmission	22-Jan-04	
	9:22:53	52.3403	22.0227	hydraulic endcap	22-Jan-04	RW
	9:22:53	52.3403	22.0227	hydraulic valve	22-Jan-04	RW8
	9:22:53	52.3403	22.0227	flap track and flap ball screw with transmission	22-Jan-04	
	9:22:53	52.3403	22.0227	flap ballscrew without transmission	22-Jan-04	
	9:22:53	52.3403	22.0227	Thrust reverser actuator	22-Jan-04	RW2
	9:22:53	52.3403	22.0227	Engine start pad with gear	22-Jan-04	RW14
	10:16:16	52.3387	22.0246	Outboard mid flap carriage	22-Jan-04	
	16:14:05	52.3517	22.0109	Horizontal stabilizer trim motor	22-Jan-04	RW1
	19:21:00	52.3603	22.0019	Outboard flap jackscrew	22-Jan-04	RW4
	20:05:08	52.3529	22.0090	MLG tire, Inbd flap track, Engine Pylon, MLG uplock hook, inbd flap track cam roller, & other MLG wheel well components	22-Jan-04	
	20:51:51	52.3725	21.9828	Outboard mid flap (same as T94?)	22-Jan-04	
	21:15:12	52.3838	21.9678	Hydraulic component - unknown	22-Jan-04	
	21:42:46	52.3958	21.9157	MLG brake hydraulic actuator	22-Jan-04	RW10
	21:58:40	52.3941	21.9494	Hyd valve - motor	22-Jan-04	RW11
	22:45:30	52.3709	21.9895	MLG support beam and some flap structure	22-Jan-04	
	23:01:00	52.3669	21.9943	Hydraulic Actuator with Ext/Ret labeling	22-Jan-04	RW12
	23:25:30	52.3600	21.9905	Fire wall (APU or Engine)	22-Jan-04	
	23:28:50	52.3540	21.9924	Pylon attach fitting & engine firewall	22-Jan-04	
	23:32:26	52.3554	21.9963	Engine gearbox (hyd or fuel) & wing skin	22-Jan-04	
	23:40:21	52.3554	22.0016	Quadrant with cable attached	22-Jan-04	RW5
	23:58:20	52.3646	21.9870	Wing skin, structure, & engine fire wall	22-Jan-04	
	0:02:00	52.3644	21.9875	Balance panel (elev & stab structure?)	23-Jan-04	
	0:08:10	52.3694	21.9840	MLG beam & inbd flap spindle	23-Jan-04	

FSH604 Surveyed Wreckage Database
(Ile de Batz)

T#	Time	Lattitude	Longitude	Description	Date	Recovered Wreckage No.
	0:14:00	52.3732	21.9777	Hose - unknown	23-Jan-04	
	0:35:00	52.3730	21.9770	Landing gear lock actuator	23-Jan-04	
	3:40:00	52.3522	221.9859	Plug door - small	23-Jan-04	
	4:36:11	52.3804	21.9704	Wing skin, 2mx10cm.	23-Jan-04	
	6:30:00	52.3538	21.9770	Thrust reverser blocker door	23-Jan-04	
	8:58:00	52.3623	21.9514	Engine disk	23-Jan-04	
	9:21:40	52.3383	21.9811	Fuselage skin & escape slide	23-Jan-04	
	10:30:00	xxx	xxx	unintentional recovery	23-Jan-04	RW3
	10:30:00	xxx	xxx	unintentional recovery	23-Jan-04	RW9
	12:00:00	xxx	xxx	Engine T/R cown opening actuator	23-Jan-04	RW6
	12:00:00	xxx	xxx	Enigne oil lubricating unit with MCD intact	23-Jan-04	RW7
	6:00:00	52.3580	22.0163	Vertical stabilizer section, Aft spar with lugs still attached to fuselage frame to just above standby PCU. Aft spar with structure to rudder hinge, including front spar of rudder surface.	24-Jan-04	RW34
	6:00:00	52.3580	22.0163	Blade seal ~42 inch (Raised with RW34)		RW35
	6:00:00	52.3580	22.0163	Flap leading edge with tube (Raised with RW34)		RW36
	6:37:20	52.3538	22.0257	Structure (2m) and hydraulic component with spline shaft input	24-Jan-04	
	14:40:00	52.3461	22.0233	Parts of an engine gearbox	24-Jan-04	
	14:47:00	52.3435	22.0220	Actuator electric motor	24-Jan-04	RW17
	17:06:00	52.4098	22.0097	Pile of cabin interior parts (O2 masks, reading lights, etc.)	24-Jan-04	
	18:15:00	52.4088	22.0418	Structural element, possibly palance panel or balance weights.	24-Jan-04	
	19:04:40	52.3682	22.0006	Hydraulic actuator with separate control valve attached.	24-Jan-04	
	19:16:40	52.3635	22.0210	Side of body & cargo floor structure	24-Jan-04	
	19:21:04	52.3662	22.0279	Flap actuator with spindle attached	24-Jan-04	
	19:21:04	52.3662	22.0279	Passenger seat & dense debris	24-Jan-04	
	20:00:03	52.3653	22.0164	Large fuselage section, including belly skin and cargo compartment	24-Jan-04	
	20:05:45	52.3605	22.0207	Door with door lock actuator (P/N 65C255442-5)	24-Jan-04	
	20:30:00	52.3564	21.9926	Leading edge flap actuator with valve module attached.	24-Jan-04	RW19
	20:35:45	52.3579	21.9930	Flap attach structure	24-Jan-04	
	20:53:54	52.3617	22.0140	Spoiler mixer	24-Jan-04	RW20
	20:53:54	52.3617	22.0140	lateral override mechanism	24-Jan-04	
	20:53:54	52.3617	22.0140	Aileron PCU	24-Jan-04	RW18
	22:00:00	52.3525	22.0185	Landing gear brake and wheel tire assembly	24-Jan-04	
	22:04:20	52.3522	22.0115	Landing gear brake components and landing gear actuator (nose wheel steering?)	24-Jan-04	
	22:42:20	52.3585	22.0215	Significant structural element (?)	24-Jan-04	
	22:48:40	52.3660	22.0287	Structural fitting	24-Jan-04	

FSH604 Surveyed Wreckage Database
(Ile de Batz)

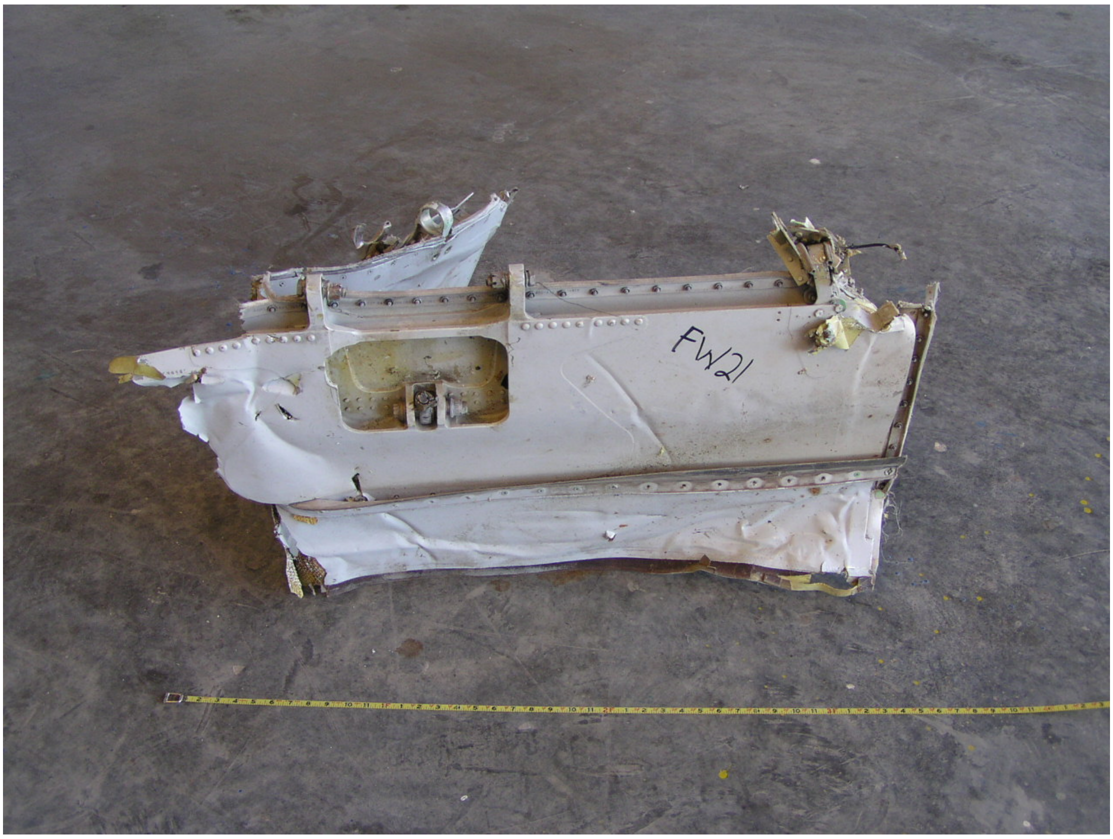
T#	Time	Lattitude	Longitude	Description	Date	Recovered Wreckage No.
	23:15:30	52.3548	22.0165	Landing gear actuator	24-Jan-04	
	23:18:50	52.3554	22.0148	Part of engine fuel system	24-Jan-04	RW21
	0:57:30	52.3544	22.0076	Flap angle gearbox	25-Jan-04	RW22
	1:15:30	52.3545	22.0155	White drive shaft	25-Jan-04	RW23
	1:43:10	52.3519	22.0227	Fractured actuator rod attached to structure	25-Jan-04	RW24
	1:49:20	52.3526	22.0179	Jackscrew of horizontal stabilizer	25-Jan-04	RW25
	20:53:54	52.3617	22.0140	Center section structural joint recovered with RW20	25-Jan-04	RW26

Exhibit E
Attachment 6

Selected Wreckage Photos

Floating Wreckage


FW18


FW21


FW24

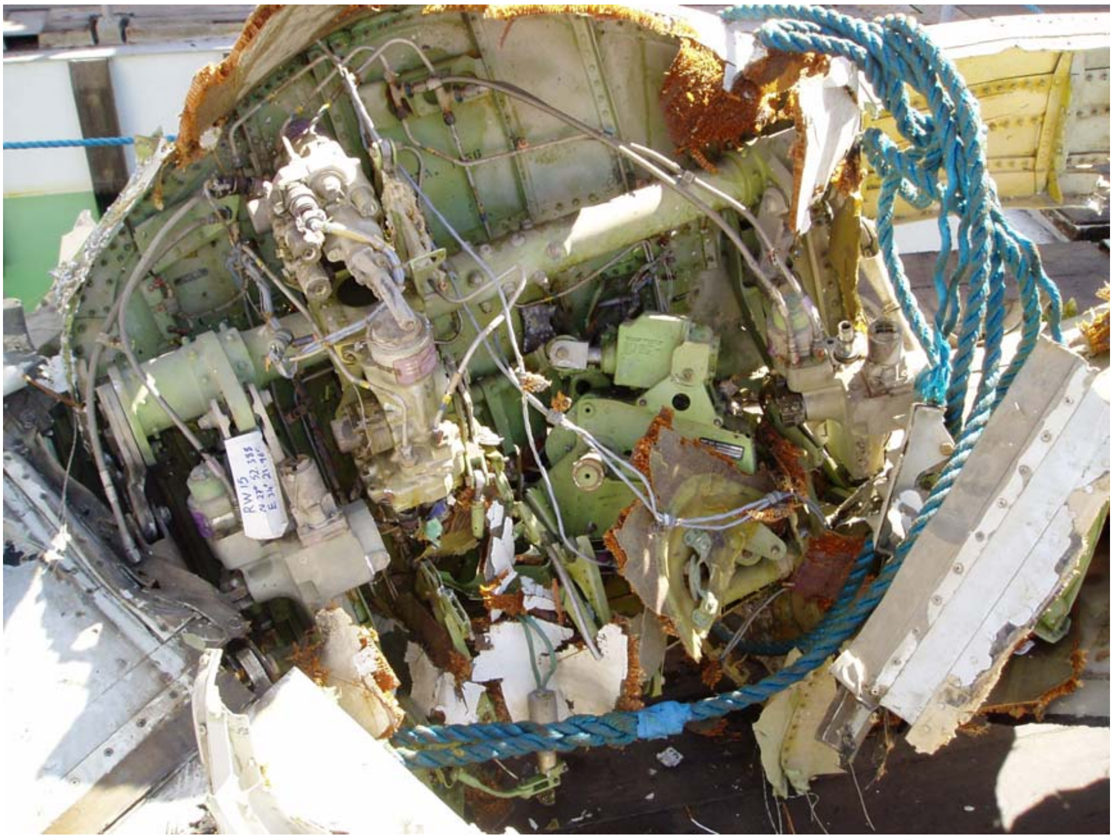

FW36


FW45

Underwater Recovered Wreckage

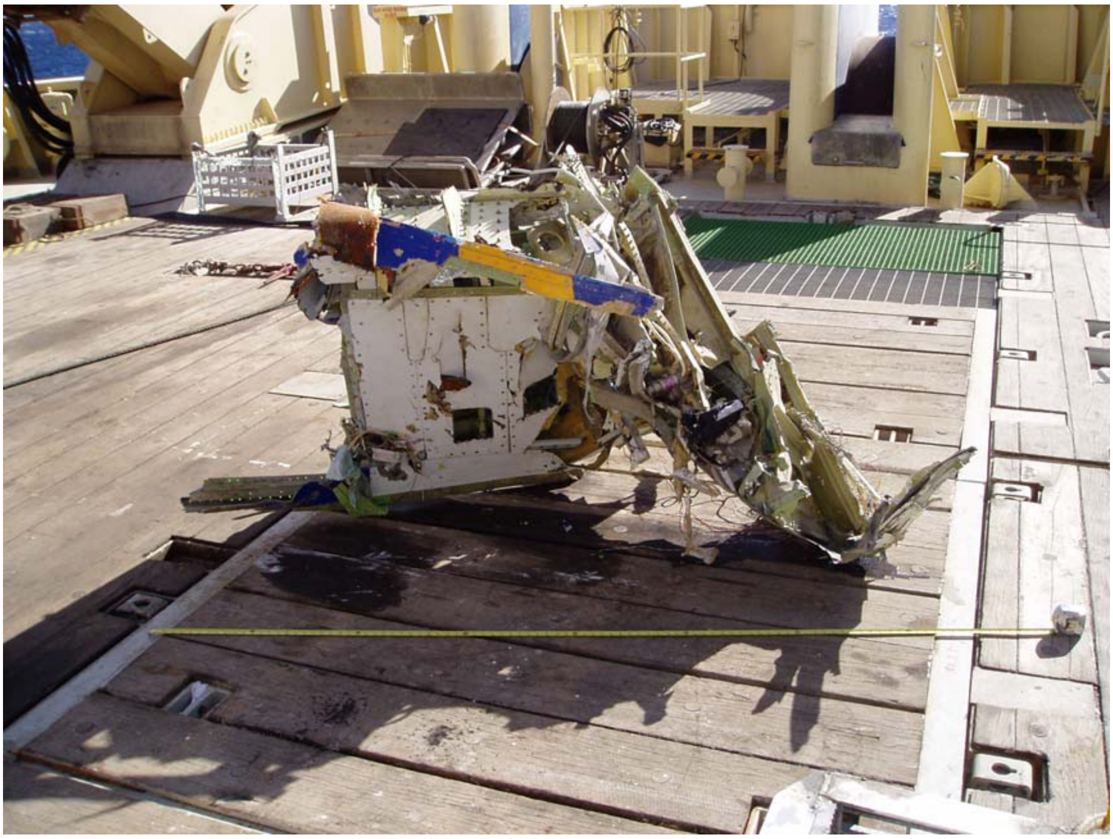

RW 13
52.3505
22.0192


RW15


RW15


RW18
N 27 52.3882
E 34 22.0006
RW18


RW19
N 27 52.5579
E 34 21.9930



STANLEY
RW 27
N 27 52.483
E 34 21.96


RW 38


AUTO NORMAL
COOL
COOL
OFF
MANUAL
WARM
WARM
RW 51
RW 51


RW36

Exhibit F

Operations Group Field Report

January 22, 2004

Group Chairman's Field Report

OPERATIONS

1. ACCIDENT

Operator:	Flash Airlines
Location:	Sharm-El-Sheikh, Egypt
Date:	January 3. 2004
Time:	0246 UTC[1]
Airplane:	Boeing B-737-300, SU-ZCF, Serial Number 26283

2. SUMMARY

On January 3, 2004, about 02:45:06 UTC, 04:45:06 Local time, Flash Airlines flight FSH604, a Boeing 737-300, Egyptian registration SU-ZCF, crashed into the Red Sea shortly after takeoff from Sharm el-Sheikh International Airport (SSH) in South Sinai, Egypt. The flight was a passenger charter flight to Charles de Gaulle Airport (CDG), France with a stopover in Cairo international Airport (CAI) for refueling. Flight 604 departed from Sharm el-Sheikh airport with 2 pilots (Captain and First Officer), 1 observer, 4 cabin crew, 6 off-duty crew members and 135 passengers on board. The airplane was destroyed due to impact forces with the Red Sea with no survivals.

The airplane had departed from Sharm el-Sheikh runway 22R and was air born at 02:42:33 UTC, approximately 2½ minutes prior to the crash, and had been cleared for a climbing left turn intercept the 306 radial from the Sharm el-Sheikh VOR station located just north of runway 22R. This climbing turn allows departing flights to gain sufficient altitude before proceeding over higher terrain located along the flight path to Cairo. Flight 604 was operating in Egyptian airspace as a charter flight operating under the provisions of Egyptian Civil Aviation Regulations Part 121

3. DETAILS OF THE INVESTIGATION

The Operations group convened at 1100 on January 14, 2004 at the offices of the Ministry of Civil Aviation. An interview was conducted with the Chief Pilot of Flash Airlines regarding the pilot and co-pilot qualifications. Pilot training records were reviewed and information was collected to include medical and flying licenses and total flying time. A member of the operations group participated in the interview of the ground engineer that flew

---

[1] All times are Universal Coordinated Time based on a 24-hour clock, unless otherwise noted. Actual time of accident is approximate, to be determined by the correlation of the Flight Data Recorder (FDR) and Air Traffic Control (ATC) transcripts.

on the airplane prior to the accident flight. A review of the weight and balance of the flight was conducted. Activities were concluded on January 22, 2003.

3.1 AIRPORT INFORMATION

According to the Aeronautical Information Publication (AIP), Sharm El Sheikh International Airport was located 23 kilometers northeast of the city. The elevation of the airport was 143 feet mean sea level. The airport had two paved parallel runways; 04L-22R and 04R-22L. Both runways were 3081 meters in length and 45 meters in width. Runways 04R and 04L had CAT 1 Approach Lighting System and runways 22R and 22L had Simple Approach Lighting System. Neither runway had runway centerline lights.

According the AIP Flight procedures, there was no standard departures and standard arrival routes or any other systematic procedures established within. Sharm El Sheikh approach airspace, heading, flight level, speed and or holding instructions shall be specified in approach control clearances to arriving and departing flights as appropriate to meet the requirements of traffic conditions.

3.2 FLIGHT CREW INFORMATION

Both flight crewmembers were certificated under Egyptian Civil Aviation Supervisory Sector Authority (ECASSA).

3.2.1 Captain Khedr Abdalla Saad Said

- Date of birth: February 26, 1950
- Date of hire with Flash Airlines: February 16, 2003
- Airline Transport Pilot Egyptian Certificate Number 561 (issued December 15, 1984)
    - Airplane Multiengine Land
    - Airplane Single Engine Land/Commercial Pilot
- Limitations: None
- Type Ratings:ATR-42, B-737/300/400/500 (issued May 27, 2003), DHC-5 Buffalo, C-130, Gomhorya.
- Medical: First Class (issued November 19, 2003)
- Limitations: None
- Initial Ground School Training:
    - Written Test: April 9, 2003
    - Oral Test: May 22, 2003
- Initial Simulator Training B-737-300/400/500: April 28 - May 12, 2003
- Initial Proficiency Check B-737-300/400/500: May 12, 2003
- Last Proficiency Check B-737-300/400/500: May 12, 2003
- Last Line Check: July 23, 2003
- Last Recurrent Training: December 16, 2003

- FLIGHT TIMES:

Total flight time (hrs/min)[2]:	7,443:45
Total flight time on B-737:	474:15
Total flight time PIC:	5,473:35
Military Instructor Flight time:	1,967:55
Total flight time last 24 hours[3]:	7:15
Total flying time last 30 days:	83:51
Total flying Time 90 days:	244:43

3.2.2 First Officer Amr Mahmoud Shafie

- Date of birth: January 1, 1979
- Date of hire with Flash Airlines: May 22, 2002
- Egyptian Commercial Pilot License Number 3284 (issued April 12, 1997), Commercial Pilot License issued by the Federal Aviation Administration (FAA) Certificate Number 2546582 (issued July 31, 1996)
    - Airplane Multiengine Land
    - Airplane Single Engine Land/Commercial Pilot
    - Instrument Airplane
    - Private Privileges
- Limitations: None
- Type Ratings: CESSNA (ISSUED April, 12, 1997) I, B737-200 (ISSUED July, 22,1998) II, B737-300/400/500 (ISSUED July, 18, 2002) II
- Medical: First Class (issued May 5, 2003)
- Limitations: None
- Initial Ground School Training:
    - Written Test: June 10, 2002
    - Oral Test: May 22, 2002
- Initial Simulator Training B-737-300/400/500: June 22 – June 30, 2002
- Initial Proficiency Check B-737-300/400/500: June 30, 2002
- Last Proficiency Check B-737-300/400/500: May 15, 2003
- Last Line Check: July 11, 2002

[2] Times are calculated for the captain up until December 31, 2003.
[3] Times do not include the accident flight.

- Last Recurrent Training: December 12, 2003
- FLIGHT TIMES:

Total flight time (hrs/min)[4]:	788:53
Total flight time B-737:	242:28
Total flying time last 24 hours[5]:	7:15
Total flying time last 30 days:	43:45
Total flying Time 90 days:	61:10

3.3 WEIGHT AND BALANCE

The Flash Airlines weight and balance calculations provided to the flight crew contained the following information[6]:

	Weight (kilograms)
Total Traffic Load	11,450[7]
Dry Operating Mass	33,200
Actual Zero Fuel Mass	44,650
Maximum Zero Fuel Mass	47,627
Takeoff Fuel	7,000
Actual Takeoff Mass	51,650
Maximum Takeoff Mass (Certificate Limit)	63,276
Landing Mass	49,650
Maximum Landing Mass (Certificate Limit)	51,709

Zero Fuel Mass Center of Gravity (CG)	20.0%	
Zero Fuel Mass CG Limits[8]	8.0% Forward	28.4% Aft
Takeoff Mass CG	18.0%	
Takeoff Mass CG Limits[9]	6.7% Forward	27.9% Aft

[4] Times are calculated for the first officer up until December 31, 2003.
[5] Times do not include the accident flight.
[6] See attached Flash Airlines Load and Trim Sheet.
[7] A review of the Load and Trim Sheet indicated a low 100-kilogram error. The total cargo weight plus passenger mass (Total Traffic Load) should be 11,550 kilograms. Correspondingly, the Zero Fuel Mass, Takeoff Mass, and Landing Mass will be low in error by the same 100-kilogram Mass.
[8] Estimated Zero Fuel Mass CG limits were derived from Flash Airlines Load and Trim sheet index chart based upon a Zero Fuel Mass of 44,650 kilograms.
[9] Estimated Takeoff Mass CG limits were derived from Flash Airlines Load and Trim sheet index chart based upon a Takeoff Mass of 51,650 kilograms.

- Stabilizer Trim settings for takeoff were:

  Flaps 1 or 5   4 ¾ Units

  Flaps 15   3 ¾ Units

- According to the Flash Airlines Flight Operations Manual Chapter 6, Paragraph 6.1.8.3, Passenger and Baggage Masses, the following chart was published:

	Male	Female
All flights except	88kg	70kg
Holiday	83kg	69kg
Children	35kg	35kg

- A review of the accident aircraft Load and Trim Sheet indicated a Passenger Mass of 9,450kg. If 350kg is removed for 10 children (10 x 35kg) the result is 9,100kg. Dividing the 125 adult passengers into the 9,100kg would give an average value of 72.8kg per adult passenger.

- Using the table above, and assuming 50% Male and 50% Female adult passengers, the worst-case difference in weight calculation would be the following:
  - The average weight of male and female for all flights except would be 88kg + 70kg / 2 = 79kg per adult passenger.
  - 79kg x 125 passengers = 9,875kg
  - The represents an increase in weight of 775kg.
  - Using this value for Load and Trim calculations provided the following information:
    - Takeoff CG 18.2%MAC
    - Zero Fuel Mass CG 20% MAC
    - Takeoff Trim (flaps 5) 4 ¾ Units

- These worst-case differences in values for passenger weight still fall within structural and calculated limitations for the airplane.

3.4 AIR TRAFFIC CONTROL

An Interview with the Director of Radar Airports, National Air Navigation Service Company indicated that at SSH, the local controller and the departure controller were the same person. The previous last flight departure before the accident flight departed about one hour earlier. An arrival flight landed less than 10 minutes after the accident flight departed. Radar was operating but no radar service was provided to the accident flight.

According to the Director, there were no Standard Instrument Departures (SIDs), or Standard Terminal Arrival Routes (STARs) in Egypt. Clearance was provided to the accident flight crew while on the ground and the departure included a left turn at pilot's discretion and to climb to Flight Level (FL) 140 overhead the SSH VOR/DME and to intercept the airway A411[10]. The minimum crossing altitude for ATC purposes was 4,000 feet, however, pilots prefer to cross at or above 10,000 feet.

[10] See attached ATC transcript for exact wording.

According to the Director, the prevailing winds at SSH require the use of runway 04L 70%-80% of the year. On the date of the accident, runway 04L was being used. However, sometime during the day prior to the accident, the runway was changed to 22R.

There was not an inspection of the runway after notification of the accident, however, it was stated that the landing airplane after the accident did not report debris on the runway. There is a daily runway inspection performed at SSH.

3.5 METEROLOGY

Sharm El-Sheikh does not provide Automatic Terminal Information Service (ATIS).

The SSH weather at 0200Z was reported as:
270 degrees at 06 knots, Ceiling and visibility OK (CAVOK) temperature 17 degrees Celsius, dewpoint minus 6 degree Celsius, altimeter 1011 hectoPascals (hPa), No significant change (NOSIG).[11]

The SSH weather at 0300Z was reported as:
280 degrees at 08 knots, Ceiling and visibility OK (CAVOK) temperature 17 degrees Celsius, dewpoint minus 6 degree Celsius, altimeter 1011 hectoPascals (hPa), No significant change (NOSIG).

[11] See attached weather reports for SSH.

2.0 ANALYSIS

2.1 Analysis Overview

Methodology used:

During the investigation, the accident investigative team, which consisted of Egyptian, French, and U.S. investigators, mutually agreed upon and adopted a "scenario tree" methodology to determine the accident sequence of events.

As part of this methodology, the investigative team identified possible accident scenarios, and sufficient evidence existed for the team to rule out the inapplicable scenarios.

The team then examined the remaining scenarios and the evidence collected during the investigation to determine which scenario most likely explained the accident sequence of events.
This Fault Tree Methodology has been applied for both:

- Technical related issues
- Human Factors related issues

Fault Tree Methodology Breakdown:

1) Define Accident Top Event

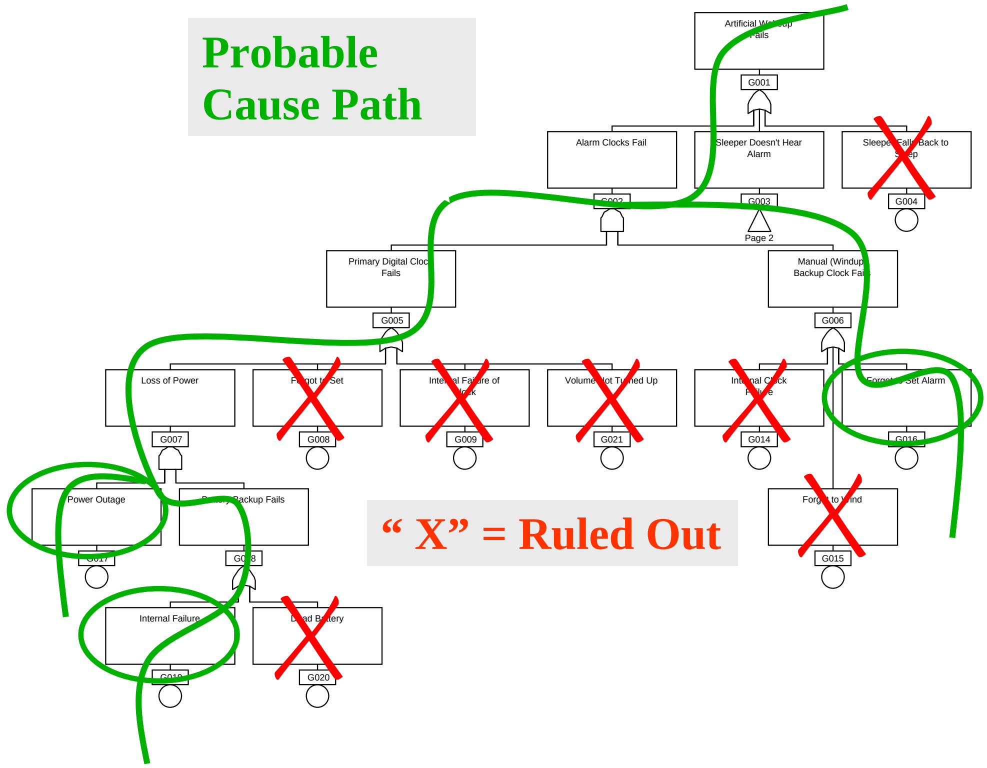
    - Gather Performance, Data Recorders, and Operational Factors Investigators to brainstorm

    - Layout all known evidence and facts related to

    - Develop Sequence of Events if timing of events is known

    - Decide on a description of what went wrong with the aircraft

2) Determine Most Direct Causes
3) Continue Breaking Down Causes
4) Use Facts to Draw Conclusions
5) Define Probable Cause Path



Probable Cause Path
Alarm Clocks Fail
Sleeper Doesn't Hear Alarm
G001
G003
Page 2
G004
Primary Digital Cloc
Fails
Manual (Windup
G005
G006
Loss of Power
G007
G008
G009
Volume
G021
G014
Power Outage
G015
Internal Failure
G020
“ X” = Ruled Out

Overview:

The analysis Chapter addresses the following issues:

- Airplane Performance Evaluation

  The performance evaluation was intended to study the behavior of the flight control surfaces as related to the inputs to the flight controls, and the airplane behavior as related to the movement of the control surfaces.

  In order to accomplish this work, Boeing's 737-300 aerodynamic simulation model was used to recreate the accident flight based on the data recorded in the FDR.

  A simulation procedure was used to calculate the response of the airplane to movement of the flight control surfaces.
  Small differences between the simulation and individual airplane's behavior are common and expected due to differences in control surface rigging, engine wear, and other normal tolerances.

  A Kinematic consistency (KINCON) process was used to supplement the FDR data and calculate additional parameters to be used in the performance analysis.

  Information from the airplane performance model, wind tunnel data, flight test data, control surface models, propulsion model, autopilot model, etc, were used.

  A baseline simulation recreation of the accident flight was started just as the airplane turned on to the runway and the throttles were advanced, and the simulation was stopped at the end of the FDR data.

  An examination of the baseline simulation revealed that the path of the accident airplane is consistent with the recorded motion of the control surfaces. Specifically, the extreme bank attitude that occurs towards the end of the flight is consistent with recorded motion of the ailerons.

  A sensitivity analysis was made for one of the airplane parameters (pressure altitude). The analysis showed that the M- Cab computed parameters are quite sensitive to the values of the used input parameters, for example an amount of 65 lb change in the airplane weight would result in a change of the computed altitude by an amount of 200 ft

  Weight and Balance data were analyzed. Analysis revealed a normal airplane loading with correct computations of the airplane weight, c.g. location, stabilizer setting and the Take Off speeds V1, VR, V2.

  Radar data was analyzed. An examination of the Radar data and the FDR data revealed that the path of the accident airplane as derived from the Radar data is consistent with the it's path as derived from the FDR date

- Analysis of Airplane systems behavior:

  All the airplane systems parameters have been thoroughly examined. All parameters were plotted against time. In several cases, several parameters were plotted together whenever needed to support the investigation. It was noted that several parameters had invalid data.
  All the systems were examined to check there behavior through the flight.

  The M-Cab was used to derive some of the missing data (including the control wheel position). The remaining invalid data did not inhibit the investigation

- Main events in Chronological sequence
  For the sake of the analysis, all the main events were listed in a chronological sequence. These events were used with the fault tree analysis.

- Analysis of the main events

  The methodoly adopted by the investigation team for the analysis was as follows:

  - To collect all pertinent information from the available sources (FDR, CVR, records, manuals, questionaires, etc) and process this data as required.
  - To list and encode the Main events in Chronological sequence
  - To use the facilities associated with the fault tree analysis technique to analyse each individual event.
  - To list all the possible causes and hypothetical conditions leading to each individual event.
  - To rule out all the conditions which seem not pertinent to the event based on systems and human Factors reviews and consider the remaining conditions.
  - To review all the other remaining conditions from the point of view of the systems and the human factors analysis
  - Listing the Pros (issues that support the probabilty of condition occurrence) and Cons (issues that do not support the probabilty of condition occurrence) related to each condition
  - Determining the most probable cause (s) for each individual events

  After several meeting of the investigation team held in:
  - Cairo January 2004
  - Cairo March 2004
  - Paris May 2004

- Seattle September 2004
- Cairo February 2005
- Cairo August 2005

Two studies have been developed by the whole investigation team jointly addressing both the:

- Systems analysis (fault tree)
- Crew behavior

The contents of the study related to the “Systems analysis (fault tree)” is shown in section 2.5

See section “2.6 Crew Behavior”, Thread Overview Updates Cairo 26-Aug-05, Flash Air CBS Sub-group Comments (25 August 2005)”

2.2 Airplane Performance Evaluation:

2.2.1. General

The performance evaluation was intended to study the behavior of the flight control surfaces as related to the inputs to the flight controls, and the airplane behavior as related to the movement of the control surfaces.

In order to accomplish this work, Boeing's 737-300 aerodynamic simulation model was used to recreate the accident flight based on the data recorded in the FDR.

FDR relevant parameters:

Several parameters were recorded in the FDR (related to the aircraft performance including):

- The movements of the pilot's controls:
    - Control column
    - Control wheel position (FDR data is not reliable)
    - Rudder pedals
    - Speed brake handle
- The movement of the primary control surfaces:
    - Elevators
    - Ailerons
    - Rudder
    - Stabilizers
- The movement of the secondary control surfaces:
    - T.E. Flaps
    - L.E. Devices (flaps, slats)
- Motion of the airplane:
    - Pitch
    - Angle of attack
    - Roll attitude
    - Heading angle
    - Drift angle
- Airplane acceleration
    - Vertical
    - Longitudinal
    - Lateral
- Additional parameters, including:
    - Airplane pressure altitude
    - Radio height
    - Computed airspeed
    - Barro corrections
    - Ground speed
    - Total Air Temp
    - Gross weight
    - Wind speed
    - Wind direction
    - Stick shaker condition
    - Present position Lat

- Present position Long

2.2.2 Simulation procedure:

The simulation calculates the response of the airplane to movement of the flight control surfaces – for example, it can calculate the roll rate resulting from a 10 degree deflection of the ailerons. The simulation has been verified by comparison against actual flight test data and was used for the design and certification of the 737-300 airplane. In addition, the simulation is the basis for 737-300 crew training simulators used around the world.

However, and because the 737-300 simulation model is essentially a computer program that represents a nominal airplane with nominal engines, small differences between the simulation and individual airplane's behavior are common and expected due to differences in control surface rigging, engine wear, and other normal tolerances.

FDR data are recorded at relatively low sample rates (most of the parameters are recorded each one seconds) and are recorded from different sources, some of which have inherent biases. Because of these issues, a Kinematic consistency (KINCON) process was used to supplement the FDR data and calculate additional parameters to be used in the performance analysis. Kinematic consistency analysis is a general practice for processing flight data (either flight test data or FDR data) to ensure consistency of position, speed, and acceleration data.

The KINCON Process independent of control surface inputs, it also performs the following:

- Removes constant biases from FDR accelerations
- Ensures corrected acceleration data are consistent with FDR ground speed, drift angle, and altitude
- Can derive parameters not recorded
- Provides calculated parameters with higher sample rates than FDR parameters

Kinematic consistence (KINCON) also models the accelerations and Euler angles as smooth functions which allows more accurate calculation of derivatives

The Kinematic consistency process does not make any assumptions about the aerodynamic properties of the airplane. In fact, the process can be applied to any moving object

Based on the airplane performance model, wind tunnel data, flight test data, control surface models, propulsion model, autopilot model, etc, the primary performance parameters can be derived at time t_1 based on their values at time t_0.
These primary performance parameters include:

- Column
- Wheel
- Pedal
- Pitch
- Roll

- Heading
- Stab
- Thrust
- Flaps
- Gear
- Altitude
- Airspeed

The resulting simulation data can be separated into different categories

1. Math pilot – not calculated using corresponding FDR data for the main primary control inputs (Column, Wheel and Pedal)
2. Kincon Output – kinematically consistent path data (accelerations and angles) for the airplane Euler's angles (Pitch, Roll, Heading)
3. Pass Through Data- FDR data is used directly as an input to simulation for the following parameters
   - Stab
   - Thrust
   - Flaps
   - Gear

   In some cases, a correction is added to improve the simulation match of the path (thrust may be added to better match airspeed)

   For Flash Airlines simulation the stabilizer was adjusted to account for control column bias (2.9° offset), and the throttle lever position was adjusted to improve match of airspeed and altitude

4. Simulator Output – not calculated using corresponding FDR data, but is a direct result of the aero model for parameters like Altitude and airspeed

Pass Through Data:

For Flash Airlines simulation:

- Stabilizer was adjusted to account for control column bias (2.9° offset)

- Throttle lever position was adjusted to improve match of airspeed and altitude

A baseline simulation recreation of the accident flight was started just as the airplane turned onto the runway and the throttles were advanced, and the simulation was stopped at the end of the FDR data. Because the simulation can calculate the response of the airplane to control inputs, a set of control input time histories (column, wheel, and rudder movements) were determined that results in the simulation following the same path as the accident airplane. It is important to note that this process does not use the control or surface position data recorded on the FDR, only the path information (e.g. accelerations, attitude and altitude).

Comparisons between the recorded FDR data and the simulation time history data are provided for longitudinal and lateral/directional data in Figure 1.16.2-1 and Figure 1.16.2-2 respectively.

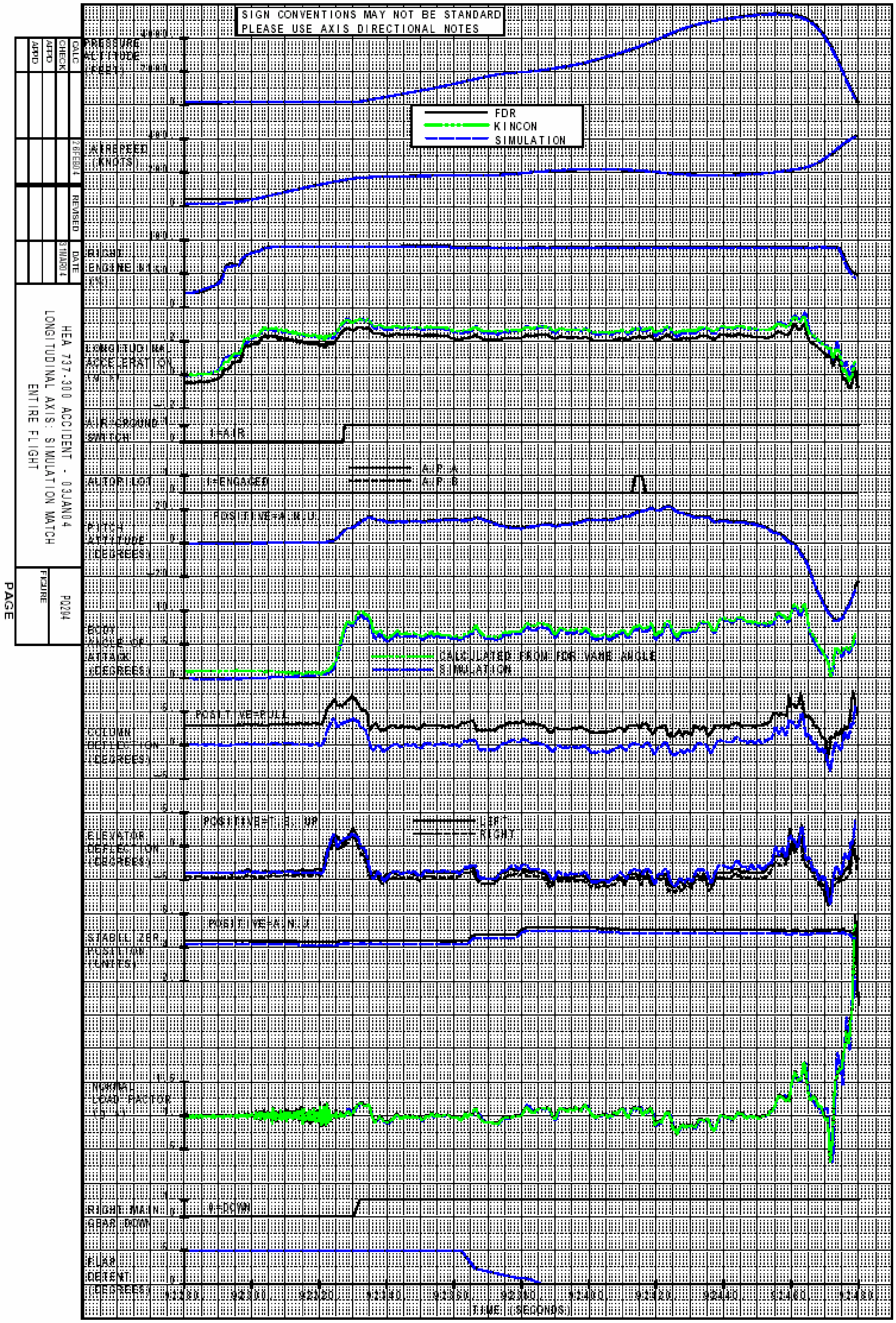


Figure 1.16.2-1 – FDR and Simulation Match Data – Longitudinal Axis

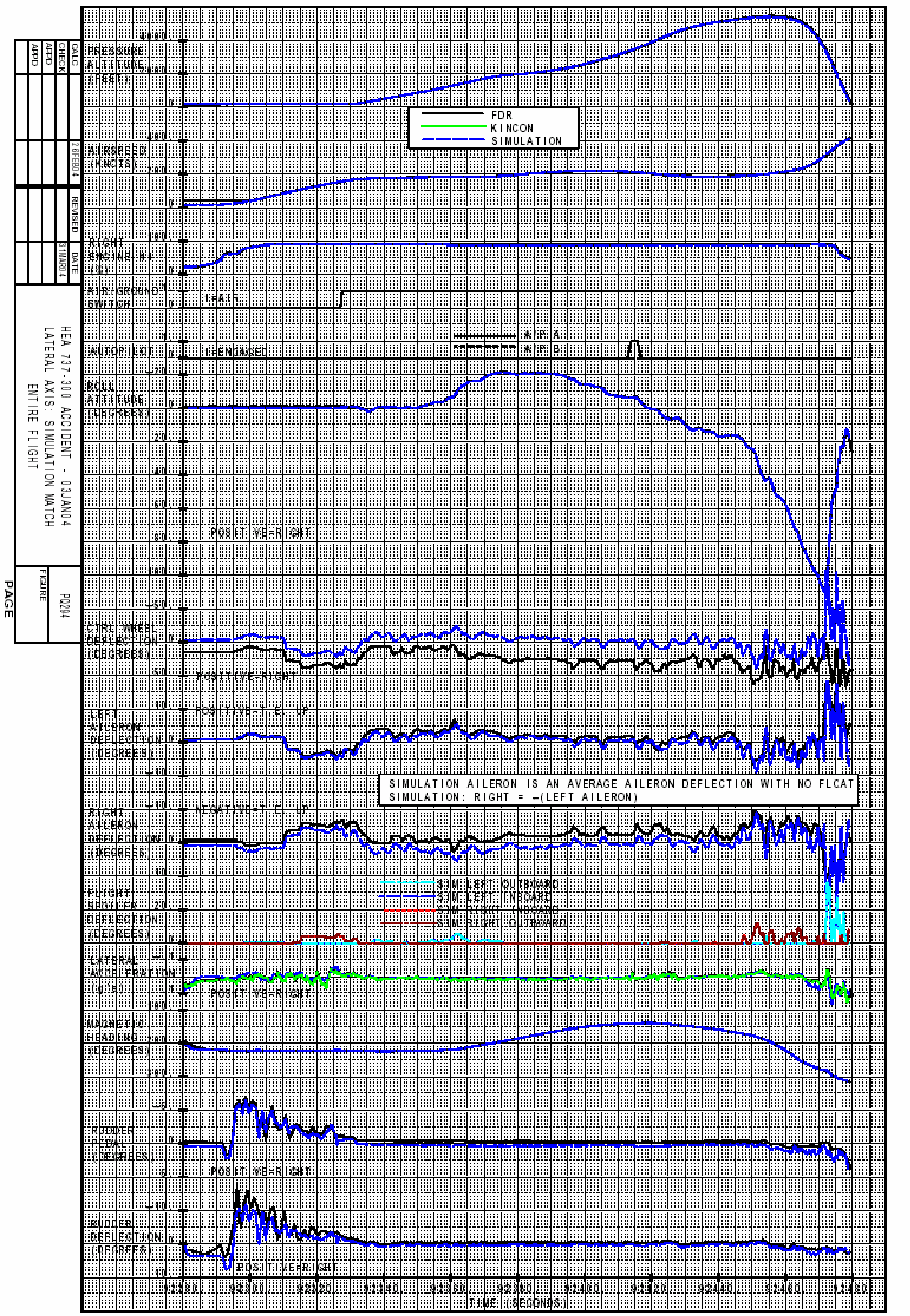


Figure 1.16.2-2 – FDR and Simulation Match Data – Lateral/Directional Axis

An examination of the baseline simulation revealed that the path of the accident airplane is consistent with the recorded motion of the control surfaces. Specifically, the extreme bank attitude that occurs towards the end of the flight is consistent with recorded motion of the ailerons.

Conclusion (Simulation):

Based on the simulation data, the motion of the control surfaces showed consistency with the recorded motion of the control inputs, with the exception of control wheel (because of the unreliable recorded control wheel data)
(See also the conclusion of the sensitivity analysis)

2.2.3 Sensitivity analysis:

Accident flight is approximately 147 seconds long; simulator match of altitude differs by approximately 200 feet (refer to Fig xx Pressure Altitude vs time frames, FDR and Simulation data)

A sensitivity analysis for straight and level flight 147 seconds long was made to determine how much the altitude can be affected by the lift force on the airplane Using Newton 2nd law relating the vertical forces to vertical acceleration and then integrating to get the height z we get

F= M*A

F= L-W

$$\ddot{z} = \frac{L-W}{W}$$

$$z = \iint \frac{L-W}{W} dt^2$$

For constant weight

$$z = g\,\frac{L-W}{W}\,\frac{t^2}{2}\Big|_{t_1}^{t_2}$$

Assume altitude error is result of incorrect lift

$$\Delta z = g\Delta\frac{L-W}{W}\frac{t^2}{2}$$

Solve for ΔL

$$\Delta L = \frac{2W\Delta z}{g\,t^2}$$

By substitution, it can be noted that

A 65 lb error in calculated lift will result in an altitude error of 200 ft after 147 seconds.

(Refer to section 1.16.1.0 Tests and researches conducted by Boeing and Honeywell, Kinematic Consistency)

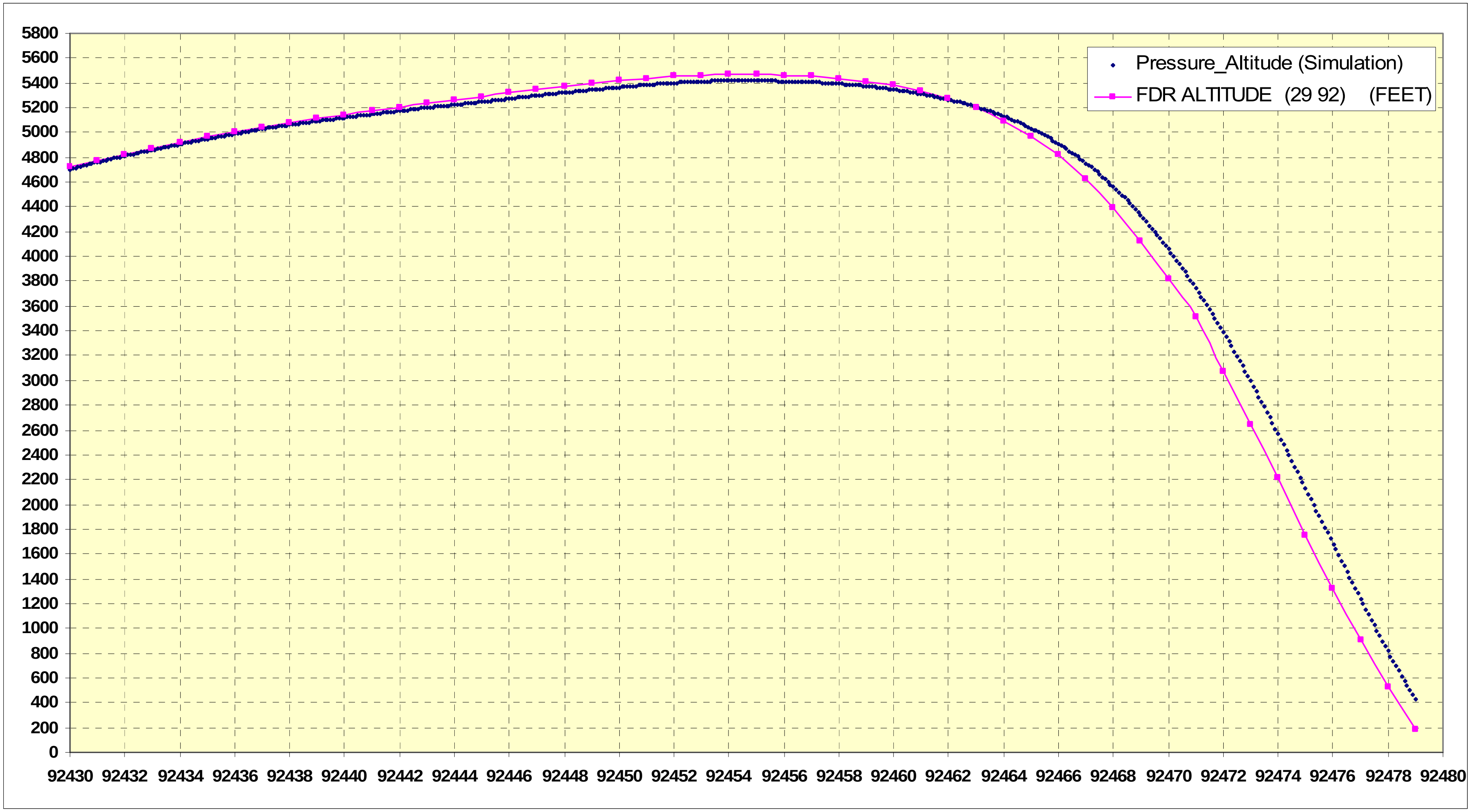


Fig 2.2.3.1 Pressure Altitude vs time frames (FDR and Simulation data)

Conclusion (Sensitivity analysis):

The results obtained from the M-Cab tests indicate that the computed parameters are quite sensitive to the values of the used input parameters, for example an amount of 65 lb change in the airplane weight would result in a change of the computed altitude by an amount of 200 ft[1]

---

[1] Altitude was not one of the primary parameters matched for the M-cab simulations. Rather, it is the result of the simulation attempting to match pitch attitude and vertical acceleration. Very small differences in column command would result in a more exact match of altitude, at the expense of matching pitch attitude

2.2.4 Weight and Balance[2]

Although the average weight for passenger used in Load and Trim sheet for the Weight and Balance calculation was not the one given in the airline Flight Operations Manual, none of the available data relevant to the airplane weight and balance showed evidences of airplane loading abnormality. Computations of the airplane weight, c.g. location, stabilizer setting and the Take Off speeds V1, VR, V2 were correct.

[2] See Chapter 1 Factual information Exhibit D Airplane Performance Group Factual Report, section C6 Weight and Balance

2.2.5 Analysis of Radar data:[3]

In the following Figures the aircraft path (indicated by Lat-Long and x-y coordinates) based on radar data is shown

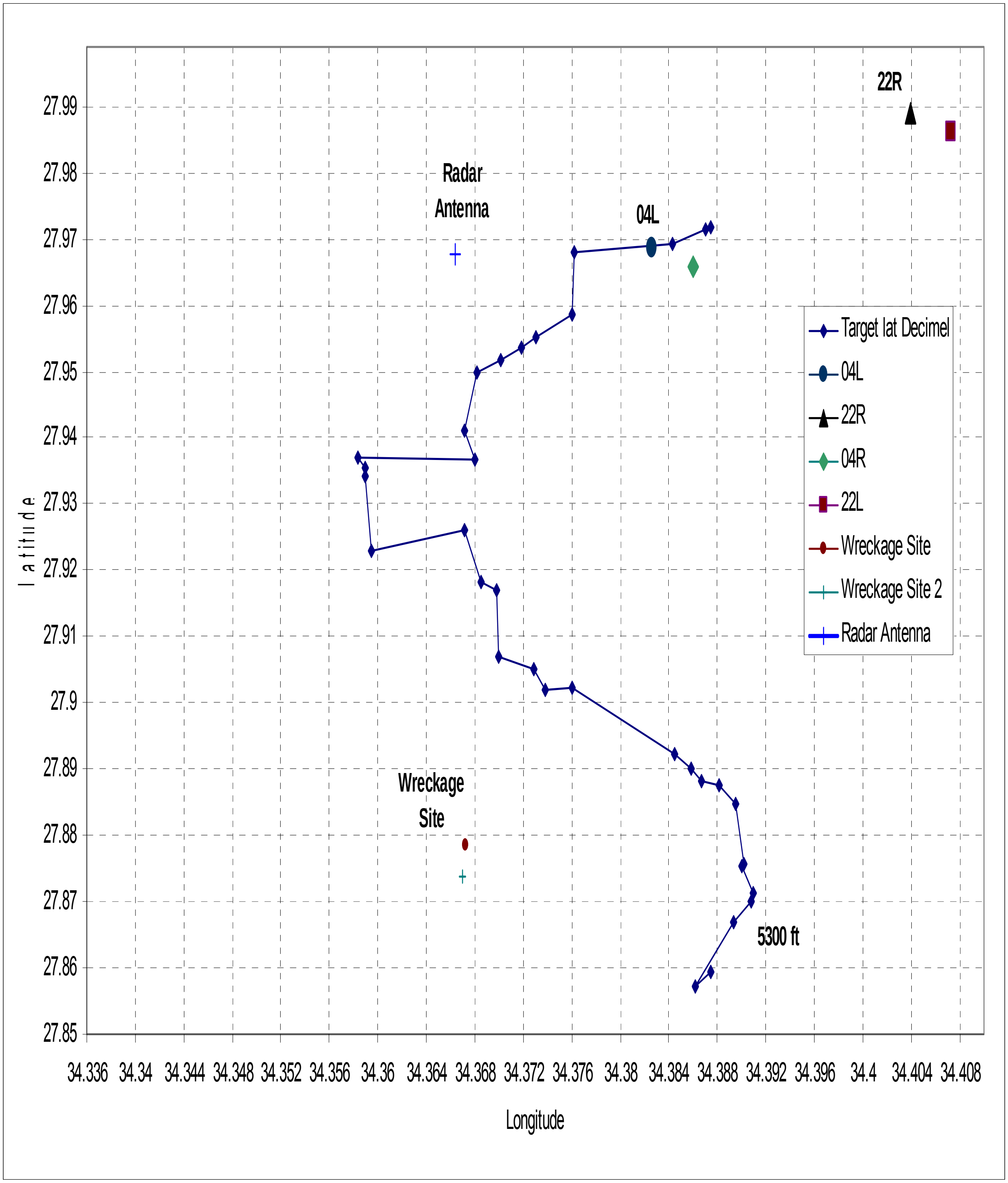


Figure C.2-1 Radar Data Plot, Sharm El Sheik Radar

[3] Refer to Factual report section 1.8 and Exhibit D (Radar Data Analysis)

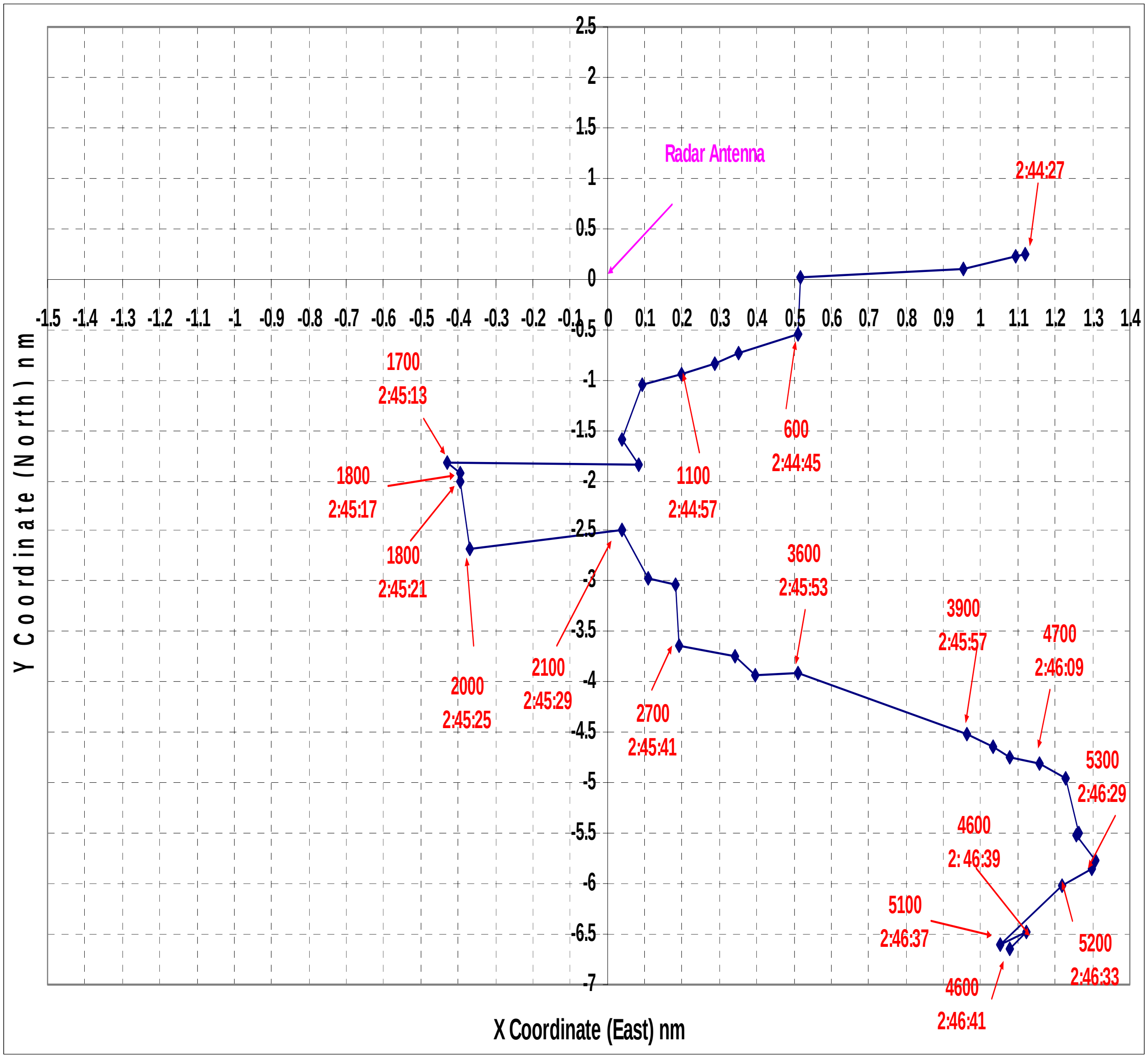


Fig C.2-1a Coordinates (Derived from Radar Data)

(Latitude and longitude coordinates, are transformed into this coordinate system using the WGS84 ellipsoid model of the Earth).

It is noted that the time scale of the radar is not exactly in match with the time scale of FDR. Based on the FDR timing, the airplane crashed in the water at 02:45:06 GMT (92480), while the radar indicated airplane disappearance at 02:47:27 GMT (about 141 seconds later). The last radar return from the airplane which can be considered as reliable was at 02:46:39 Radar time (about 92467 second frames on

the FDR data based on the altitude data). The airplane altitude shown was 4600 ft. The radar data did not show any further smaller altitudes.
The letter n was shown on the Radar data starting from 02:46:47 radar time (about 92475 second frames on the FDR)
The letter n indicates that mode C altitude has not been updated for approximately 7.5 seconds and is considered unreliable, aircraft is below adapted transition level and altitude is in hundreds of feet above mean sea level

Conclusion (Radar data):

An examination of the radar data and the FDR data showed that the path of the accident airplane as derived from the radar data is consistent with the path as derived from the FDR date

2.3 Analysis of Airplane systems behavior:

2.3.1 Environmental Control System (ECS)

The FDR records some parameter related to ECS including:

- ECS packs status (On/ Off, Low/ High)
- Isolation valve poaition (Closed/ Open)
- Cabin pressure altitude (if higher than 10,000 ft)

Based on FDR data and CVR recorded information, there is no evidence of ECS system failure or abnormal behavior. Thus, the ECS system does not have any relation with the accident.

2.3.2 Fire

The FDR monitors the following for conditions of fire:

- Engine 1 and 2
- APU
- Wheel well
- Lavatory (monitors for smoke)

Based on FDR data and CVR recorded information, there is no evidence of any fire condition in the engines, APU, the lavatories nor the wheel well..

2.3.3 Flight controls

The Following parameters were recorded in the FDR

:Analog Data:

- Ailerons positions (Degrees)
- Elevators position (Degrees)
- Pitch Trim position (Degrees)
- Rudder position (Degrees)
- TE Flaps position (Degrees)
- Control wheel position (Degrees)
- Control Column position (Degrees)
- Rudder Pedal position (Degrees)
- Speed Brake Handle position (Degrees)

▪ Discrete Data

- Alternate Flaps switch position
- L.E Flaps # 1,2,3,4 status (Extend, In Transit)
- L.E Slats # 1,2,3,4,5,6 status (Full Extend, In Transit, Mid Extend)

Close observation of the flight controls parameters showed the following:

- Some parameters values were unreliable
  - Aileron control wheel
  - Slat # 1 (showed mid extend position from the very beginning)

- The two ailerons shows a bias of about one degree TEU (Trailing Edge Up) before airborn. After airborn, the bias changed to about 2.7 degrees. (The changes in aileron position bias could be caused by the Airload on the aileron reacting against the wing cable run between the aileron and aileron PCU. Therefore, the bias in aileron position is due to aileron hinge moment which varies as a function of airspeed).

- The Pitch trim reading indicated a constant bias from the expected trim position. This bias was corrected in the M- Cab tests.

- Because the spoiler surface positions are not recoreded in the FDR, any possible abmormality with the spoiler surfaces data can not be shown by the FDR.

- For the consistency analysis between the airplane behavior and the flight control surfaces, See section 2.2 Airplane Performance evaluation.

- A full analysis of the aircraft lateral control system has been done (refer to appendix 2-1 lateral control analysis). All the hypothetical failures in the system have been comprehensively studied All the scenarios resulting from each individual failure (or combination of particular failures) were checked against the accident scenario. Most of the hypothetical failures scenarios were ruled out because of there inconsistency with the accident scenario. The remaining hypothetical scenarios were further examined because they could not be excluded based on a review of FDR data.These hypothetical failures scenarios are as follows [1]:
  - Both trim switches are stuck closed in the same direction:
  - Autopilot actuator, both Solenoids and Transfer Valve Jammed (Actuator Hardover without Force Limiter 17 to 20 lb Force)
  - (Spoiler wing cable jam) offset of the neutral position at time 92450 (maximum wheel deflection).and clears at 92472
  - (F/O wheel jam) offset of the neutral position at time 92450 (maximum wheel deflection).and clears at 92472

2.3.4 Fuel system:

The Total Fuel Mass is the only parameter recorded in the FDR. It is sampled each 64 seconds. Only three samples were recorded as follows:

Time (seconds)	Total Fuel Quantity (KGS)
92304	6404.732

[1] See the complete analysis in section “2.5.13 Right roll continues to overbank with ailerons activities, the lateral control system”

92368	6858.325
92432	6549.882

The amounts of fuel in each individual tank are not recorded in the FDR. Thus the FDR fuel information does not identify any condition of fuel assymetry (if any)

The fuel mass as recorded in the Load Sheet was 7000 kg. It is noted that the FDR showed some slight increase in the Total Fuel Quantity between 92304 and 92368 (about 450 Kg). Change of airplane attitude and the airplane acceleration could explain these abnormal changes.

However, the available information indicates that the fuel system did not have any relation with the accident

2.3.5 Hydraulic system

The FDR records some parameter related to Hydraulics including:

- Systems pressure (system A and system B)
- Hydraulic pumps output pressure status (A hydraulic pumps, B hydraulic pumps, standby pump)

(Sample rate is 64 seconds)

Close observation of the hydraulics parameters showed the following:

- The System pressure recorded for both system A and system B were unreliable (press values were above 5000 psi)
- Hydraulic pumps output pressure status (A hydraulic pumps, B hydraulic pumps, standby pump) showed “No Low Press” status
- Sys A hydraulic loads (Landing Gears, T.E. flaps. L.E. Devices) were driven to the commanded positions.
- Flight control surfaces (powered by A and B systems) showed several movements through out the whole flight.

Based on the FDR available date, there is no evidence that the hydraulic systems do not have any relation with the accident.

2.3.6 Landing Gears

The Following parameters were recorded in the FDR (Sampling rate was each one second)

- Brake Press (Left, Right)
- Gear Position (Nose, L main, R main)
- Gear Red Warning Light (Nose, L main, R main)
- Air/ Ground (Main, Nose)
- Wheel Well Fire
- Main/ Alt Brake Switch

Close observation of the engines parameters showed the following:

- Wheel Well Fire recording is unreliable (always changing between Fire and No-Fire status)
- Gear Red Warning Light (Nose, L main, R main) showed red warning at the time of retarding the throttles levers. This condition could be normal with Landing Gears in the up position.

Based on the FDR available date, there is no evidence that the landing gears have any relation with the accident.

2.3.7 Power plants

The FDR records the following parameters for both engines:

- N1 (%RPM)
- N2 (%RPM)
- FUEL FLOW
- THRUST LEVER ANGLE

- ENG OIL PRESSURE
- ENG OIL QUANTITY
- OIL TEMP

- ENGINES CUTOFF LEVER Position Status
- ENGINES FIRE Status

- ENGINES T/R L, R SLEEVE DEPLOYED Status
- ENGINES T/R L, R SLEEVE NOT STWD Status

- CN1 (Low Press Compressor) TRACKED VIB
- CN2 (High Press Compressor) TRACKED VIB
- TN1 (Low Press Turbine) TRACKED VIB
- TN2 (High Press Turbine) ACCEL SRC
- FAN IMB ANGLE

- COWL ANTI ICE Status
- ENGINE BLEED Status

- PMC (Power Management Computer) Status

- GO AROUND N1 (%RPM)
- MAX CONTINUOUS N1 LIMIT (%RPM)
- MAX CLIMB N1 LIMIT (%RPM)
- MAX CRUISE N1 LIMIT (%RPM)

- N1 BUG DRIVE (%RPM)
- TARGET N1 (%RPM)

Close observation of the engines parameters showed the following:

- Some parameters values were unreliable
    - CRUISE N1 LIMIT #2
    - N1 L
    - ENG 1 CUTOFF lever position
    - ENG 2 CUTOFF lever position

- All T/R Sleeves Showed stowed and locked position

- Engine bleeds were on

- Based on N2 comparison for both engines, the two engines showed symmetrical thrust

- Engines power were reduced at about 92472 timeframe (seconds) (consistent with CVR announcements) The left engine PLA data indicated slight throttle lever advancement at 92477 ending at 92479

- Both PMC's (Power Management Computer) were On.

- Fire discrete parameters indicated "No Fire" in the engines

Based on the FDR available date, there is no evidence that the engines have any relation with the accident.

2.3.8 APU

Only the APU FIRE status was recorded in the FDR

Based on the FDR available date, there is no evidence that the APU has any relation with the accident.

2.3.9 Auto Flight & Communication:

The Following parameters were recorded in the FDR (Sampling rate was each one second in most cases):

Analog Parameters:

- DH SEL (FEET)
- DISTANCE TO GO (NM)
- DME DISTANCE L (NM)
- DME DISTANCE R (NM)
- G/S DEV EFIS (DDM)
- LOC DEV EFIS (DDM)
- SEL AIRSPD FCC L (KNOTS)
- SEL ALT FCC L (FEET)
- SEL COURSE 1 (DEG)
- SEL COURSE 2 (DEG)
- SEL HEADING FCC L (DEG)
- SEL MACH FCC L (MACH)
- VOR/ILS FREQ L (MHz)
- VOR/ILS FREQ R (MHz)

Discrete parameters

- Range Selection Status (Captain, F/O)
- A/P Off Status
- A/P Warning Status
- A/T Engage Status
- A/T GA Status
- A/T Limit Status
- A/T Manual Disconnect Status
- A/T MCP Speed Engagement Status
- A/T MIN Speed Engagement Status
- A/T N1 Engagement Status
- A/T Retard Engagement Status
- A/T Warning Status
- AIRPORTS Select Status (Captain, F/O)
- ALT ACQ FCC Engagement Status
- ALT HOLD FCC Engagement Status
- APPROACH FCC Engagement Status
- CMD A FCC Engagement Status
- CMD B FCC Engagement Status
- CWS A FCC Engagement Status
- CWS ROLFCC L Engagement Status
- DONT SINK Status
- EFIS /NON EFIS Selection
- EFIS SEL SW CAPT Status
- EIS /NON EIS Status
- EVENT MARKER Status
- F/D A ON FCC Status
- F/D B ON FCC Status

- FLARE ENGA FCC (0-. 1-ENGA)
- FMC SEL SW Status (Captain)
- FMC/IRU DATA SOURCE Selection(0-IRU 1-FMC)
- FULL COMPASS ROSE Selection (Captain, F/O)
- G/S ENGA FCC Engagement Status
- G/S GPWS Status
- HDG SEFCC L Engagement Status
- HF KEYING Selection (Left, Right)
- ILS (MOD) Selection (Captain, F/O)
- ILS (STD) Selection (Captain, F/O)
- INNER MARKER Status
- IRS SEL SW Selection (Captain)
- L NAV ENGA FCC Engagement Status
- LEVEL CHANGE FCC Engagement Status
- LOCAL LIMITED MASTER Setting Status
- MAP MD SEL Status (Captain, F/O)
- MASTER CAUTION Status.
- MCP SPEED FCC Engagement Status
- MIDDLE MARKER Status
- MINIMUMS Status
- MLS SEL (Left and Right) Selection
- NAV AIDS Selection Status (Captain, F/O)
- NAV MODE SEL Status (Captain, F/O)
- OUTER MARKER Status
- PLAN MD SEL Status (Captain, F/O)
- PULL UP Status
- ROUTE DATA SEL (Captain, F/O)
- SCAN DME / NON SCAN DME Status
- SINGLE CHANNEL FCC L Engagement Status
- SINK RATE Status (0-. 1-TRUE)
- STICK SHAKER Status (Left and Right)
- TERRAIN Status
- TERRAIN PULL UP Status
- TO/GA FCC Engagement Status
- TOO LOW FLAP Status
- TOO LOW GEAR Status
- TOO LOW TERRAIN Status
- TRIM DN A/P Trim Status
- TRIM DN MAN Trim Status
- TRIM UP A/P Trim Status
- TRIM UP MAN Trim Status
- TRUE / MAG SW Selection Status
- V/S MODE FCC Engagement Status
- VHF C KEYING Status (Left, Center, Right)
- VOR (STD) SEL Status (Captain, F/O)
- VOR MD SEL Status (Captain, F/O)
- VOR/ILS SEL Status (Left, Right)
- VOR/LOC ENGA FCC Engagement Status
- WAY POINT SEL Status (Captain, F/O)
- WINDSHEAR Status
- WINDSHEAR CAUTION Status

- WXR DATA Selection Status (Captain, F/O)
- YAW DAMPER DISENGAGE   Status
- A/P OFF FCC Status
- A/P WARNING Status
- CMD A FCC Engagement Status
- CMD B FCC Engagement Status
- CWS A FCC Engagement Status
- CWS ROLL FCC L Engagement Status
- HDG SEL FCC Left Engagement Status

Close observation of the Autoflight Systems showed the following:

- A/P OFF FCC status showed ON condition at 92413 and then OFF Condition at 92416
- CMD A FCC Status showed an engagement condition at 92413 and then disengagement at 92416
- A/P WARN status showed warning condition at 92416, the warning ended at 92417
- A/T ENGA showed engagement status throughout the flight.
- A/T MAN DISC showed no manual disconnection
- A/T N1 showed disengagement condition up to 92295, then A/T N1 showed engagement condition up to 92308. A/T N1 remained disengaged in the interval between 92309 and 92355, after that A/T N1 remained Engaged.
- CWS ROLL FCC L showed engagement condition at 92413, then disengagement at 92416
- FD A ON FCC, FD B ON FCC showed ON condition throughout the whole flight.
- HDG SEL FCC L showed engagement condition at 92341 up to 92413. HDG SEL FCC L was disengaged at 92414 up to 92421. After that it remained engaged till the end of the flight
- LEVEL CHANGE FCC showed engagement status at 92344. Engagement condition remained till the end of the flight
- Course selected was 306 (sampled every 64 seconds)
- Heading selected was ~360 degree (at 92323) followed by ~107 degree (at 92387) then ~ 85 degrees (at 92451). Heading was sampled every 64 seconds.
- VOR selection was 114.2 MHz
- MCP SPEED FCC showed engagement condition at 92344. Engagement condition remained till the end of the flight
- TOGA FCC showed an engagement condition only for 2 seconds (92296, 92297)
- WINDSHEAR and WINDSHEAR CAUTN did not show any condition of Windshear.

Full analysis of the main events related to Auto Flight Systems has been carried out. (See section 2.5. Anaysis of the chronological main events.)

2.3.10 Miscellaneous:

- Master Warning

FDR data Showed “Master Warning On” status at 92465

Conditions resulting in Master Warning condition are indicated in the following table:

Master Caution Discrete at Time 92465

Condition	1	2	3
Flight Controls			
Low Quantity		2	
Low Pressure		2	
Feel Diff Press		2	
Speed Trim Fail	1		
Mach Trim Fail	1		
Yaw Damper			3
Autoslat Fail		2	
Hydraulics			
Low Press – Elec Pump			3
Overheat – Elec Pump		2	
Low Press – Eng Pump			3
IRS			
Fault		2	
On DC		2	
DC Fail		2	
Fuel			
Low Pressure	1		
Filter Bypass.			3
APU			
Low Oil Pressure		2	
Fault		2	
Overspeed	1		
Electrical			
Low Oil Pressure		2	
High Oil Temp		2	
Standby Power Off		2	
Transfer Bus Off			3
Bus Off			3
Overheat Detection			
Engine1 overheat		2	
Engine 2 overheat		2	
APU Detection Inop	1		
Anti-Ice			
Window overheat		2	
Pitot heat		2	
Cowl Anti-Ice			3
Doors			
Fwd/Aft Entry	1		
Equipment	1		
Fwd/Aft Cargo	1		
Fwd/Aft Service	1		
Airstairs (not installed on PQ294)			
Engine			
Reverser			3
PMC-Inop	1		
Low Idle	1		
Overhead			
Equipment Cooling - Off		2	
Emer Exit Lts-Not Armed		2	
Flight Recorder - Off			3
Pass Oxy - On			3
Air Cond			
Flt Deck Duct Ovht		2	
Pax Duct Ovht		2	
Dual Bleed		2	
Wing-Body Overheat		2	
Bleed Trip Off		2	
Auto Fail		2	
Off Sched Descent	1		
Pack Trip Off		2	

Legend
1 = unknown
2 = unlikely
3 = ruled out

All the above conditions can result in Master Caution activation. Based on the available data, it is hard to identify one individual fault as the cause of this event.

2.4 Main events in Chronological sequence

Based on the information collected from the FDR and the CVR, a sequence of the main events that occurred during the accident flight has been established. These main events are:

1.0 TO/GA Mode Disengage

2.0 Aileron Movement during Take Off

3.0 FD Modes (Pitch-Roll Re-engagement

4.0 Roll Left, and Left Turn Begun

5.0 Roll Back towatrds Wing Level

6.0 Pitch Up and Airspeed Decay

7.0 Autopilot Engage Sequence

8.0 Mode Change from “HDG SEL” to “CWS-R”

9.0 Ailerons Move in Direction of Right Roll

10.0 Auto Pilot Disengagement Indication on FDR

11.0 Airplane Brgins Roll to Right

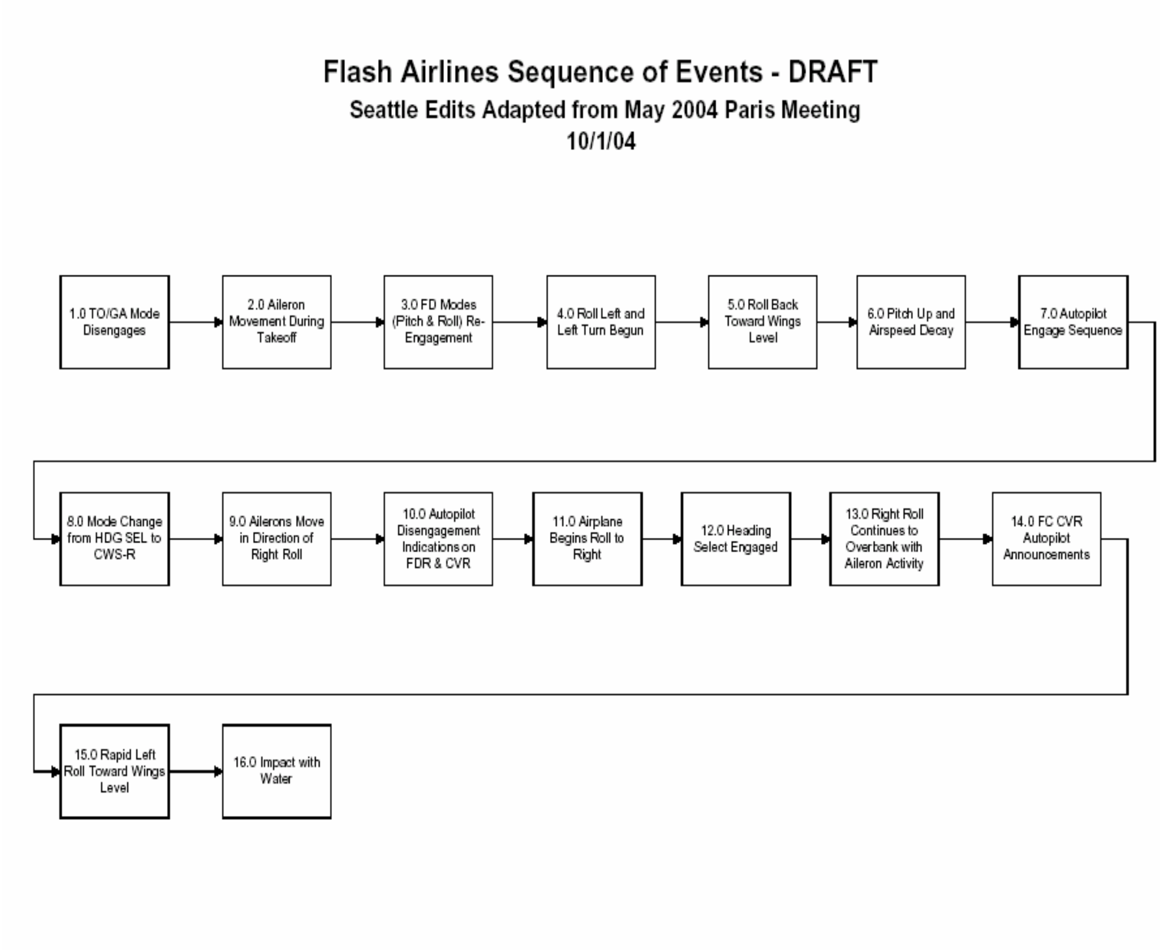
12.0 Heading Select Engaged

13.0 Right Roll Continues to Overbank with Aileron Activity

14.0 F/O Autopilot announcements (CVR)

15.0 Raoid Left Roll Towards Wing Level

16.0 Impact with Water


Flash Airlines Sequence of Events - DRAFT
Seattle Edits Adapted from May 2004 Paris Meeting
10/1/04
1.0 TO/GA Mode Disengages
2.0 Aileron Movement During Takeoff
3.0 FD Modes (Pitch & Roll) Re-Engagement
4.0 Roll Left and Left Turn Begun
5.0 Roll Back Toward Wings Level
6.0 Pitch Up and Airspeed Decay
7.0 Autopilot Engage Sequence
8.0 Mode Change from HDG SEL to CWS-R
9.0 Ailerons Move in Direction of Right Roll
10.0 Autopilot Disengagement Indications on FDR & CVR
11.0 Airplane Begins Roll to Right
12.0 Heading Select Engaged
13.0 Right Roll Continues to Overbank with Aileron Activity
14.0 FC CVR Autopilot Announcements
15.0 Rapid Left Roll Toward Wings Level
16.0 Impact with Water

2.5 Anaysis of the chronological main events

2.5.1 TO/GA Mode Disengages:

2.5.1.1 FDR Data:

FDR data shows TOGA on one side for only 1 or 2 seconds, other side unknown (all 13 flights with both A and B for different flights): for the accident flight, the TO/GA Mode was engaged at 92296 second, and was disengaged at 92297 second

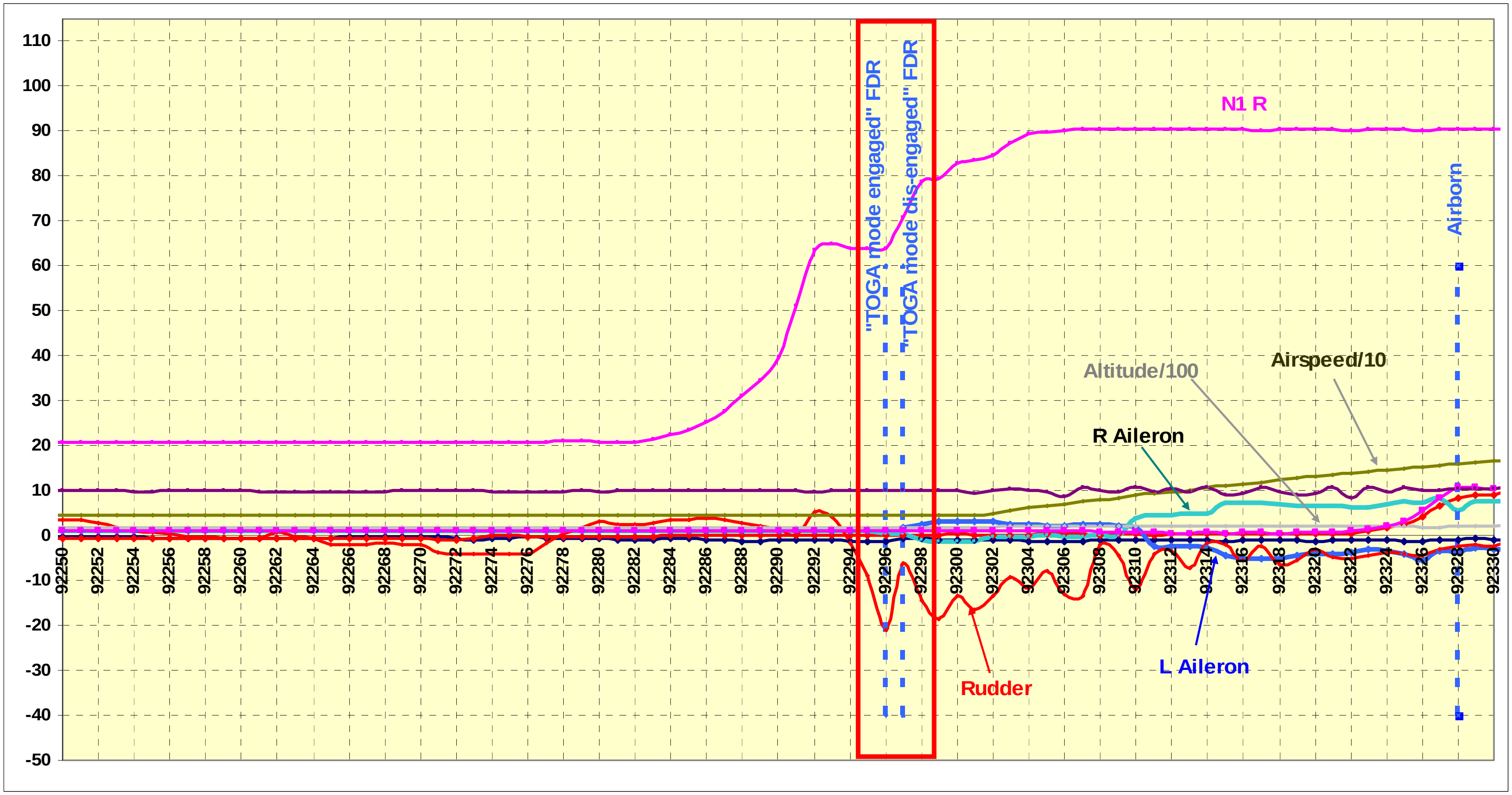


Figure 2.5.1.1a TO/GA Mode Disengages (FDR data)

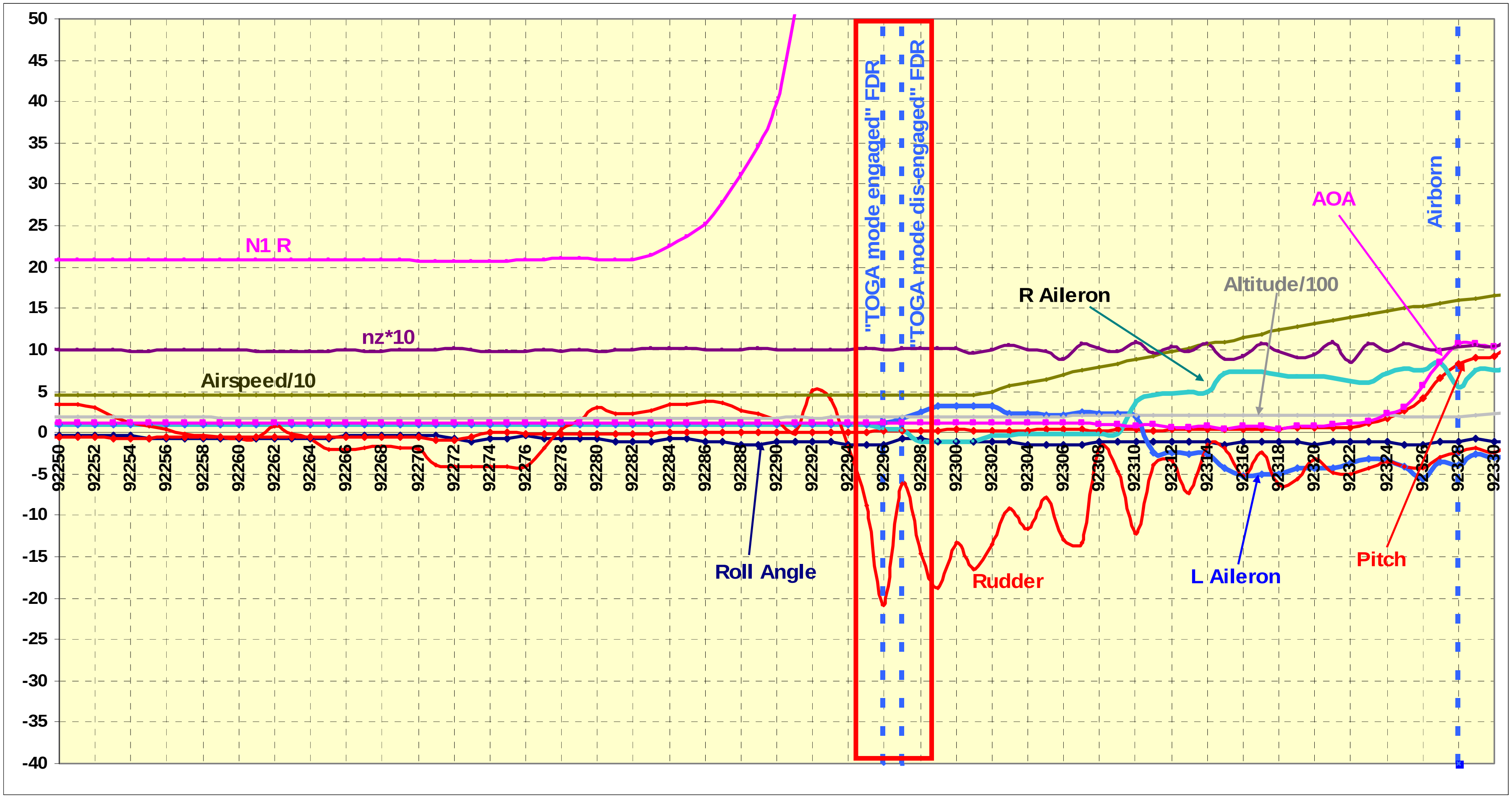


Figure 2.5.1.1b TO/GA Mode Disengages (FDR data)

TO/GA Observation within the last 25 Hours:

SU-ZCF – FDR 25 Hour Data

TOGA Observations

Flight	Both F/D ON?	Normal looking A/T Takeoff	First TOGA Push (1)	If Second TOGA Push (1)
1	YES	YES	1	2
2	YES	YES	0	
3	YES	YES	2	
4	NO	YES	0	
5	YES	YES	2	
6	YES	YES	1	
7	YES	YES	1	
8	YES	YES	2	
9	YES	YES	2	1
10	YES	YES	0	
11	YES	YES	2	
12	YES	YES	2	
13	YES	YES	2	

(1) Number of samples recorded for TOGA_FCC (sample intvl=1 sec)

2.5.1.2 TO/GA Modes and Logic (Takeoff Mode Logic)

- Takeoff mode provides thrust control during the initial phase of the takeoff roll (0 to 80 knots).
- The takeoff mode is set by the takeoff/go-around switch, with the A/T armed for takeoff. The A/T is armed for takeoff when the airplane is on the ground, the Autothrottle is engaged, and the FMC takeoff mode is executed. If the A/T is engaged in go-around, the takeoff mode is inhibited. The takeoff mode is reset when the throttle hold logic is set, or the Autothrottle is disengaged.

(Refer to Boeing MM Chapter 22-31-00, Page 32)

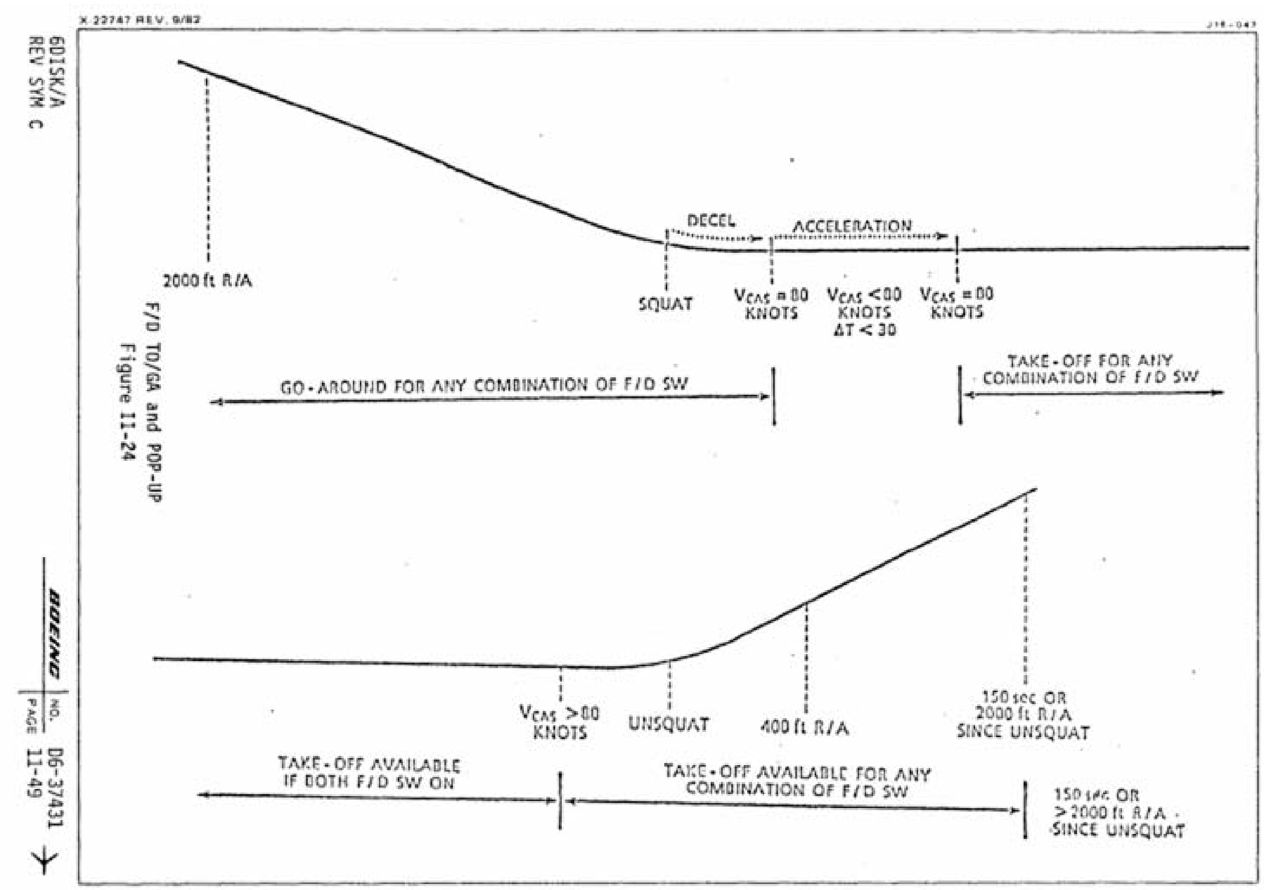


Fig 2.5.1.2 Take Off Mode

2.5.1.3 TO/GA Mode Disengage Logic:

The TO/GA Mode disengages during the Take Off mode if the following logic is satisfied:

{(Airspeed < 80 knots). [(One bad F/D switch input to one FCC) + (Bad squat switch input to one side) + (Landing gear up indication on one side)} + {(IRS instrument transfer switch in Both on X) + (Sensor signal invalid on one side) + (EFIS select switch in Both on X)}

(Refer to Fig 2.5.1.3 TO/GA Mode Disengage Logic[1])

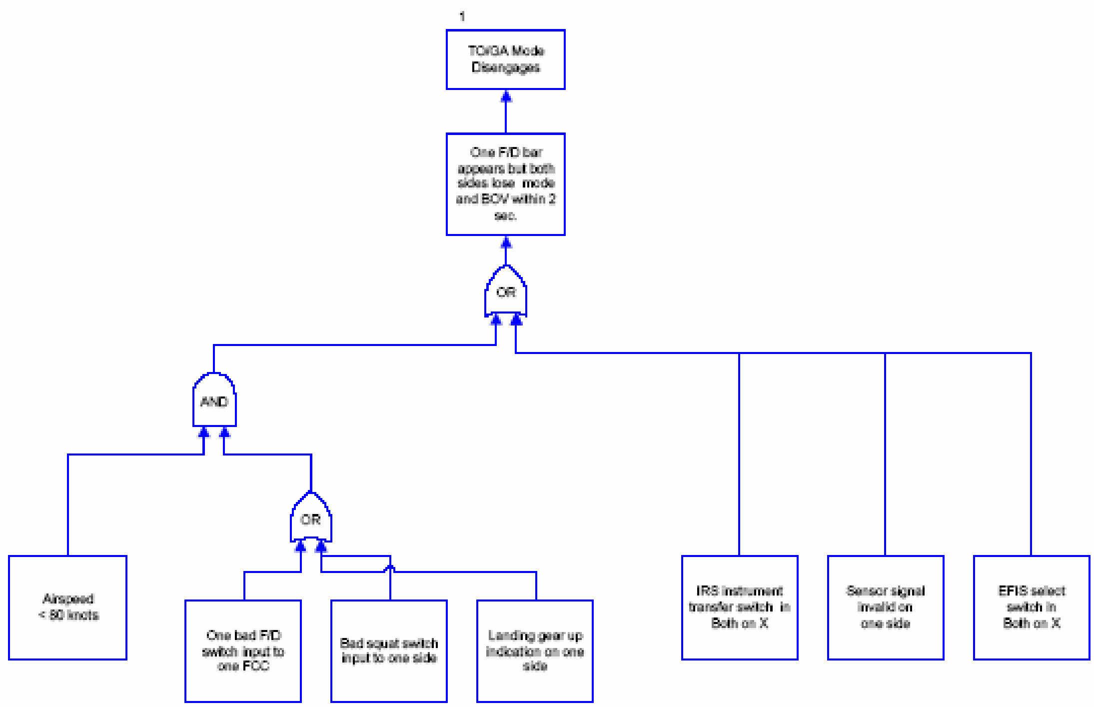


Fig 2.5.1.3 TO/GA Mode Disengage Logic

[1] Data forwarded by Boeing during Cairo meeting, February 2005

2.5.1.4 TO/GA Mode Disengages analysis:

- FCC takeoff mode has not been operating properly for the entire 25 hours recorded on the FDR. Based on FDR data available, the cause for this either a bad squat switch (landing gear compressed) input to one FCC or a bad landing gear position indication to one FCC. In either case, the results is that pressing the TOGA button during takeoff would result in one FCC entering takeoff mode while the other enters go-around mode. This disagreement is detected and results in both FCCs dropping the TOGA mode[2].

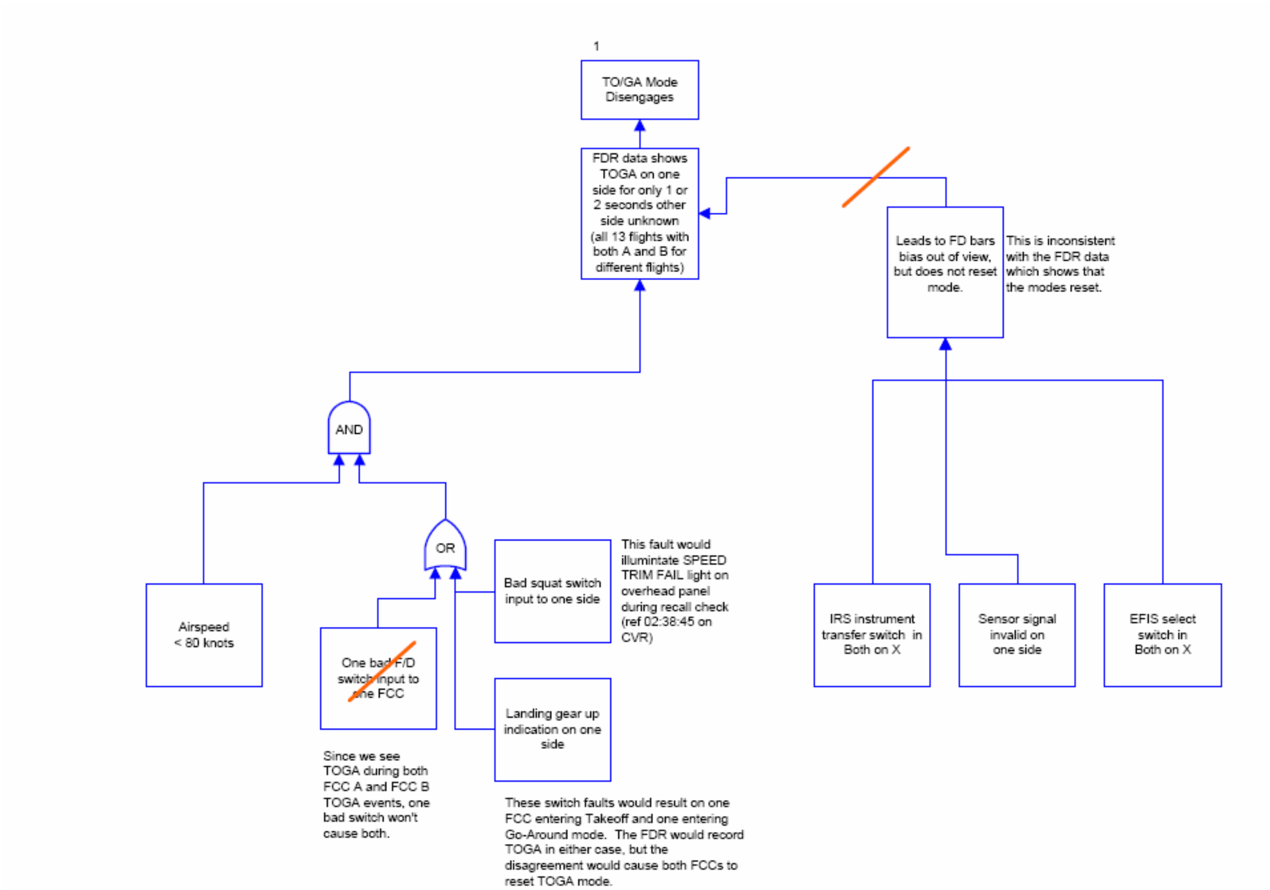


Fig 2.5.1.3.a TO/GA Mode Disengage Logic

[2] There is no corresponding entry in the aircraft's tech log. The chief pilot at Flash Air stated that he was aware of this fault on SU-ZCF and that work-around procedures were in place

- Since we see TOGA during both FCC A and FCC B TOGA events, one bad switch won't cause both. That makes the condition of “One bad F/D switch input to one FCC”.

- The condition of {(IRS instrument transfer switch in Both on X) + (Sensor signal invalid on one side) + (EFIS select switch in Both on X)} leads to FD bars bias out of view, but does not reset mode. This is inconsistent with the FDR data which shows that the modes reset.

- Regarding the” Landing gear up indication on one side”, the switch faults would result on one FCC entering Takeoff and one entering Go-Around mode. The FDR would record TOGA in either case, but the disagreement would cause both FCCs to reset TOGA mode.

- Regarding the “Bad squat switch input to one side”, this fault would illuminate SPEED TRIM FAIL light on overhead panel during recall check. (ref 02:38:45 on CVR)

Conclusion:

Based on the FDR data, the only possible causes for TOGA Mode Disengage are:

- Bad squat switch input to one side
- Landing gear up indication on one side.

There are no evidences that the TOGA mode disengagement has direct relation with the accident.
However, FDR data showed that this mode disengaged each time it was engaged.
No crew report for this anomaly was found.

2.5.2 Aileron Movement during Takeoff

2.5.2.1 FDR data related to the event:

- Before T.O., with both ailerons at same deflection (neutral position), the FDR showed a bias of about one degree up (0.9696 degree)
- During the airplane roll on ground and up to about 80 kts speed, the left aileron deflected upwards towards trailing edge up (TEU) direction (to a maximum value of about 3.2 degrees which is equivalent to about 2.2 degrees after considering the neutral bias). The right aileron deflected downwards towards trailing edge down (TED) direction (to a maximum value of about -1.2 degrees which is equivalent to about -2.2 degrees after considering the neutral bias).
- At about 80 knots (frame 92305), the ailerons were deflected to neutral. The FDR showed new neutral bias at this speed of about 2.24 degrees.
- After 80 Knots, the FDR showed ailerons deflections towards right bank command up to time frame 92334 (about 6 seconds after airborn). The right aileron reached a maximum deflection of about 8.5 degrees (about 6.3 degrees from neutral). The left aileron reached a maximum deflection of about -5.6 degrees (about -7.8 degrees from neutral).
- The wind condition was 280/08 at Take Off. The aircraft was taking off from runway 22R, with a relative wind direction of about 60 degrees. The cross wind component was about 6.9 kts blowing from the right side of the airplane.

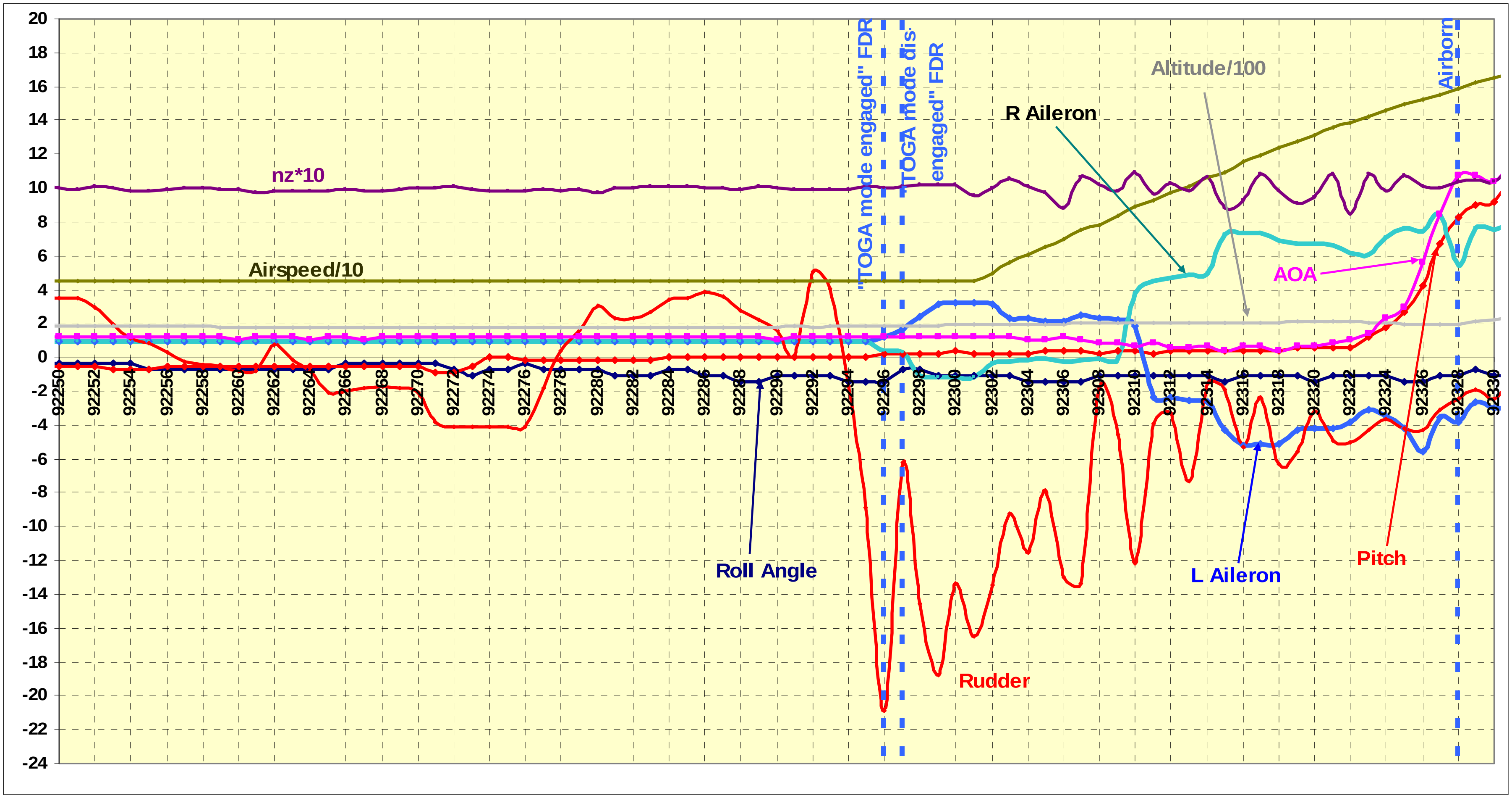


Figure 2.5.2.1a Aileron Movement during Takeoff event

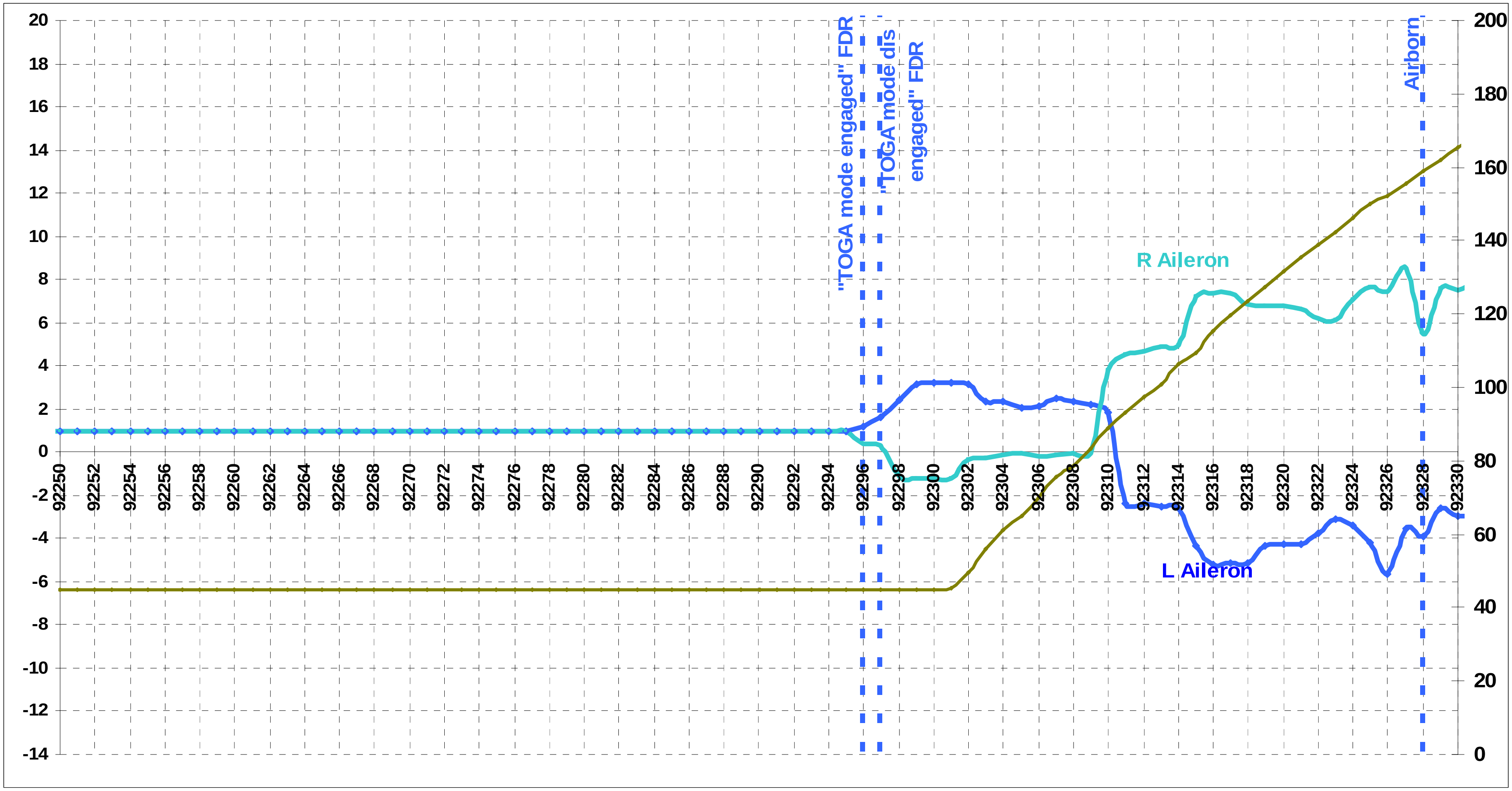


Figure 2.5.2.1b Aileron Movement during Takeoff event

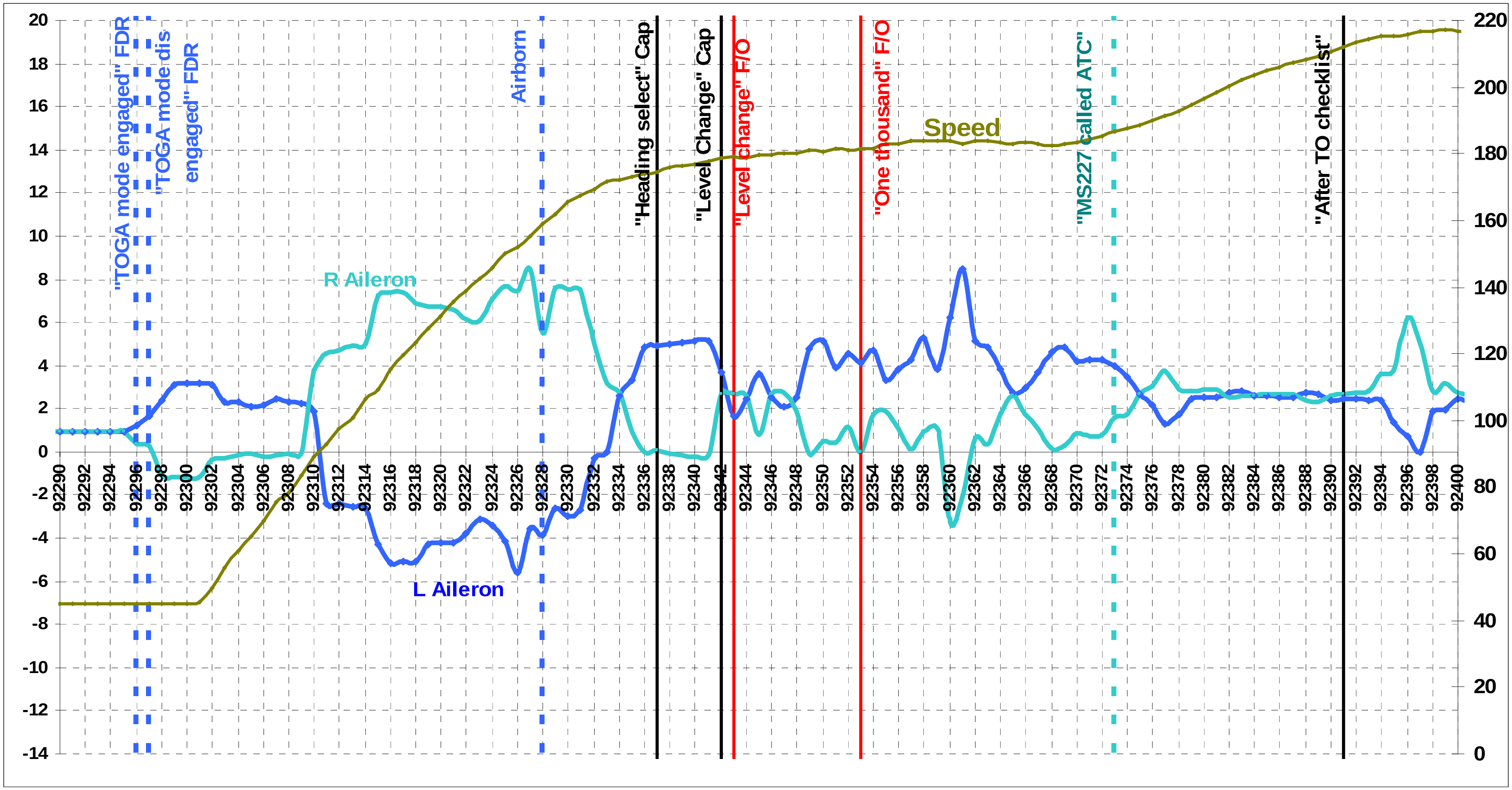


Figure 2.5.2.1c Aileron Movement during Takeoff event

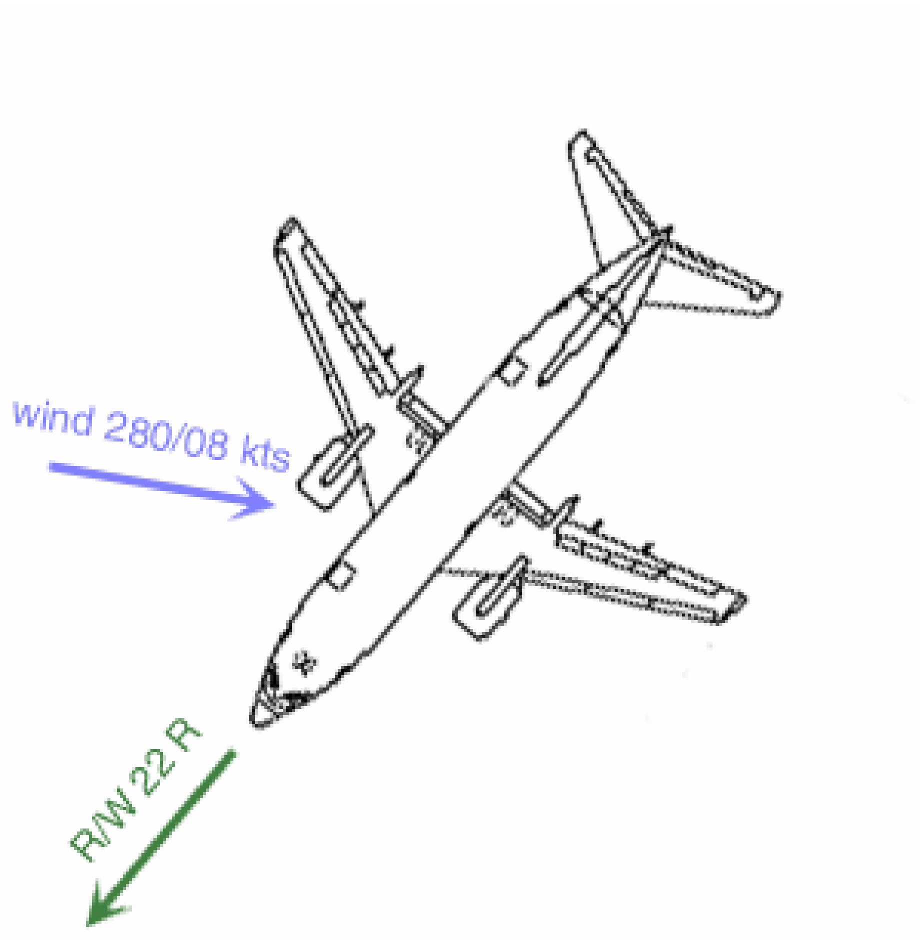


Figure 2.5.2.2 Wind direction during T.O

2.5.2.2 Aileron Float:

The left and right ailerons positions were related to the speed for the last 25 flying hours (for both PQ294 and PQ481 airplanes). Results are shown in the following figures[1]:

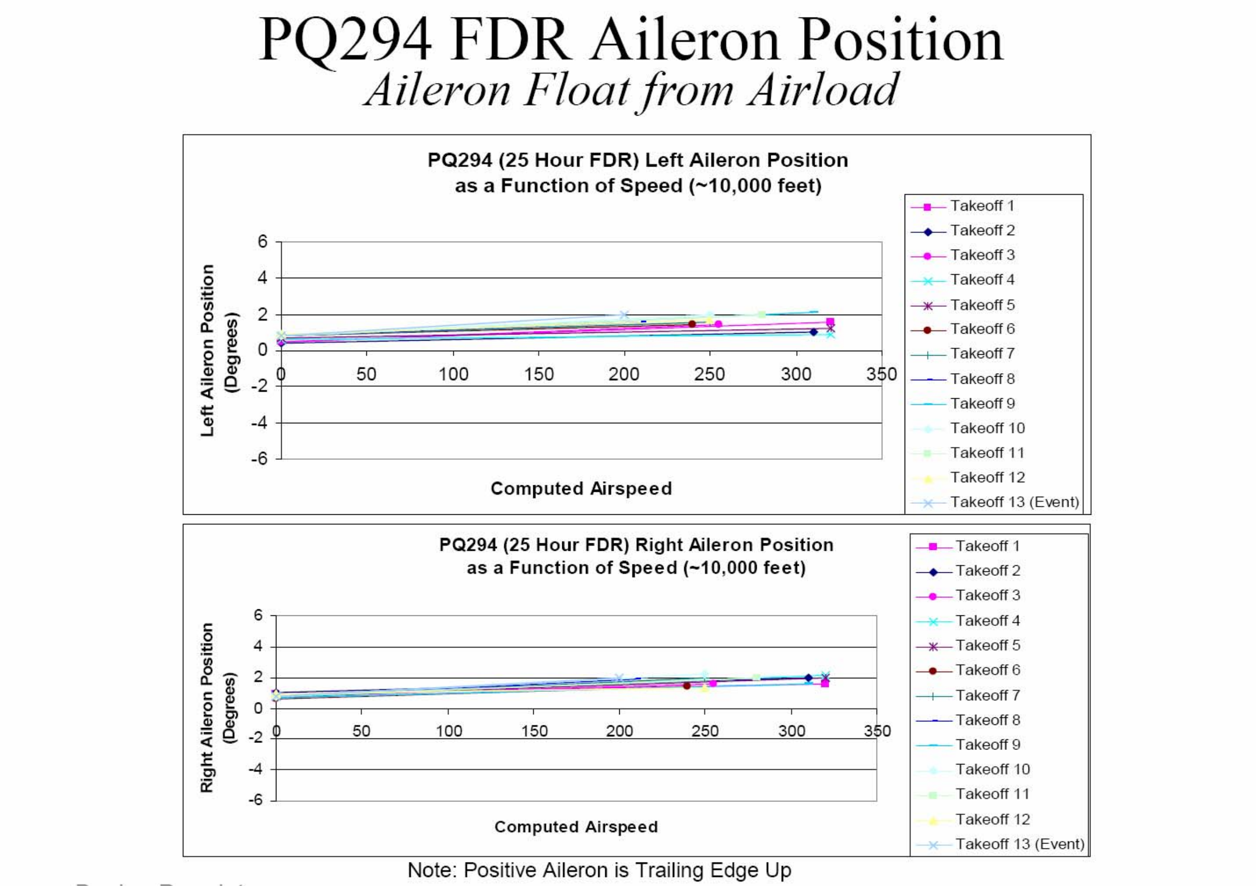


Figure 2.5.2.3a Aileron float from Airload (PQ294)

[1] Study presented by Boeing during March 2004 meeting in Cairo

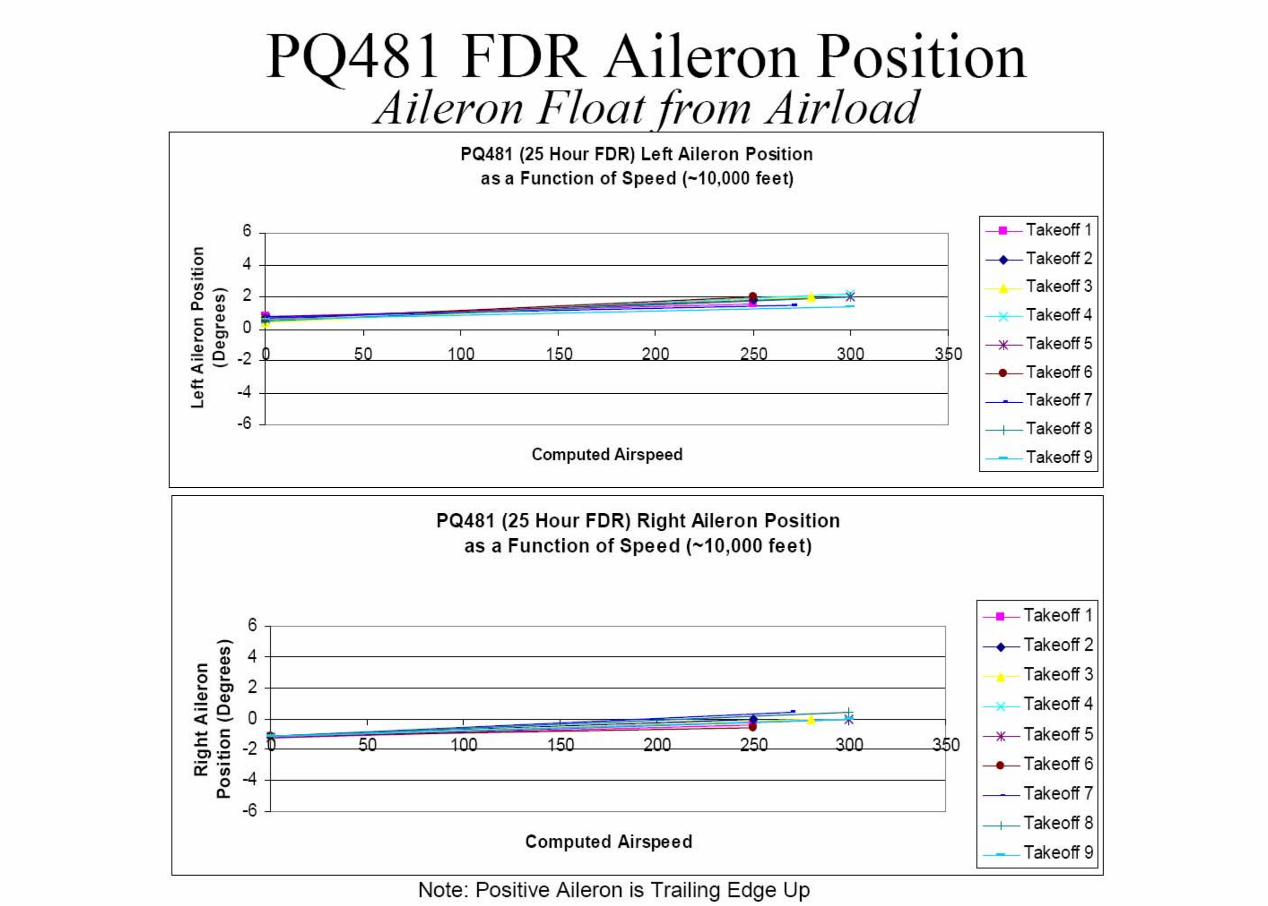


Figure 2.5.2.3b Aileron float from Airload (PQ481)

As shown from the above figures, the ailerons blow up as result of increasing speed is not exactly the same for all Take Off's. The aileron blow up increases with increasing speed.

Conclusion:

- Aileron movement direction during Takeoff is consistent with the wind condition existing during the Takeoff.
- Aileron bias change could be related to change in airplane speed.

Based on the FDR available date, there is no evidence that the aileron movement during Takeoff could gave direct relation with the accident.

2.5.3 FD Modes (Pitch & Roll) Re-Engagement

Based on the CVR and FDR data:

- After takeoff and at 02:42:43 the captain called for HDG SEL "Four Hundred Heading select".
- At 02:42:44 First officer (F/O) confirmed "Four Hundred Heading select sir"
- At time 2:42:47, FDR data indicates Heading Select mode engaged (Radio Altitude indicated 371 feet AGL) (Frame 92341)
  (Setting "HDG SEL" mode would restore the FD roll command bar).

- At 42:48 Captain called for Level Change
- At 02:42:49 First officer confirmed "Level Change, MCP speed, N1 Armed sir"
- At time 2:42:50, FDR data indicates Level Change mode engaged (Frame 92344)
  (Setting "Level Change" mode would restore the FD pitch command bar).

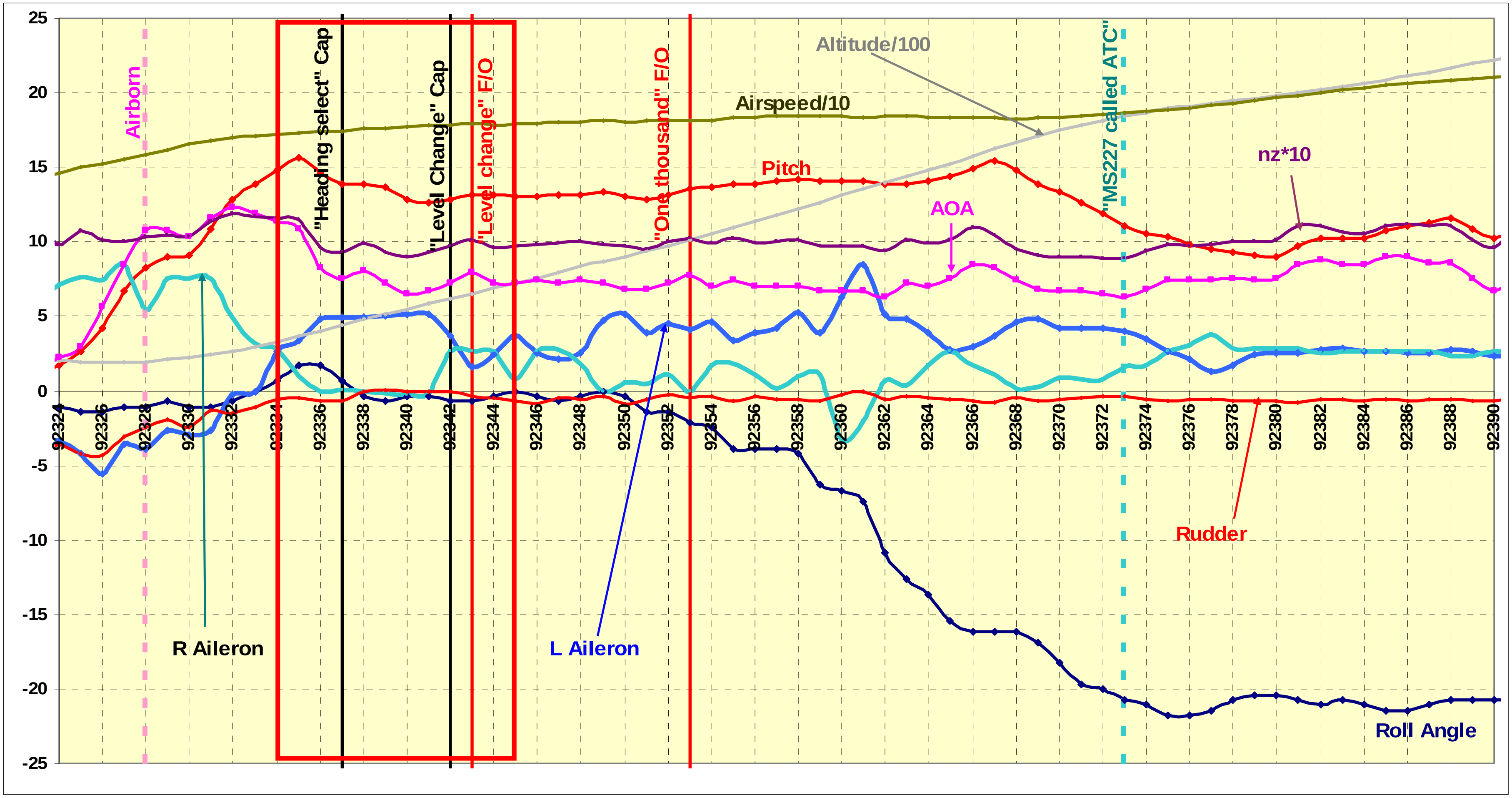


Figure 2.5.3.1 FD Modes (Pitch & Roll) Re-Engagement event

Conclusion:

Setting “HDG SEL” and “Level Change” modes is normal and expected to restore the FD roll and pitch bars. These settings have no direct relations with the accident.

2.5.4 Roll Left and Left Turn Begun

The left turn is part of the planned departure pattern.

The crew received ATC clearance for a “left turn to intercept radial three zero six”. This radial forms the airway to Cairo and involves a left turn of 274° from runway 22. They briefed the departure and began the left turn as planned.

Note: Though not published, a 270° turn is the customary night-time departure patterns from SSH and would have been familiar to the crew. The direction of turn (left or right) depends upon the runway used, but should be over the Red Sea. In fact, the FDR records that the accident crew successfully flew the mirror image pattern about 24 hours previously (right turn of 266° from runway 4).

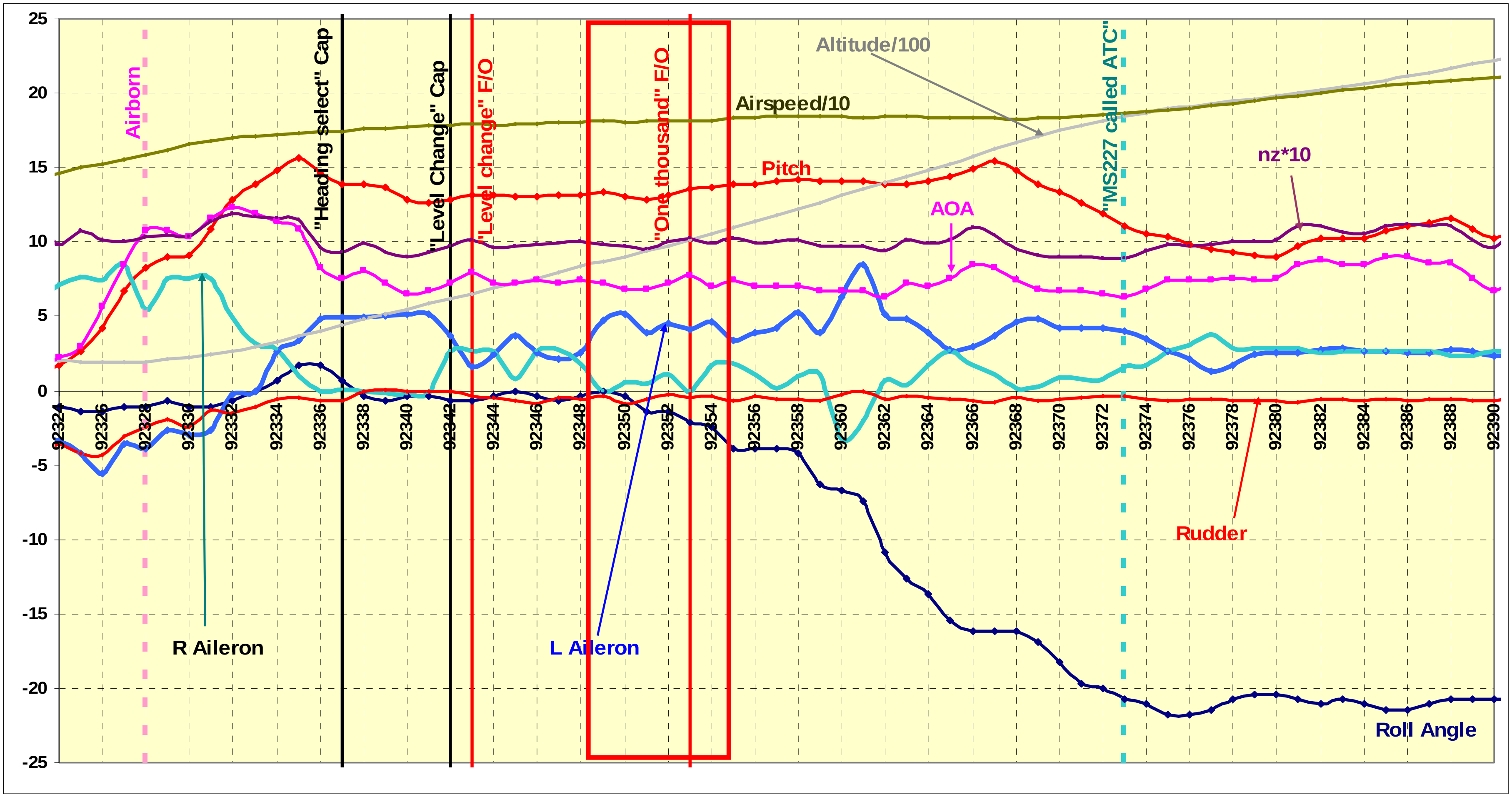
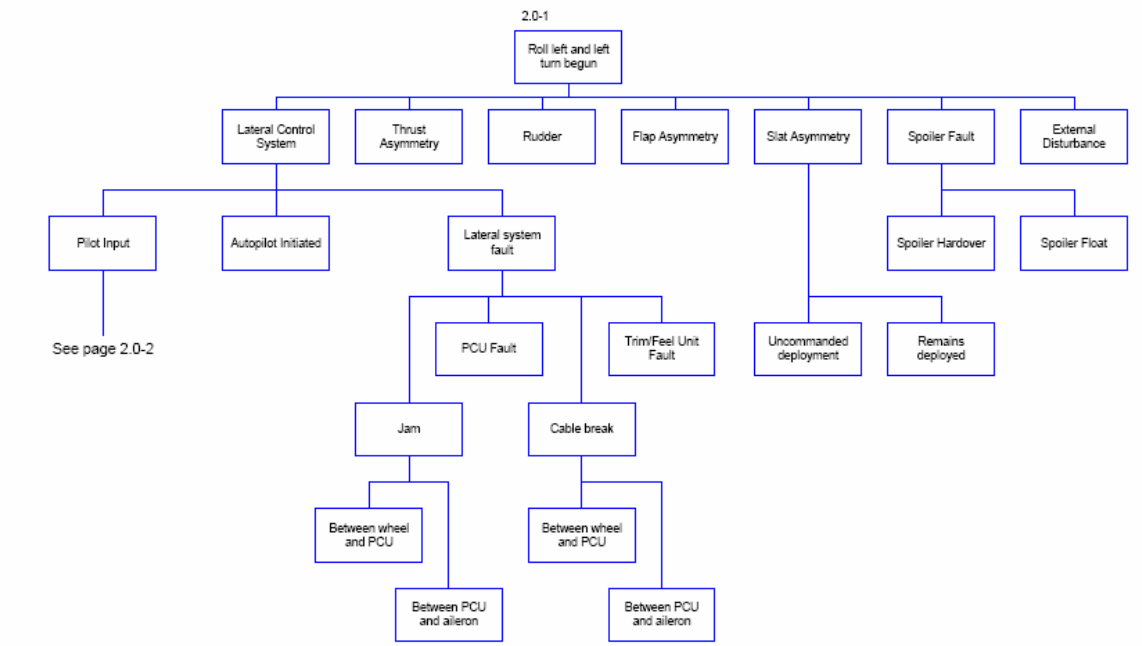


Figure 2.5.4.1 Roll Left and Left Turn Begun event

Conclusion:

The Roll Left and the beginning of Left Turn are normal and expected to intercept and follow the Radial 306 to Cairo. These movements have no direct relation with the accident.



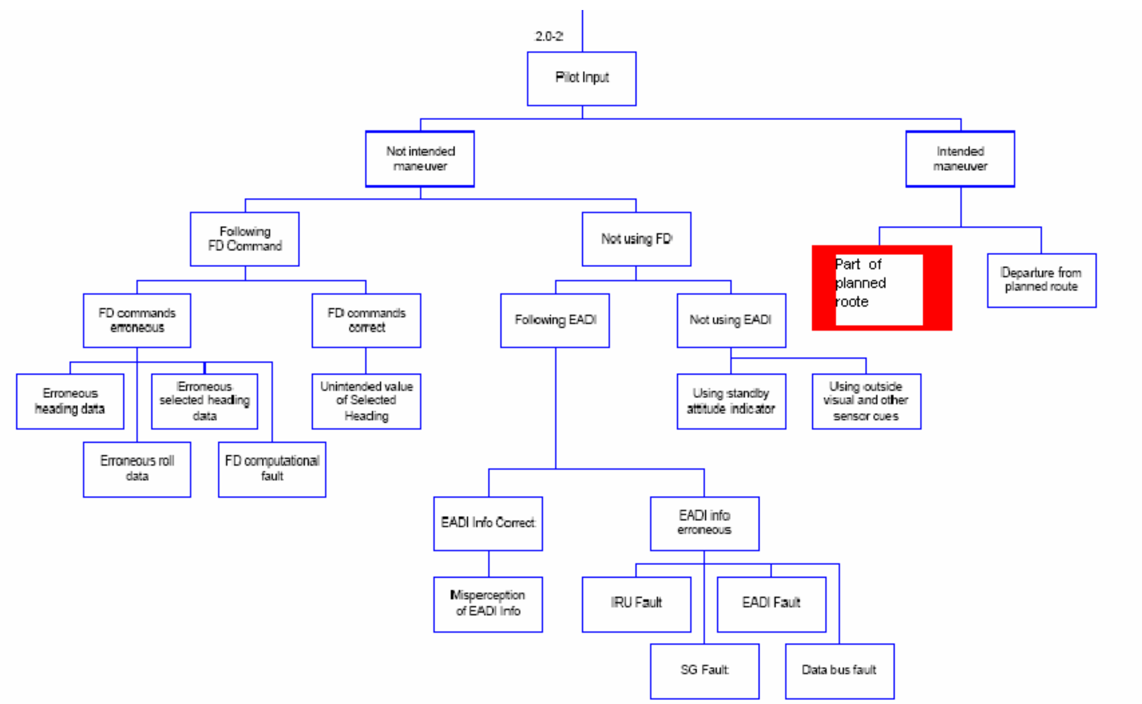


Figure 2.5.4.2 Roll Left and Left Turn Begun analysis

2.5.5 Roll back towards wing level

Based on the FDR data and at almost time frame 92419 second, the airplane left turn stopped and the wings became in level condition

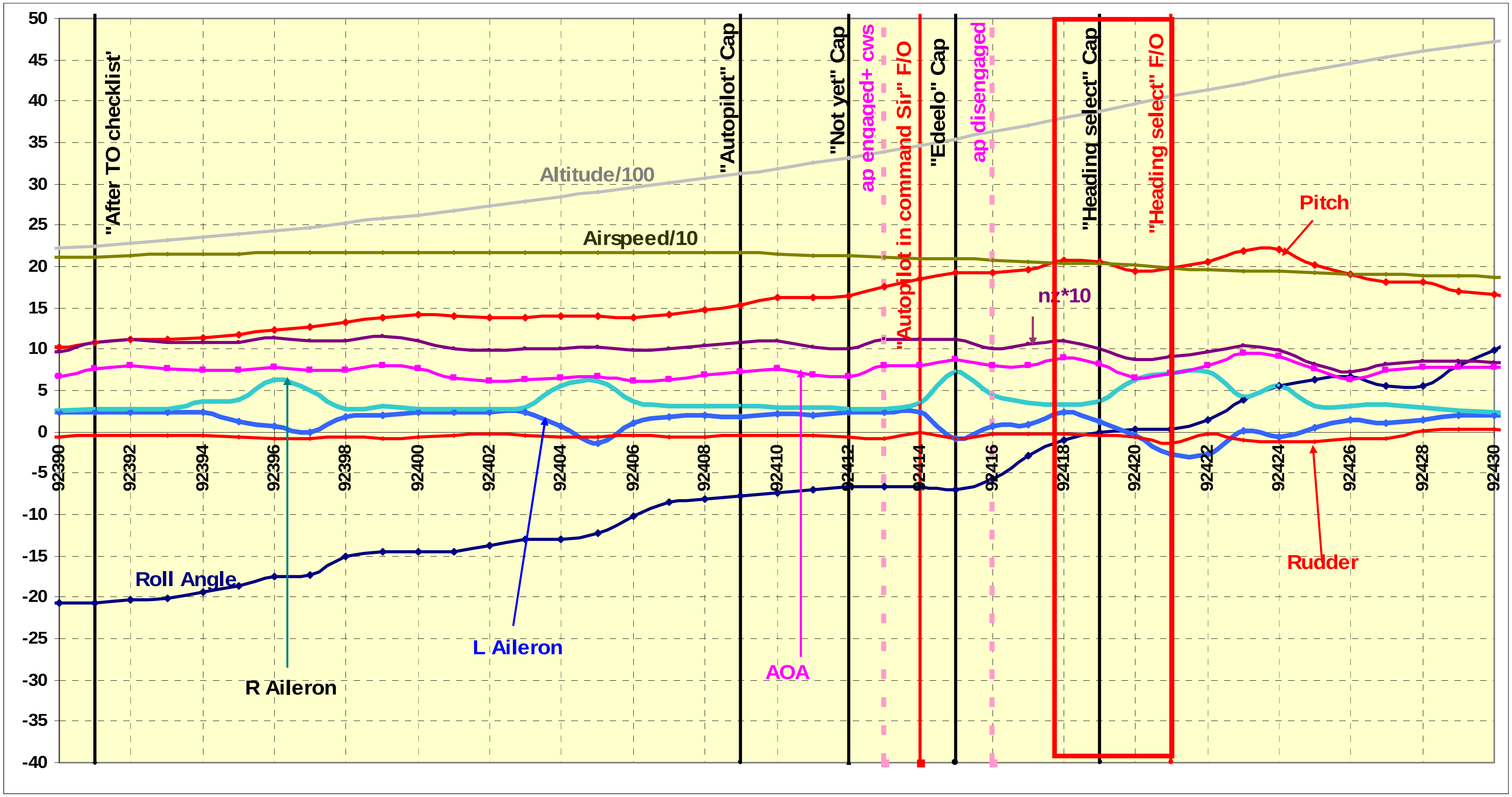


Figure 2.5.5.1 Roll back towards wing level event

2.5.5.1 Conditions which could lead to this event

A. NA

B- Flaps assymetry:

The FDR did not show evidences of flap asymmetry. Based on these information, there is no evidence of flap asymmetry existing at the time of the event and consequently this condition could be ruled out

C- Slats assymetry:

C.1 Uncommanded Deployment

Based on the performance evaluation, M-Cab results (Simulation match to FDR) this condition could be ruled out. (See section 2.5.13 Right roll continues to overbank with ailerons activities)

C.2 Remains Deployed (SLAT FULL DEPLOYED)

Based on the performance evaluation, M-Cab results (Simulation match to FDR) this condition could be ruled out. (See section 2.5.13 Right roll continues to overbank with ailerons activities)

D- Thrust assymetry

With reference to section “2.3.6. Power plants”, it is shown that all the engines parameters were recorded in the FDR. However, some parameters data were not reliable (e.g. L engine N1). The other engines parameters are reliable including the N2 for both engines.. Based on these information, there is no evidence of thrust assymetry existed at the time of the event and consequently this condition could be ruled out

E- External Disturbance

This condition could be ruled out based on FDR data, M- Cab Simulator Match to FDR and meteorogical data

F- Anomalies with the lateral control system

See Appendix 2-1 lateral control analysis, and section 2.5.13 Right roll continues to overbank with ailerons activities, Lateral control system

G- Pilot input.

This condition could not ruled out

2.5.5.2 M Cab results related to Simulated Failures (Spoilers, LE Slats)

Simulated failures:

1. Right outboard flight spoilers (#7) Hardover simulation (hardover starts at 92391)
2. Left outboard flight spoilers (#2) Hardover simulation (hardover starts at 92391)

3. Right outboard flight spoilers (#7) Float simulation (floats starts at 92391)
4. Left outboard flight spoilers (#2) Float simulation (floats starts at 92391)

5. Critical right wing leading edge slat # 6 extends
6. Critical left wing leading edge slat # 1 extends

It is to be noted that the results of the M-Cab tests as indicated in the appendix figures, show that the scenarios resulted from all the above mentioned simulated failures are not consistent with the accident scenario. Therefore, these simulated failures could be ruled out.

2.5.5.3 Roll Left and beginning of Left Turn possible causes:

After completing the process of elimination of the unlikely possibilities, the following conditions could be considered as possible causes leading to this event:

1- Widening Departure Pattern (intentional control action)

This possible cause is supported by the following evidences:

- Chief pilot reports some crews choose to widen their departure pattern by squaring turn at approximately 90° to runway heading. The wings level heading, 140°, is 80° from the runway heading.
- Although there was no specific briefing about widening pattern, the flight path is consistent with information provided by the Ex-Chief Pilot of Flash Airline concerning usual pattern
- The aircraft remained near heading 140 for 9 seconds. Roll rate decreases as aircraft nears 140.
- The PF (captain) may have wanted to ensure that he did not violate the local VOR altitude crossing practice.
- The previous day's departure from SSH included a 270 turn to right with altitude deviation

However, the following should be noted:

- The same crew made a similar departure about 24 hours previously, at a heavier weight without widening their departure and with altitude deviation.
- There is no discussion about this maneuver recorded on the CVR.

2- Mistaken understanding of "Initially 140" (intentional)

- ATC clearance: "Destination Cairo as filed, climb initially flight level one four zero", F/O read back "destination Cairo via flight plan route one four zero". Captain later asked for confirmation about "Initially 140" from F/O and for F/O to confirm with ATC. After initial clearance, neither ATC nor F/O specified whether "140" refers to a heading or altitude. Airplane rolls wings level on exactly 140.
- It has to be noticed that the crew never briefed the departure as it is usually done (headings, sets, displays,).Therefore all the dialogues between the Captain and the F/O before the turn is about "140". From 2:41:19 to 2:41:40 it is clear that the Captain's mind is focused on a 140° Heading: 2:41:19 F/O "left turn to establish 306", 2:41:29 Captain "initially 140". This match with what said Flash ex-Chief pilot in his last statement about widening pattern. This might rule out "mistaken initial 140 heading interpretation".

-

However, the following evidences do not support this possibility assumption:

- No request from captain to set selected heading to 140.
- Did not ask for clarification of "Heading' clearance.

- “Initially” phrase refers to altitude, not heading.
- “14000” set in altitude window immediately after ATC clearance and was in the window during subsequent discussion and confirmation with ATC.

3- To level wings prior to engaging autopilot (intentionally)

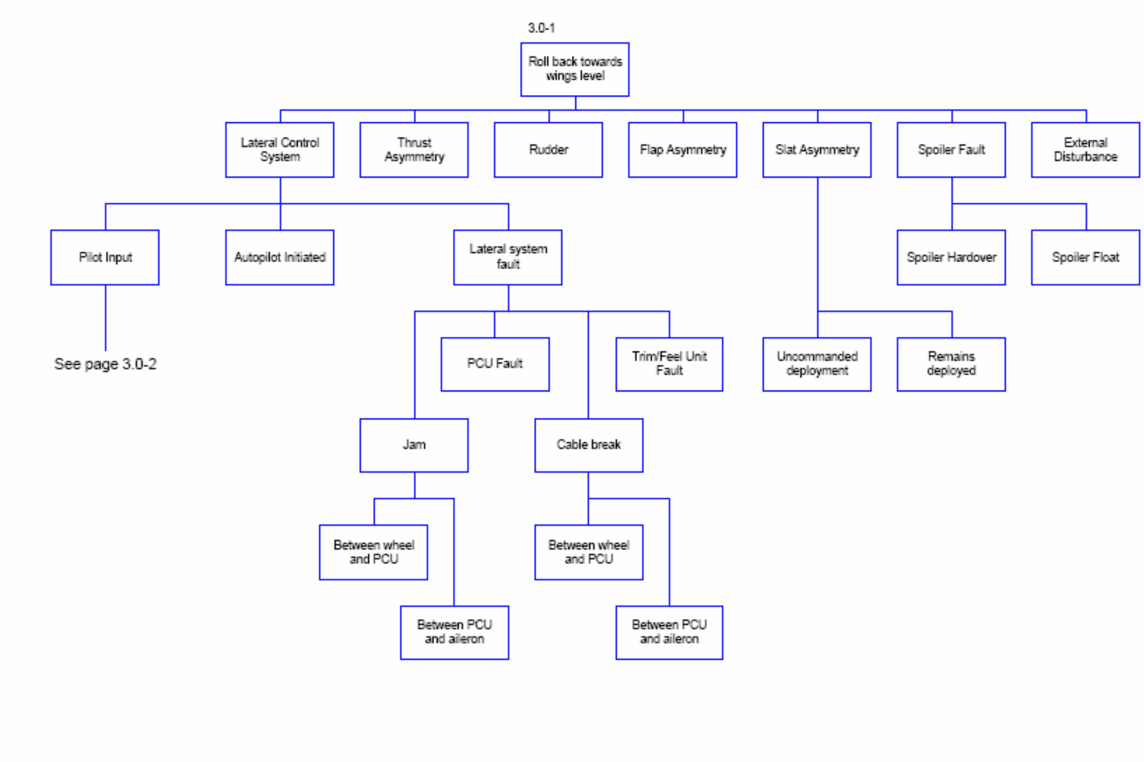
On FDR previous flight, the same crew did not engage the AP until wings level at approximately 9000 ft following completion of a series of turns after takeoff
However, On FDR flight, the crew engaged the autopilot in the middle of a 270° turn at a bank angle of 20 to 25°.

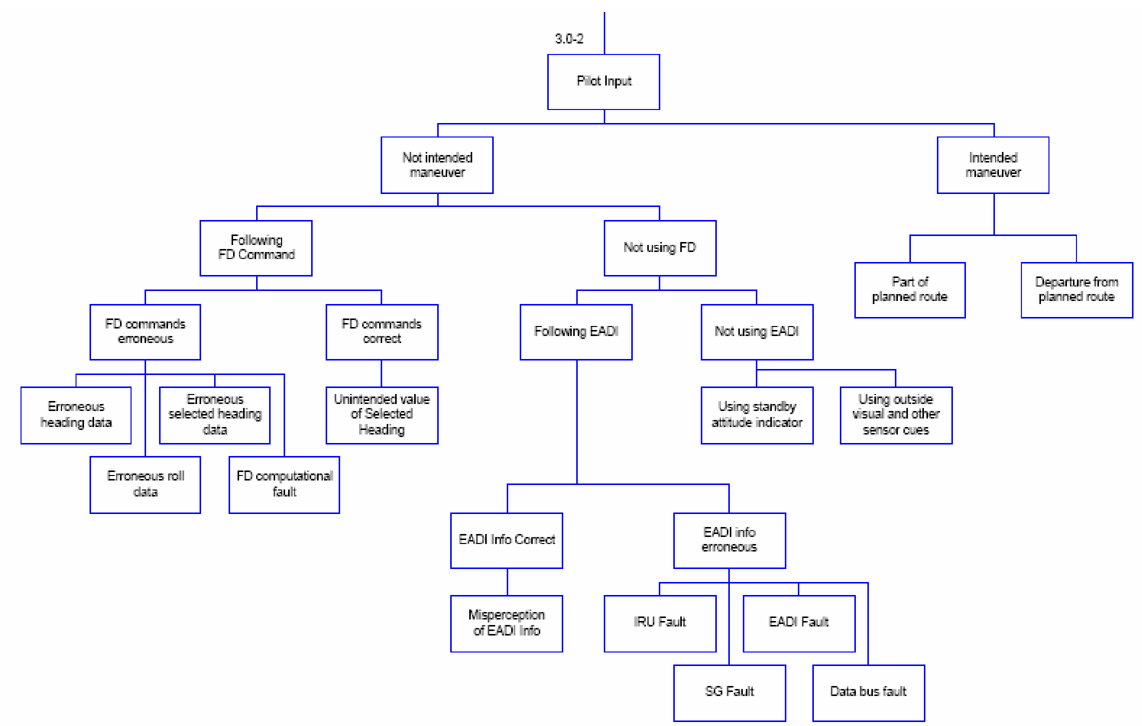
4- Pilot loses awareness of heading or bank (unintentional)

Roll out coincident with passing over coastline and resulting loss of outside visual references. Pitch begins to deviated from expected value. Misleading vestibular cues were present.
However, attitude information available on displays to 3 flight deck occupants.

Conclusion:

The investigation could not determine a higher possibility to any of the above findings based on the given data.


3.0-1
Roll back towards wings level
Lateral Control System
Thrust Asymmetry
Rudder
Flap Asymmetry
Slat Asymmetry
Spoiler Fault
External Disturbance
Pilot Input
Autopilot Initiated
Lateral system fault
Spoiler Hardover
Spoiler Float
See page 3.0-2
PCU Fault
Trim/Feel Unit Fault
Uncommanded deployment
Remains deployed
Jam
Cable break
Between wheel and PCU
Between wheel and PCU
Between PCU and aileron
Between PCU and aileron

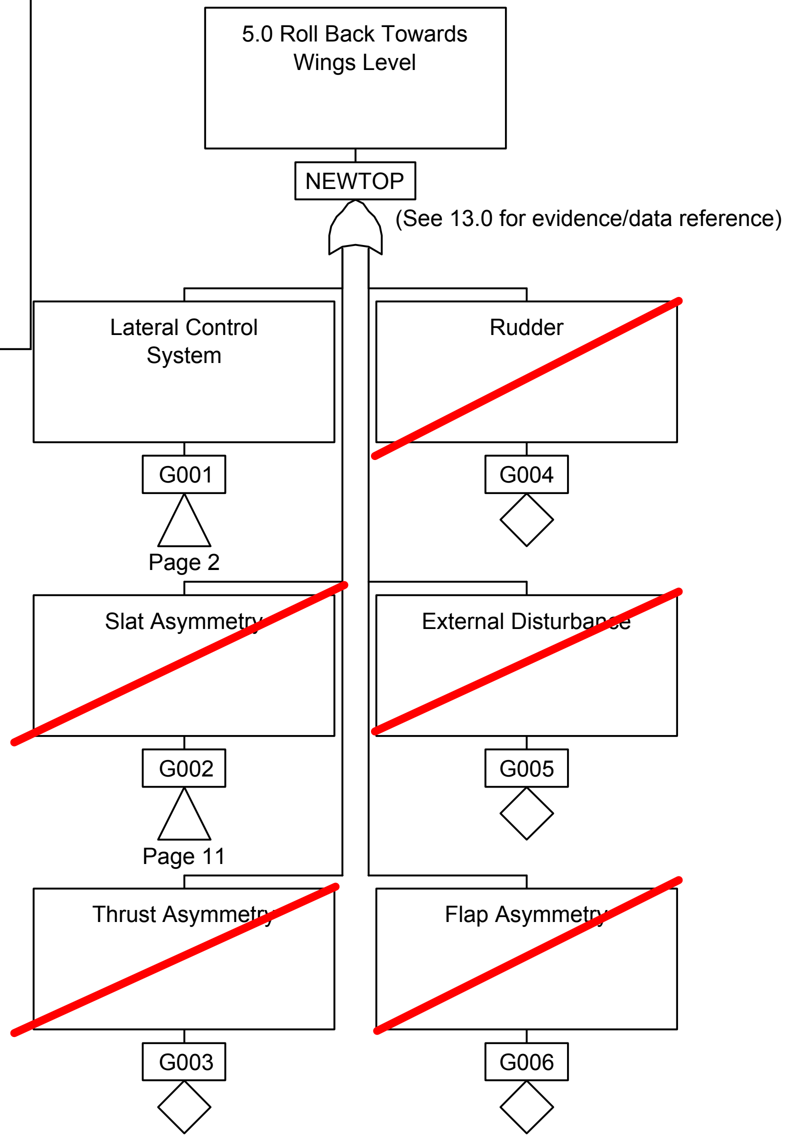

3.0-2
Pilot Input
Not intended maneuver
Intended maneuver
Following FD Command
Not using FD
Part of planned route
Departure from planned route
FD commands erroneous
FD commands correct
Following EADI
Not using EADI
Erroneous heading data
Erroneous selected heading data
Unintended value of Selected Heading
Using standby attitude indicator
Using outside visual and other sensor cues
Erroneous roll data
FD computational fault
EADI Info Correct
EADI info erroneous
Misperception of EADI Info
IRU Fault
EADI Fault
SG Fault
Data bus fault

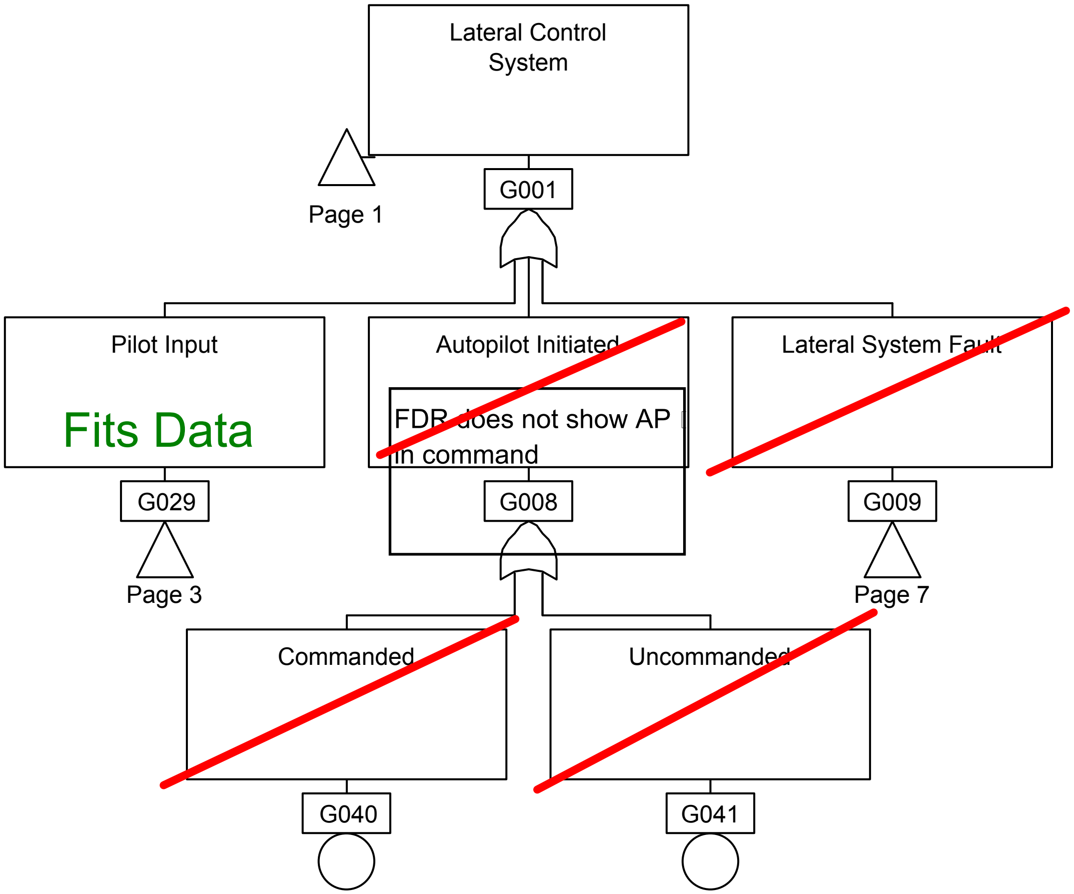
Legend:

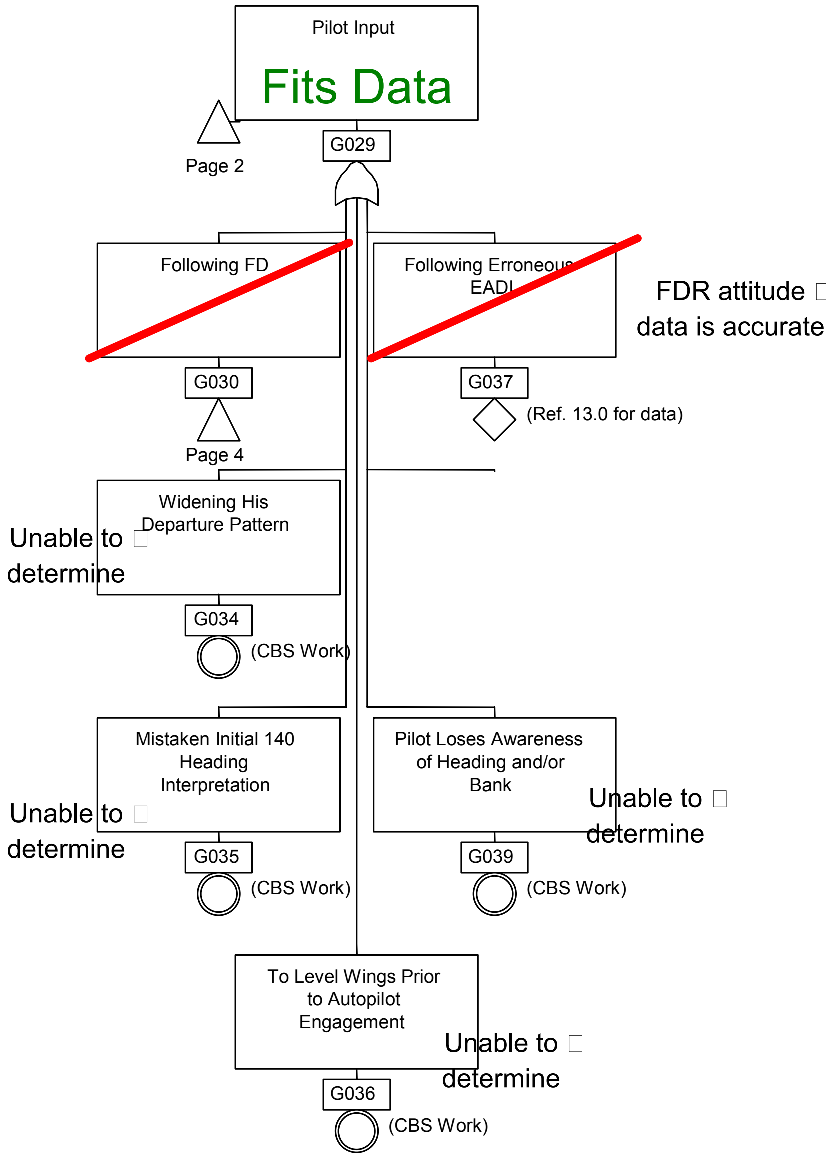
◇ Sufficient Data Collected at This Point

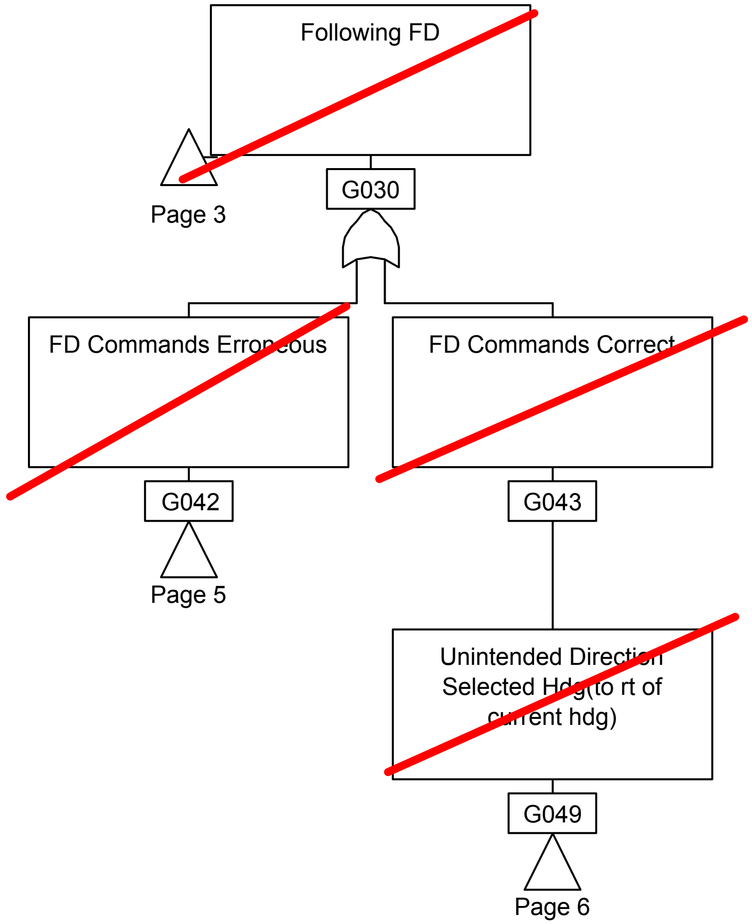
◎ May Need More Data

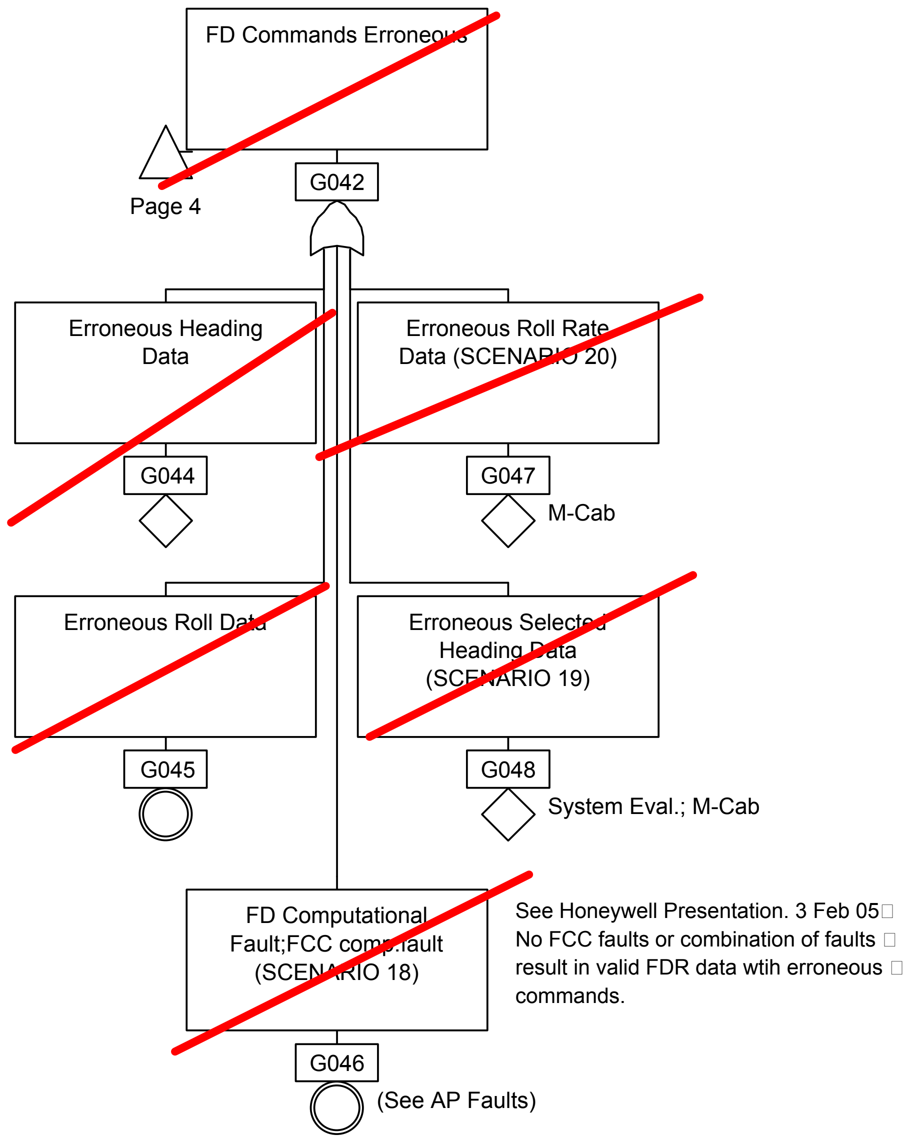
○ Not Eval'd for Data Needs

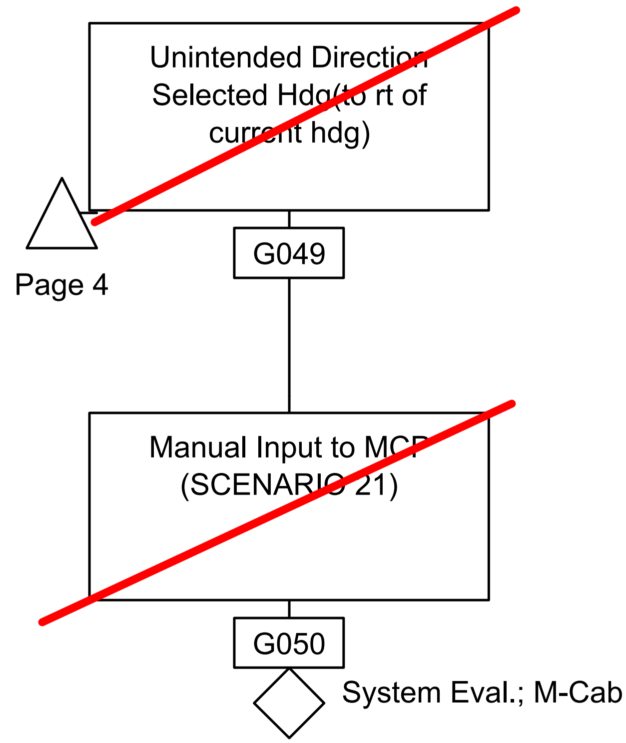


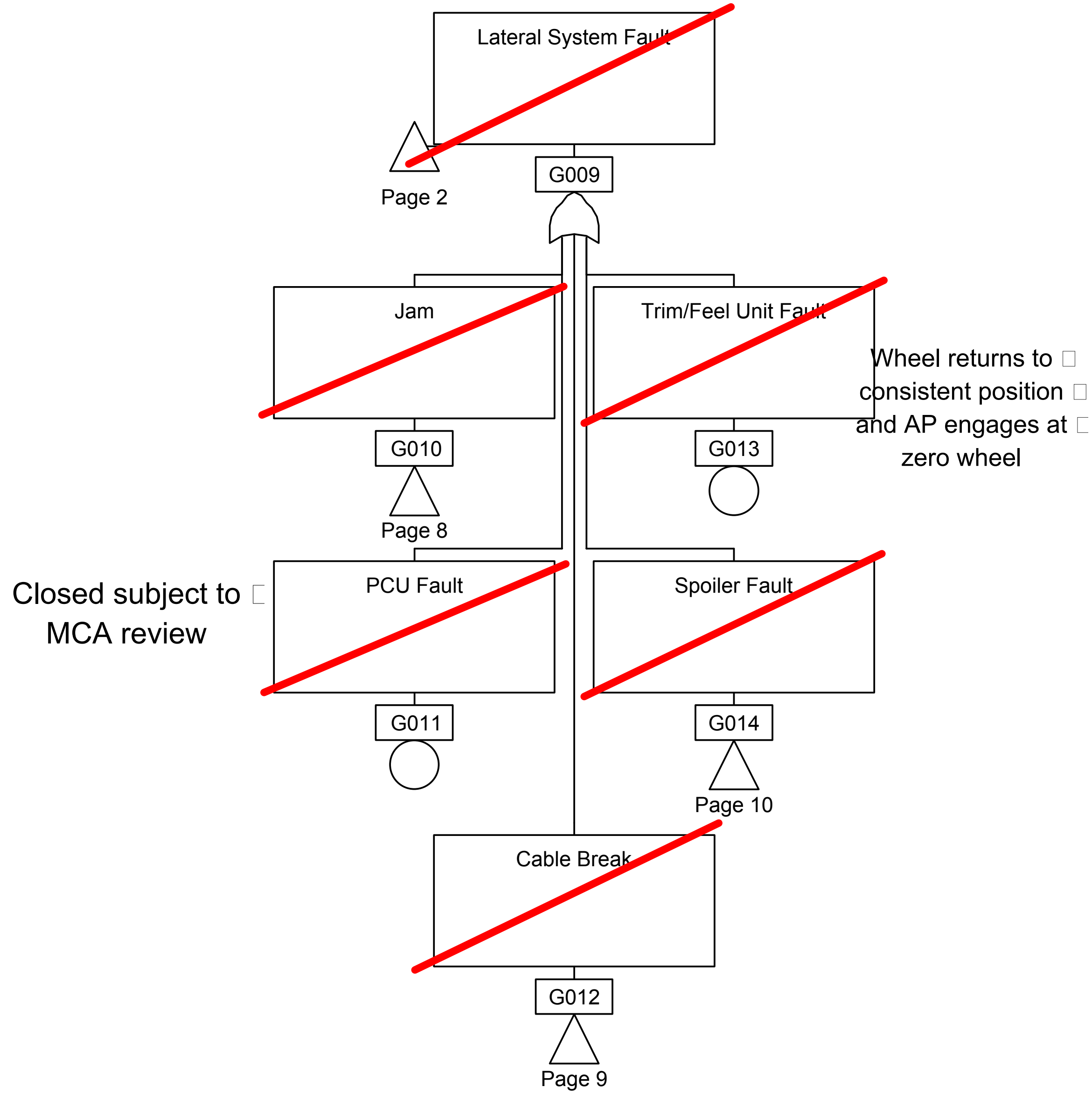

Lateral Control System
G001
Page 1
Pilot Input
Fits Data
G029
Page 3
Autopilot Initiated
FDR does not show AP in command
G008
Lateral System Fault
G009
Page 7
Commanded
G040
Uncommanded
G041


Pilot Input
Fits Data
Page 2
G029
Following FD
G030
Page 4
Following Erroneous EADI
G037
FDR attitude data is accurate
(Ref. 13.0 for data)
Widening His Departure Pattern
Unable to determine
G034
(CBS Work)
Mistaken Initial 140 Heading Interpretation
Unable to determine
G035
(CBS Work)
Pilot Loses Awareness of Heading and/or Bank
Unable to determine
G039
(CBS Work)
To Level Wings Prior to Autopilot Engagement
Unable to determine
G036
(CBS Work)

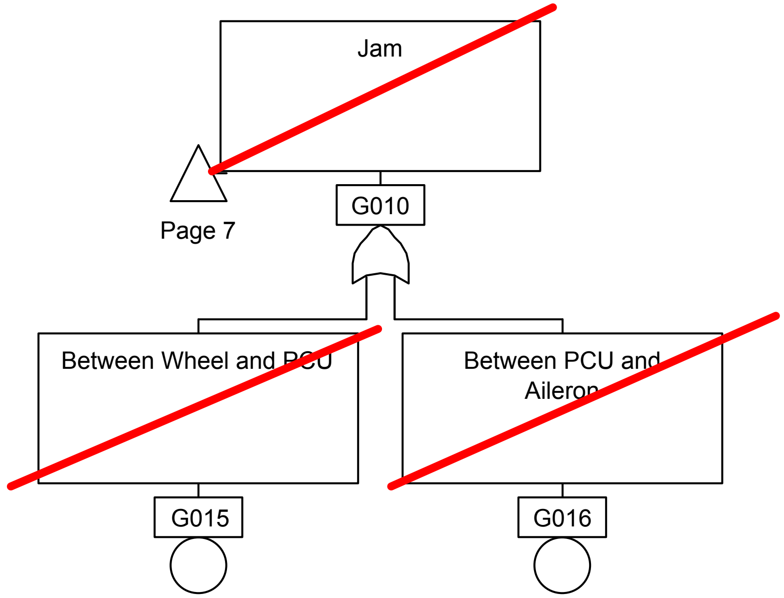

Following FD
Page 3
G030
FD Commands Erroneous
FD Commands Correct
G042
G043
Page 5
Unintended Direction Selected Hdg(to rt of current hdg)
G049
Page 6

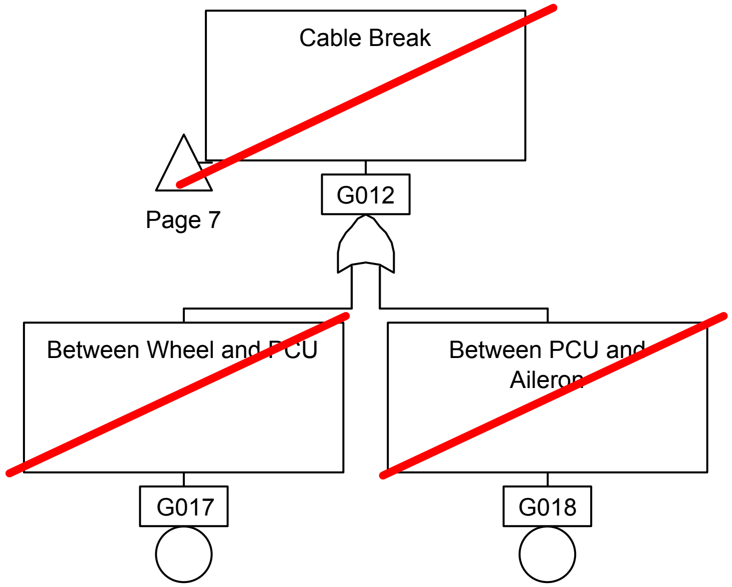

FD Commands Erroneous
Page 4
G042
Erroneous Heading Data
G044
Erroneous Roll Rate Data (SCENARIO 20)
G047
M-Cab
Erroneous Roll Data
G045
Erroneous Selected Heading Data (SCENARIO 19)
G048
System Eval.; M-Cab
FD Computational Fault;FCC comp.fault (SCENARIO 18)
G046
(See AP Faults)
See Honeywell Presentation. 3 Feb 05
No FCC faults or combination of faults
result in valid FDR data wtih erroneous
commands.

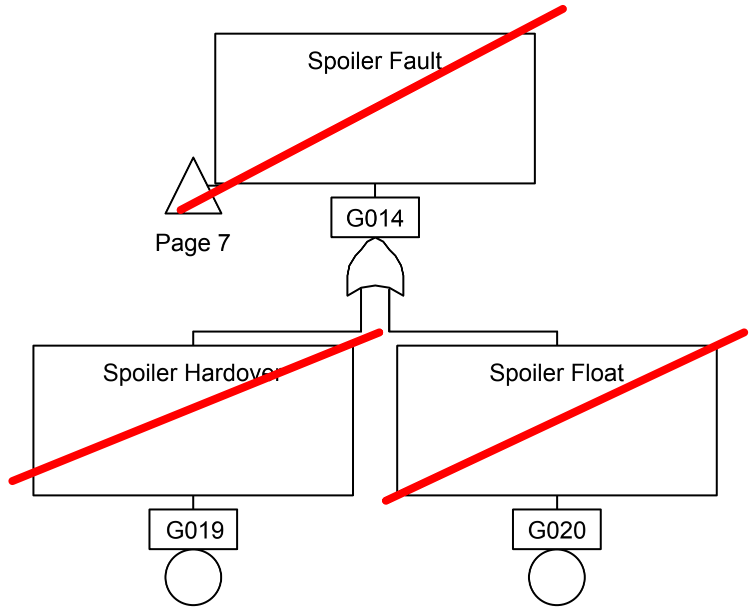

Unintended Direction Selected Hdg(to rt of current hdg)
Page 4
G049
Manual Input to MCP (SCENARIO 21)
G050
System Eval.; M-Cab

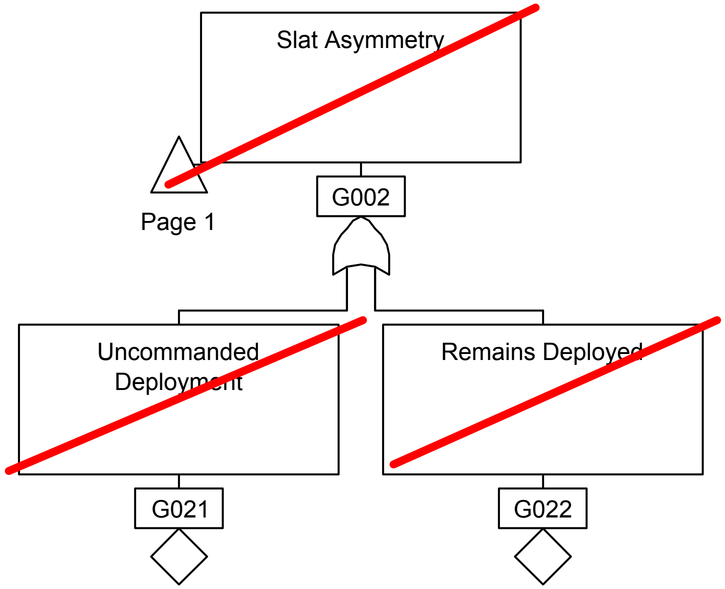


Lateral System Fault
Page 2
G009
Jam
Trim/Feel Unit Fault
Wheel returns to consistent position and AP engages at zero wheel
G010
G013
Page 8
Closed subject to MCA review
PCU Fault
Spoiler Fault
G011
G014
Page 10
Cable Break
G012
Page 9


Jam
Page 7
G010
Between Wheel and PCU
Between PCU and Aileron
G015
G016


Cable Break
Page 7
G012
Between Wheel and PCU
Between PCU and Aileron
G017
G018


Spoiler Fault
Page 7
G014
Spoiler Hardover
Spoiler Float
G019
G020


Slat Asymmetry
Page 1
G002
Uncommanded Deployment
Remains Deployed
G021
G022

2.5.6 Pitch up and airspeed decay

Based on the FDR data the speed reached 217 Kt at time frame 92405 (seconds), but the speed decreased to 184.5 Kts at 92437.

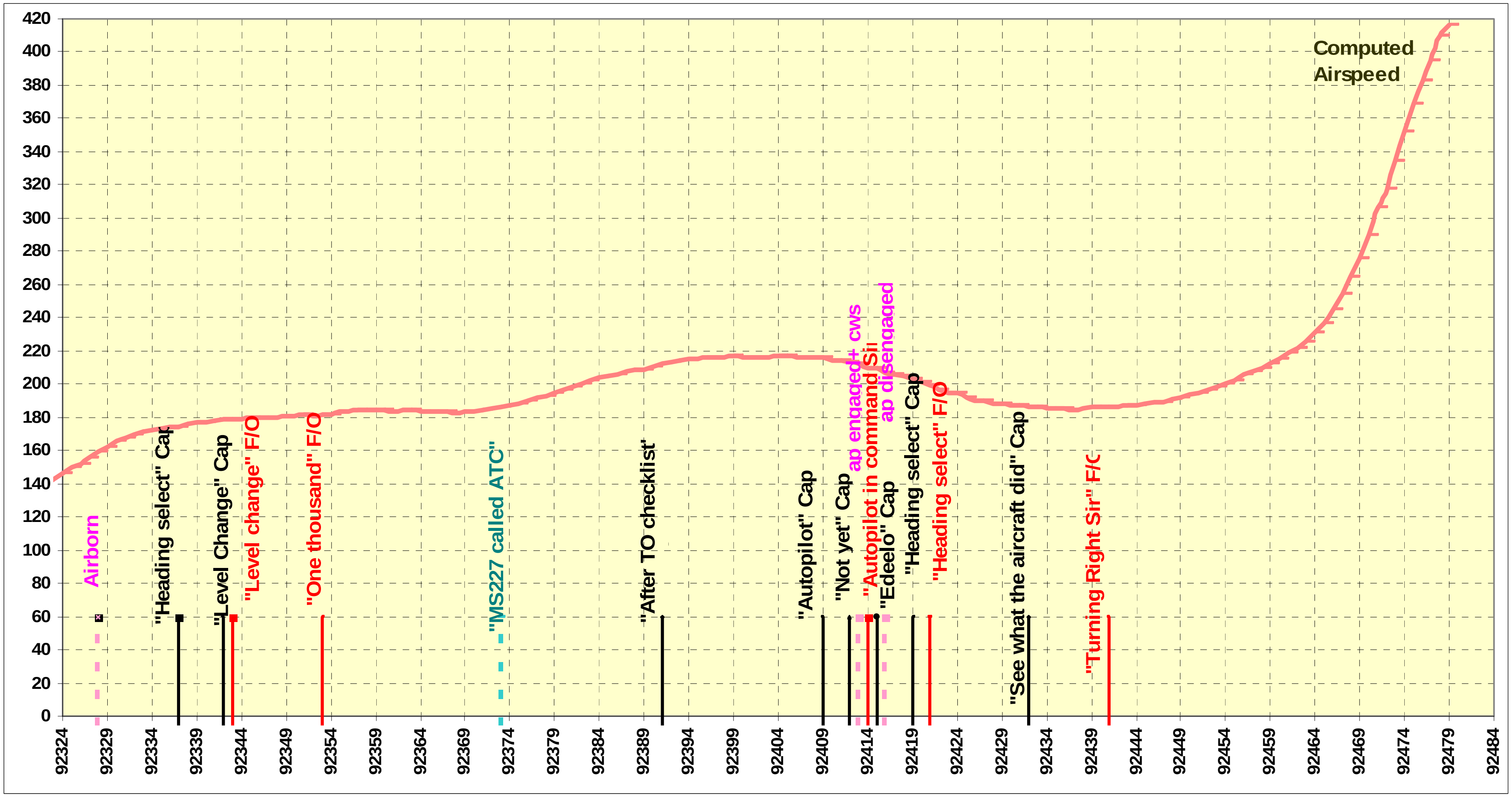


Figure 2.5.6.1 Pitch up and airspeed decay

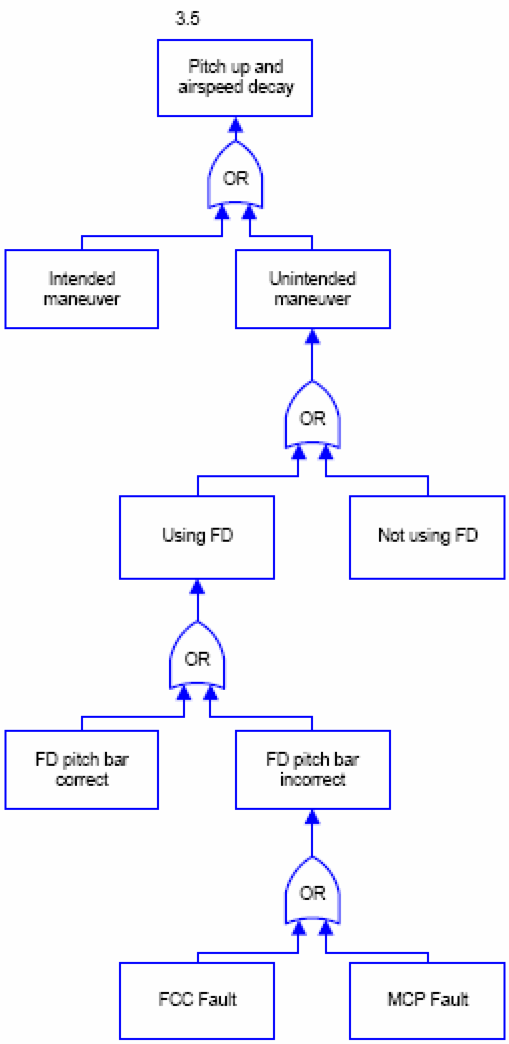
Pitch up and airspeed decay analysis:

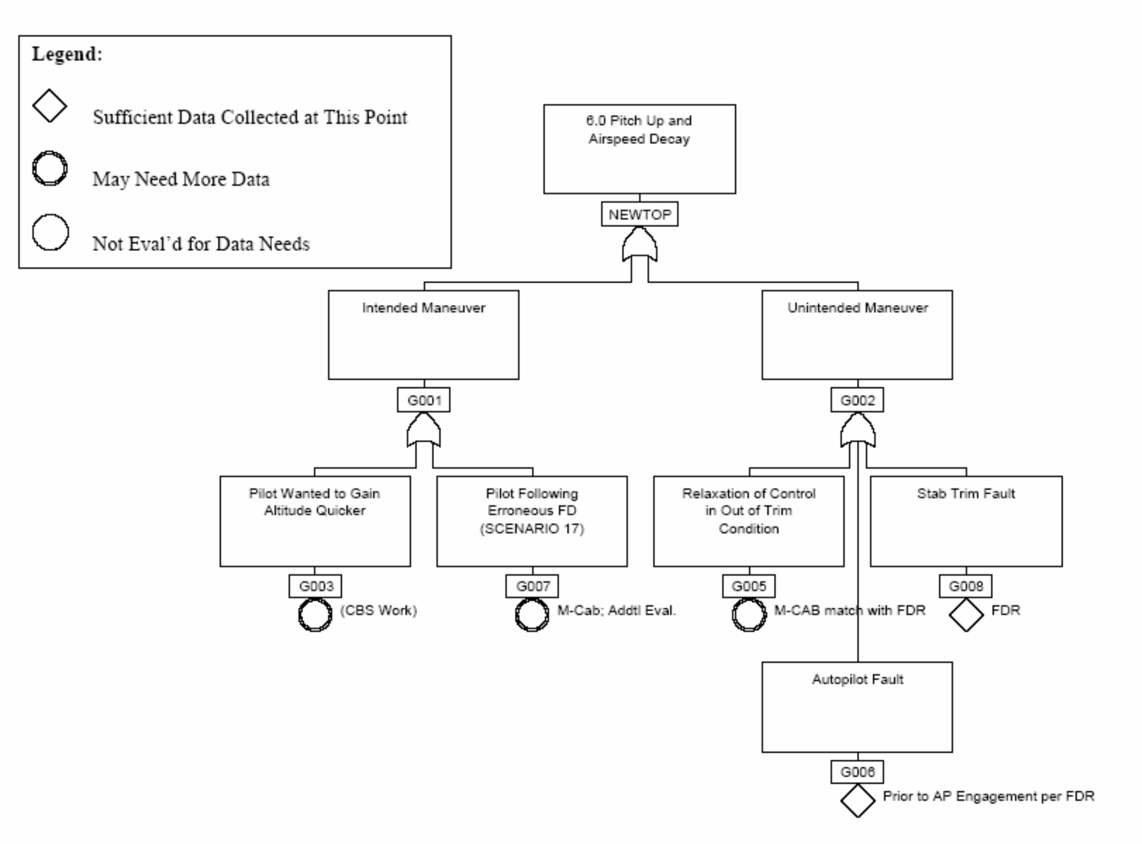
The possible conditions which might lead to this event are shown in the following:

1. Pilot Wanted to Gain Altitude Quicker (Intended Maneuver)
   This possibility may be supported by the fact that the airplane should intercept the VOR radial at a minimum of 11,000 ft
2. Pilot Following Erroneous FD (intended)
   There are not enough data to rule in or rule out this probability
3. Relaxation of Control in Out of Trim Condition (Unintended Maneuver)
   The results from the M-CAB tests match with FDR
4. Autopilot Fault (Unintended Maneuver)
   This condition might be ruled out. This event started prior to AP Engagement (based on FDR data)
5. Stab Trim Fault (Unintended Maneuver)
   This condition might be ruled out. Based on FDR data, the stabilizer did not show abnormal behavior throughout the flight.
6. Pilot pulling on the control column (unintentional)

Conclusion:

With the exclusion of the ruled out (conditions 4 and 5), the investigation could not determine a higher possibility to any of the remaining conditions (conditions 1, 2, 3 and 6) based on the given data.
In all cases, this event does not have direct relation to the accident


3.5
Pitch up and airspeed decay
OR
Intended maneuver
Unintended maneuver
OR
Using FD
Not using FD
OR
FD pitch bar correct
FD pitch bar incorrect
OR
FCC Fault
MCP Fault


1
Legend:
Sufficient Data Collected at This Point
May Need More Data
Not Eval'd for Data Needs
6.0 Pitch Up and Airspeed Decay
NEWTOP
Intended Maneuver
Unintended Maneuver
G001
G002
Pilot Wanted to Gain Altitude Quicker
Pilot Following Erroneous FD (SCENARIO 17)
Relaxation of Control in Out of Trim Condition
Stab Trim Fault
G003
(CBS Work)
G007
M-Cab; Addtl Eval.
G005
M-CAB match with FDR
G008
FDR
Autopilot Fault
G006
Prior to AP Engagement per FDR

2.5.7 Autopilot engage sequence

Based on the CVR data, the Captain announced ‘Autopilot” at 92409, followed by “Not yet” at 92412. At 92413 FDR showed A/P engaged+ CWS-R

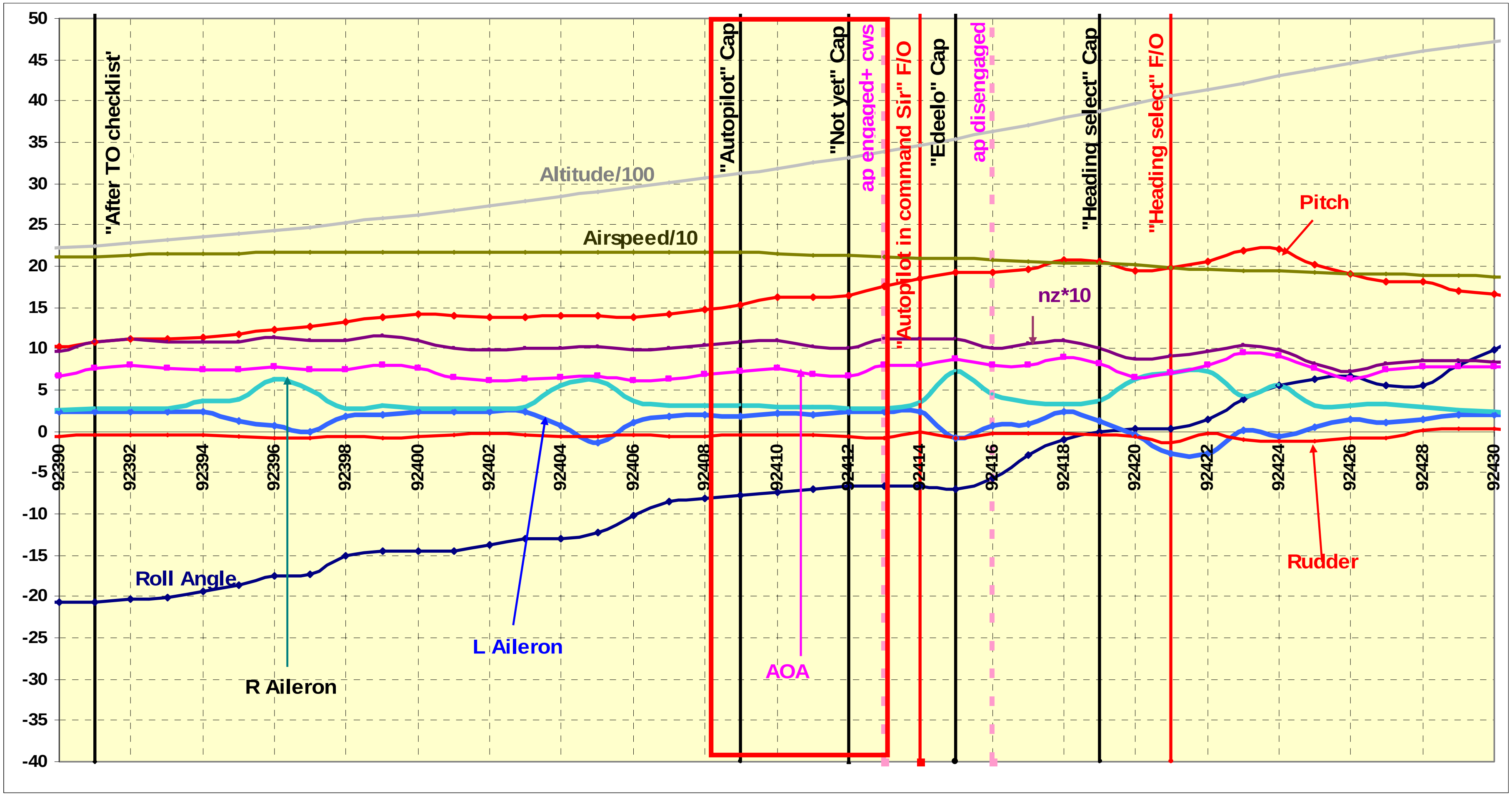


Figure 2.5.7.1 Autopilot engage sequence

2.5.7.1 Autopilot Engage Logic [1]

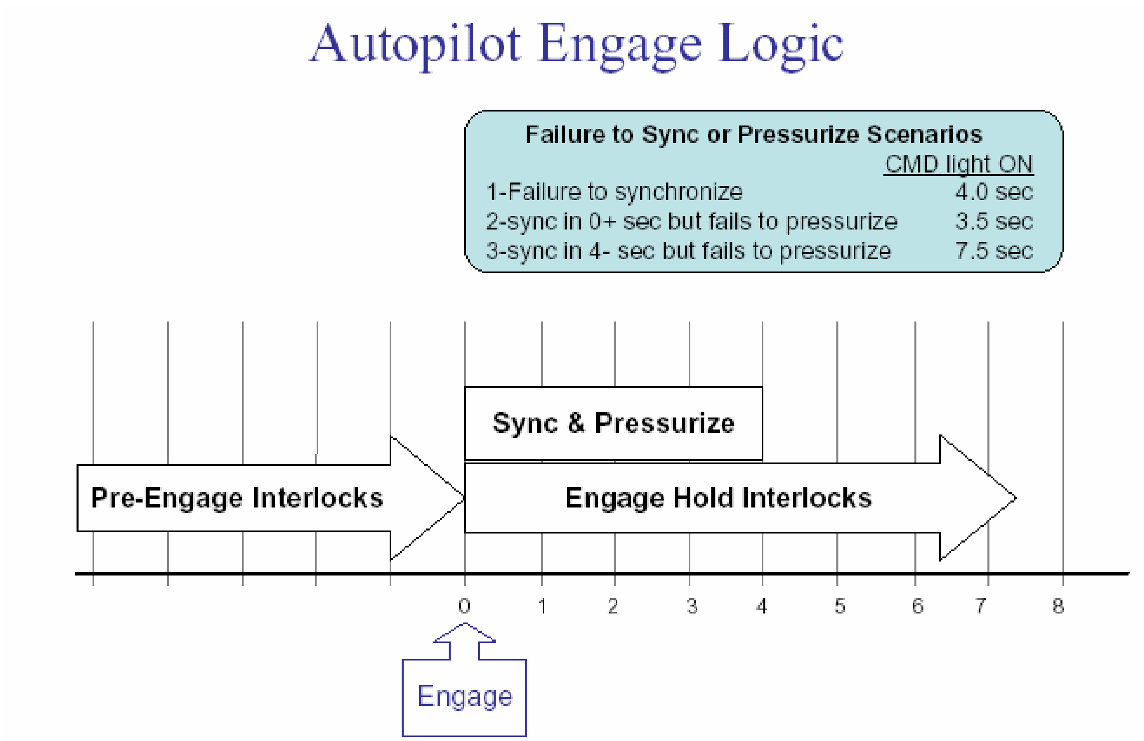


Figure 2.5.7.2a Autopilot Engage Logic

[1] Cairo March 04 Autopilot Flash 737 March Progress Meeting Flash 737 March Progress Meeting - Cairo

A/P Engage Function

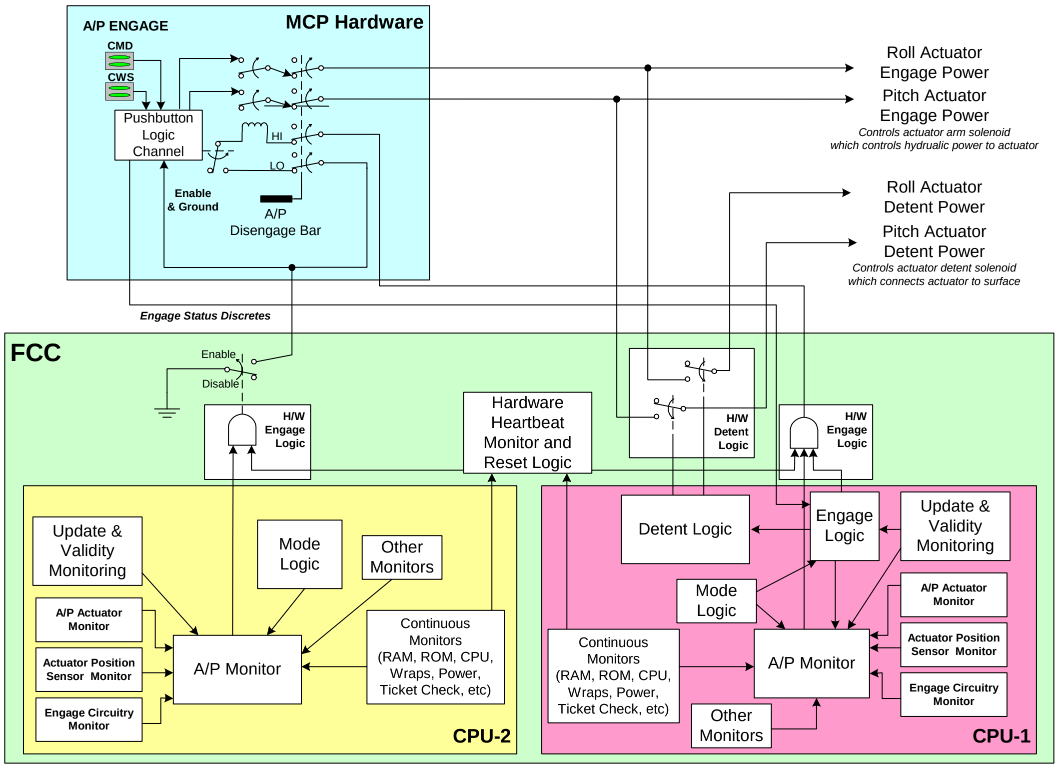


Figure 2.5.7.2b Autopilot Engage Logic

If the pre-engage logic is valid, pushing any of the autopilot switches (push/light type switches CMD and CWS) engages the autopilot and turns the light on. Once the light is on, a loss of the engage hold logic causes the light to go off and the autopilot disengages. If the pre-engage logic is not valid when the switch is pressed, the light does not turn on and the autopilot does not engage.

	UNLOCK	HOLD	DISENGAGE
1. A/P STAB TRIM CUTOUT SWITCH NORMAL	X	X	
2. MAIN ELECTRIC TRIM SWITCHES (NOT PRESSED)	X	X	
3. A/P STAB TRIM MOTOR SPEED VALID (10 SEC)	X	X	
4. AILERON FORCE LIMITER AUTHORITY LIMIT VALID (10 SEC)	X	X	
5. AILERON FORCE LIMITER CLUTCH - DISENGAGE [4]	X		
6. AILERON FORCE LIMITER CLUTCH - ENGAGE WITHIN 0.5 SEC [4]		X	
7. A/P DISENGAGE SWITCH NOT PRESSED	X	X	
8. A/P AILERON HYD PRESSURE SWITCH - NO PRESSURE	X		
9. A/P AILERON HYD PRESSURE SWITCH - PRESSURE WITHIN 3.5 SEC AFTER ACT DET SOL ENGAGED		X	
10. A/P ELEVATOR HYD PRESSURE SWITCH - NO PRESSURE	X		
11. A/P ELEVATOR HYD PRESSURE SWITCH - PRESSURE WITHIN 3.5 SEC AFTER ELEV ACT DET SOL ENGAGED		X	
12. FCC 115V AC (0.5 SEC)	X	X	
13. (DC) ENGAGE INTLK A	X	X	
14. NOT (FGN IN CMD AND APP PB AND LRRA <800 FT)	X		
15. FCC DC AND FCC POWER SUPPLY	X	X	
16. 1800 Hz POWER SUPPLY	X	X	
17. POWER UP TEST VALID	X		
18. CONTINUOUS MONITOR	X	X	
19. A/P ONLY CONTINUOUS MONITOR VALID	X	X	
20. LESS THAN 3 LB FORCE ON CONTROL WHEEL	X		
21. LESS THAN 5 LB FORCE ON CONTROL COLUMN	X		
22. SELECTED IRU ROLL ANGLE VALID (NORM - OFF SIDE)	X	X	
23. SELECTED IRU ROLL RATE VALID (NORM - OFF SIDE)	X	X	
24. SELECTED IRU PITCH ANGLE VALID (NORM - ON SIDE)	X	X	
25. SELECTED IRU PITCH RATE VALID (NORM - ON SIDE)	X	X	
26. A/P TO CMD AND R/A <400 FT WITH LOC AND GS ENGAGED			X
27. F/D IN TO OR GA, R/A ALT <400 FEET AND A/P TO CMD			X
28. ADC CAS NOT VALID (EXCEPT WITH MONITORS ACTIVE)			X
29. IRU TRANSFER (SEE TEXT)	[2]		[2]
30. A/P ENGAGE SWITCH SWAP (SEE TEXT)			X
31. ADC CORRECTED BARO ALT VALID	X		[1]
32. ADC UNCORRECTED BARO ALT VALID	X		[1]
33. LCL AC BUS TRANSFER (SINGLE SHOT)	[2]		[2]
34. A/P DISENGAGE SWITCH PRESSED			
35. DISENGAGE BAR ON MCP PULLED DOWN [3]			

[1] SEE PITCH MODE DISENGAGE TABLE

[2] DISENGAGES, CAN BE RE-ENGAGED IN ANY MODE EXCEPT APP MODE WITH FGN IN CMD

[3] MCP WITH PUSHBUTTON ENGAGE SWITCHES

[4] AIRPLANES WITH MECHANICAL AILERON FORCE LIMITER

Table 2.5.7.1 Autopilot Unlock, Hold and Disengage Logic

Autopilot Engage & Engage Hold Interlocks

	Pre-Engage	Engage Hold
Condition	Prevent Engage	Cause Disengage
Pitch CWS force greater than 5 lbs	X	
Roll CWS force greater than 2.25 lbs	X	
Elevator Detent Pressure Switch Indicates Pressurized	X	
Aileron Detent Pressure Switch Indicates Pressurized	X	
Auto Stab Trim Cutout Switch in Cutout	X	X
Both Flap Switches and Stab Trim Motor don't agree as Flaps Up or as Flaps Down	X	X
Main Electric Trim Switch Activated	X	X
Aileron Force Limiter position does not agree with Flaps UP or Flaps Down	X	X
CAS Invalid	X	X
Uncorrected Altitude Invalid	X	X
26 VAC 400 Hz Invalid	X	X
MCP to FCC Bus Invalid	X	X
Pitch Angle Invalid	X	X
Pitch Rate Invalid	X	X
Roll Angle Invalid	X	X
Roll Rate Invalid	X	X
Baro Altitude Invalid (Prevents CMD only)	X	X
Elevator Detent Pressure Switch Indicates Non-Pressurized		X
Aileron Detent Pressure Switch Indicates Non-Pressurized		X
(Magnetic Heading OR TAS Invalid) AND (Roll CWS) AND (Bank Angle <8 degrees)	X	X

Table 2.5.7.2 Autopilot Engage, Engage Hold Logic

2.5.7.2 Autopilot engagement attempt analysis based on the FDR and CVR data:

2.5.7.2.1 Based on the FDR recorded data, the autopilot was engaged for few seconds and then disengaged, meaning that the pre-engage logic was valid, i.e. the following logic was valid:

- Pitch CWS force was not greater than 5 lbs, and
- Roll CWS force was not greater than 2.25 lbs, and
- Elevator Detent Pressure Switch indicates no pressure, and
- Aileron Detent Pressure Switch indicates no pressurized, and
- Auto Stab Trim Cutout Switch was not in Cutout, and
- Both Flap Switches and Stab Trim Motor agree as Flaps Up or as Flaps Down , and
- Main Electric Trim Switch not Activated, and
- Aileron Force Limiter position agrees with Flaps UP or Flaps Down, and
- CAS valid, and
- Uncorrected Altitude valid, and
- 26 VAC 400 Hz valid, and
- MCP to FCC Bus valid, and
- Pitch Angle valid, and
- Pitch Rate valid, and
- Roll Angle valid, and
- Roll Rate valid, and
- Baro Altitude

2.5.7.2.2 The conditions leading to the event of engaging the autopilot are presented in the following:

1. Captain requests autopilot, Captain cancels request, F/O pushes CMD button anyway

   This probability is consistent with Flash Airline company practice. Impression from CVR is that the first officer is manipulating the MCP Controls prior to autopilot engagement.CMD button is located on right side of MCP, closer to F/O.

   However, Boeing procedure is for “pilot flying” to push the CMD button.

2. Captain requests autopilot, Captain prompts F/O due slow response, F/O pushes CMD button

   This probability is consistent with Flash Airline company practice Impression from CVR is that the first officer is manipulating the MCP, Controls prior to autopilot engagement, CMD button is located on right side of MCP, closer to F/O.

However, Boeing procedure is for “pilot flying” to push the CMD button.

3. Captain pushes CMD button, gets no response., Captain questions no response and makes second push., F/O reports autopilot engaged.

   Boeing procedure is for “pilot flying” to push the CMD button

Conclusion:

The investigation could not determine a higher possibility to any of the above findings based on the given data. However, with reference to the CVR/ FDR correlation, this event could have initiated crew distraction.

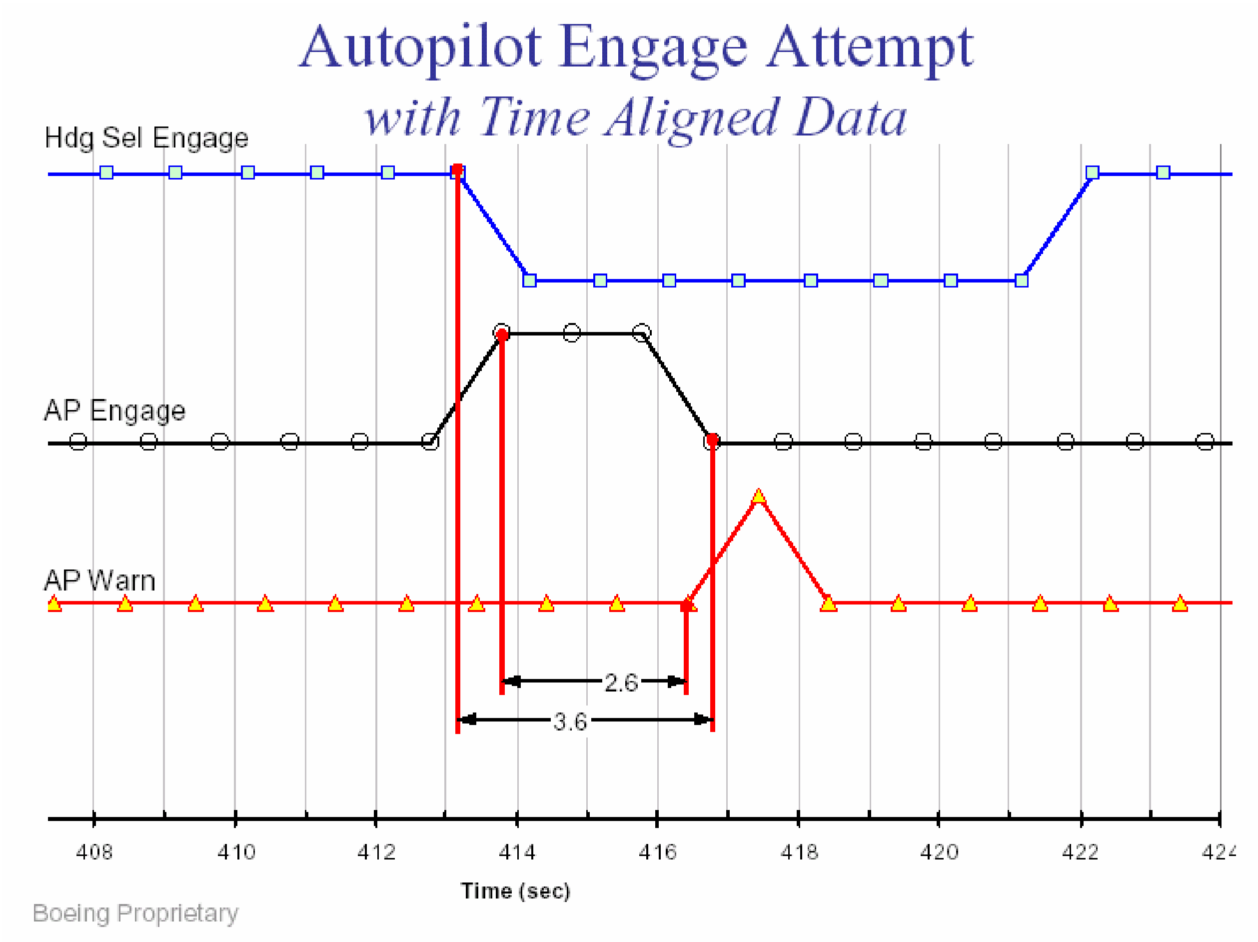
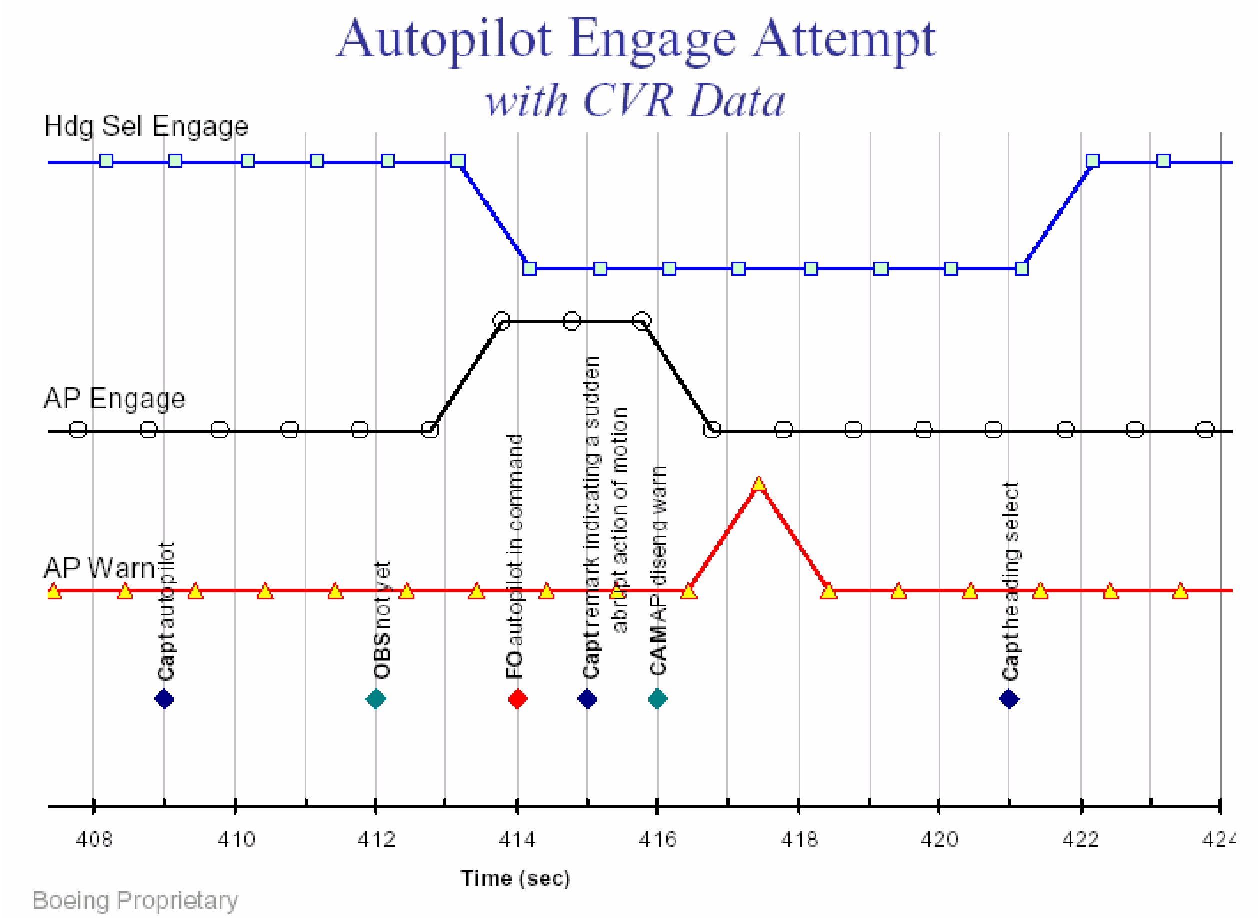


Figure 2.5.7.3 Autopilot Engage Attempt with Time Aligned Data



The CVR statement "Not yet" at 412 is attributed to Captain instead of the Observer

Figure 2.5.7.4 Autopilot Engage Attempt with Time CVR Data

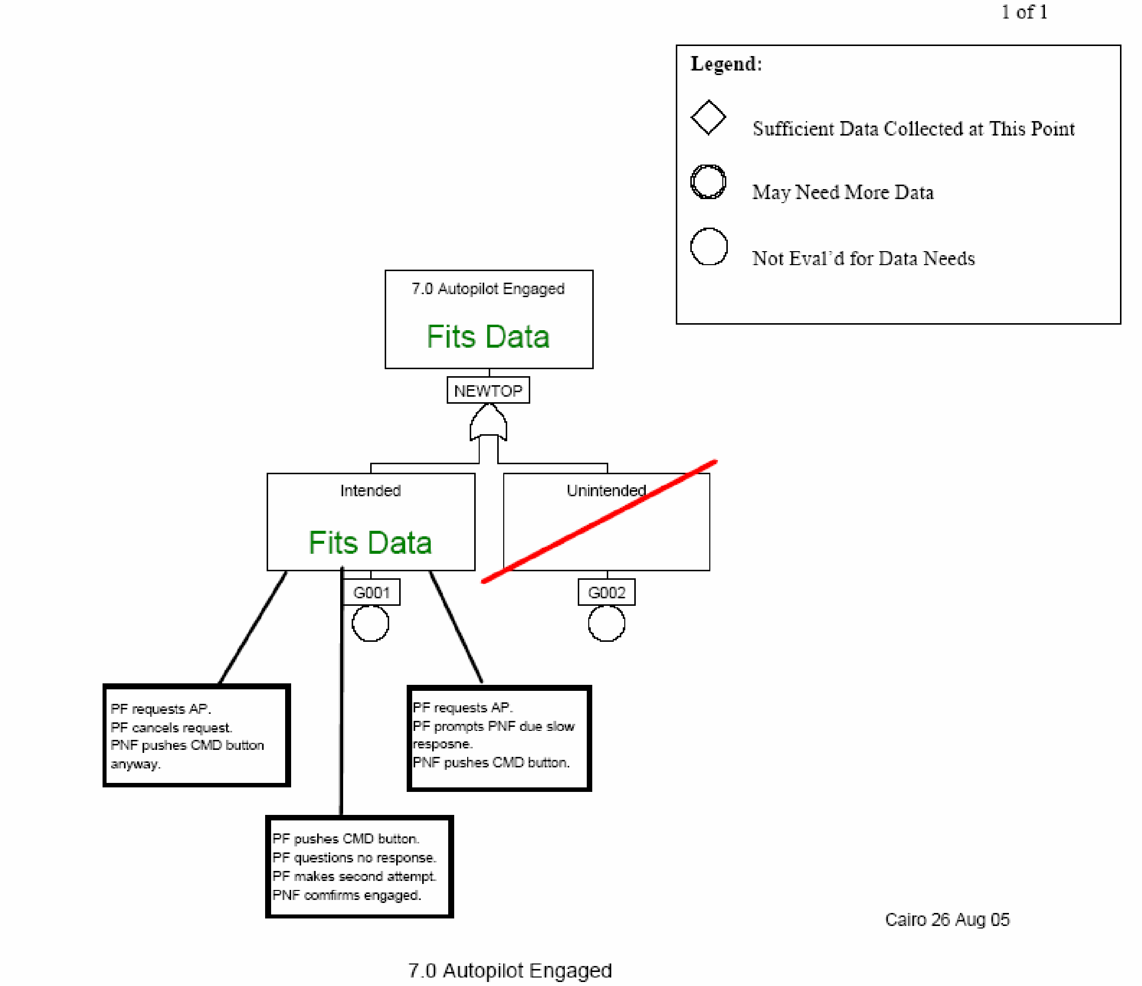


Figure 2.5.7.5 Autopilot Engage fault Tree Analysis

2.5.8 Mode change from HDG SEL to CWS-R

At 92413 FDR showed A/P engaged+ CWS-R

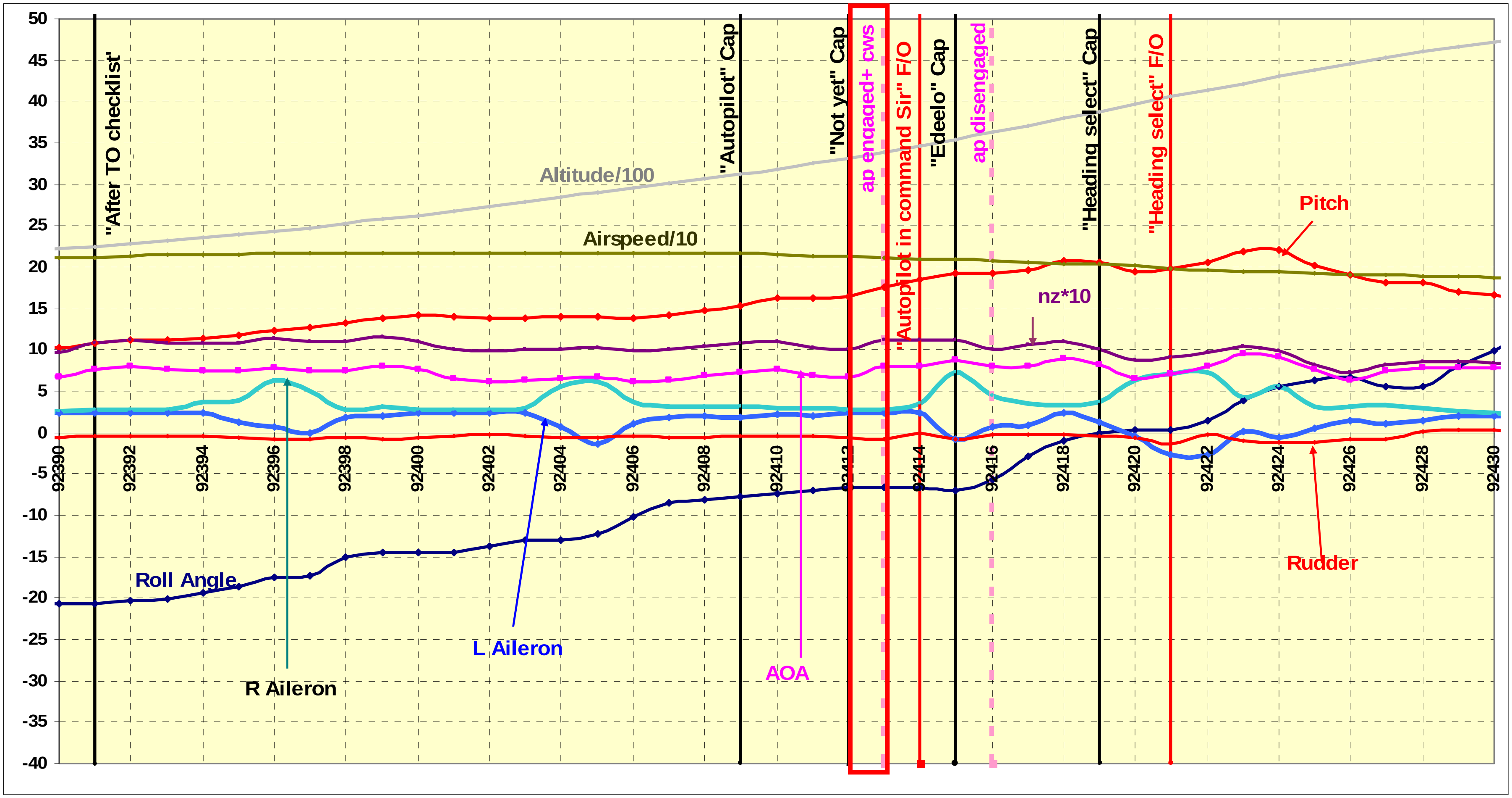


Figure 2.5.8 Mode change from HDG SEL to CWS-R

2.5.8.1 Possible conditions leading to "Heading Select Mode Fails Off"

1. Loss of TAS (True Air Speed)
   Unlikely to be the cause of the event as it would have also caused loss of level change. Level change was not lost

2. Loss of "Magnetic Heading"
   Unlikely to be the cause of the event because the Magnetic Heading was available immediately before and is valid on FDR

3. MCP (Mode Control Panel) Fault
   This condition could be ruled out

3. FCC Fault (Unpredictable)
   This condition could be ruled out

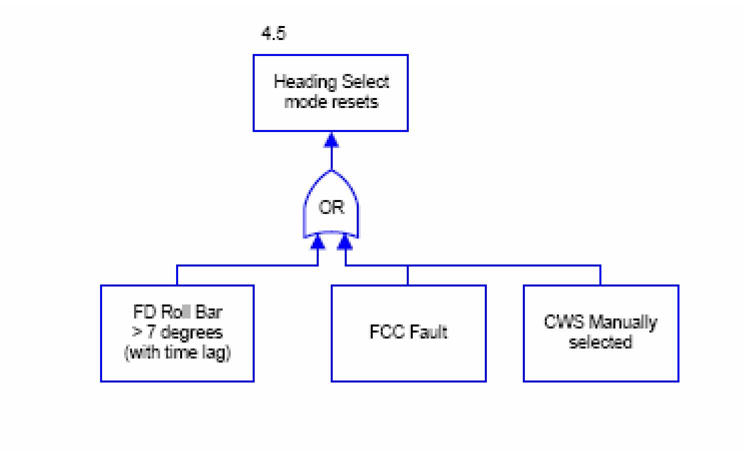
5. CWS Manually Selected (no failures condition)
   Unlikely to occur simultaneously with AP engagement

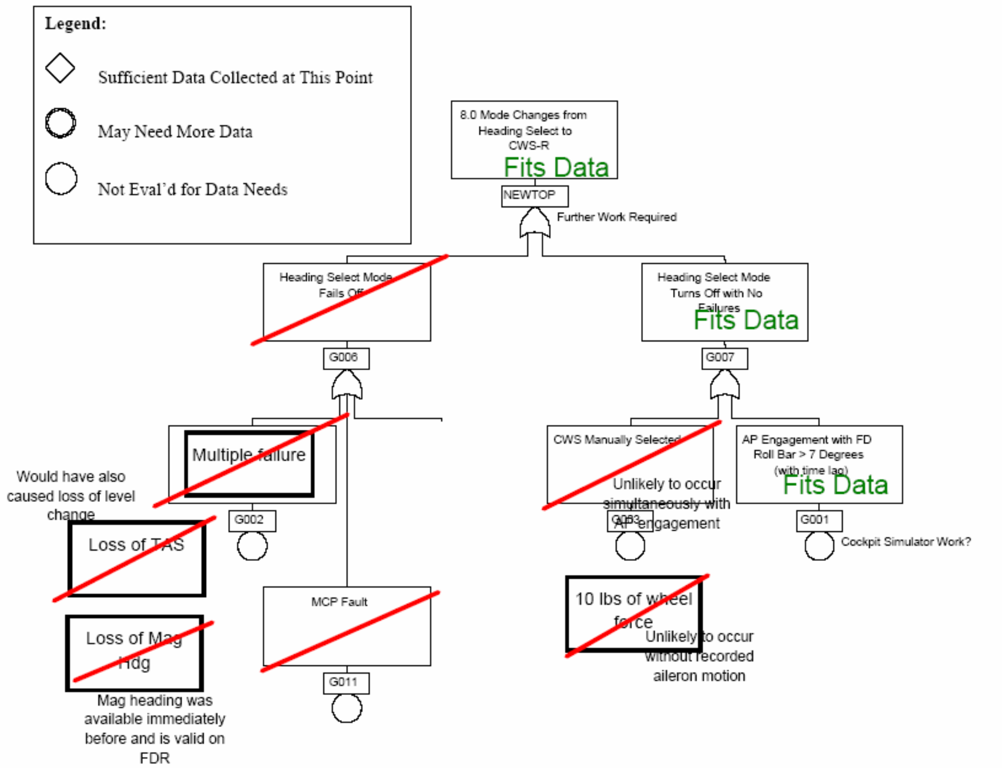
6. 10 lbs (or higher) of wheel force ((no failures condition)
   Unlikely to occur without recorded aileron motion

7. AP Engagement with FD Roll Bar > 7 Degrees (with time lag) (no failures condition)
   If the FD director command is greater than 7 degrees at the time autopilot engagement is attempted, the roll mode will change from HDG SEL to CWS. According to FDR data this seems to be consistent with the probable FD command which existed when A/P engagement was initiated.
   This condition could not be ruled out.

Conclusion:

After ruling out the conditions which are unlikely to occur as mentioned above, the possible condition that could have led to this event is that the autopilot was Engaged with FD Roll Bar > 7 Degrees (with time lag)





Updated: 10/1/04 (Seattle)

2.5.9 Aileron move in direction of right roll

Based on the FDR, the ailerons started moving in the direction requesting for airplane right roll almost after 92392

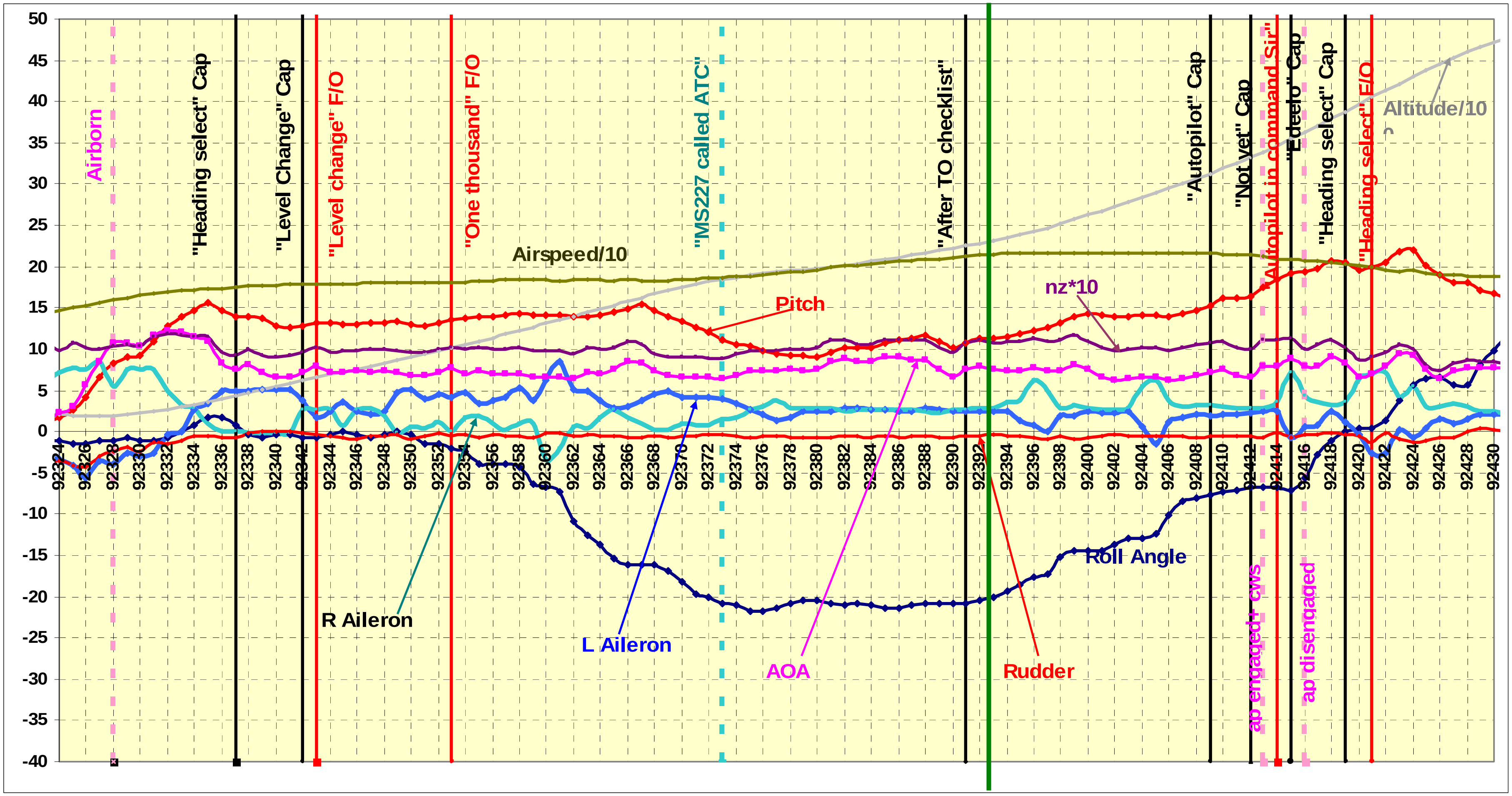


Figure 2.5.9.1a Aileron Move in direction of right roll

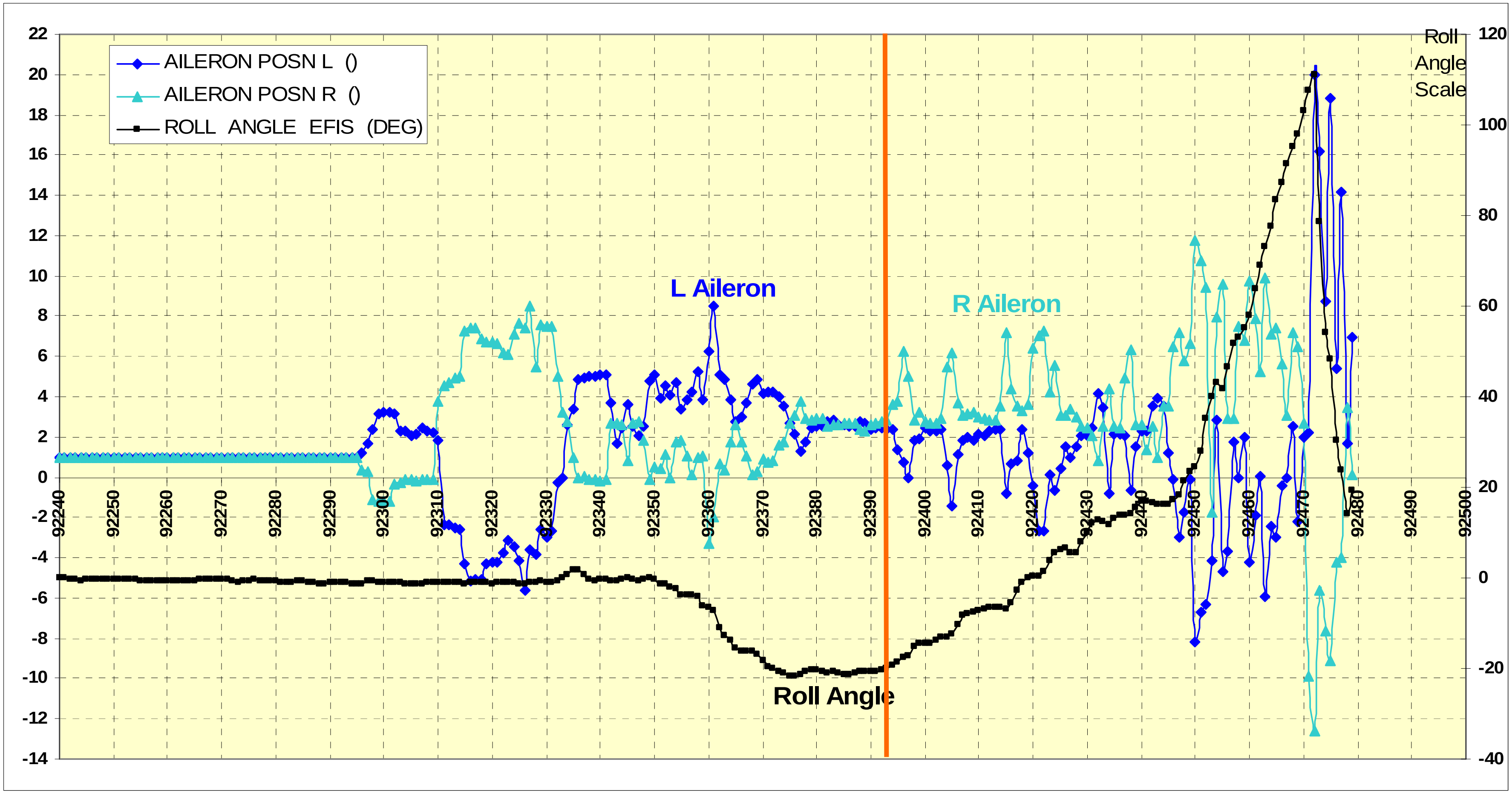


Figure 2.5.9.1b Aileron Move in direction of right roll

Based on the FDR data, and starting from about the time frame 92393 the right aileron showed upward movement (TEU), the left aileron showed downward movement. This movement dirction continued up to the 92471 timeframe after which airplane recovery attempt was made.

Probable conditions leading to the event:

A. NA:

B- Flaps assymetry:

The FDR did not show evidences of flap asymmetry. Based on these information, there is no evidence of flap asymmetry existing at the time of the event and consequently this condition could be ruled out

C- Slats assymetry:

1.1 Uncommanded Deployment

Based on the performance evaluation, Slat failure simulations that were conducted on computer workstations, this condition could be ruled out. (See section 2.5.13 Right roll continues to overbank with ailerons activities)

1.2 Remains Deployed (SLAT FULL DEPLOYED)

Based on the performance evaluation, M-Cab results (Simulation match to FDR) this condition could be ruled out. (See section 2.5.13 Right roll continues to overbank with ailerons activities)

D- Thrust assymetry

With reference to section “2.3.6. Power plants”, it is shown that all the engines parameters were recorded in the FDR. However, some parameters data were not reliable (e.g. L engine N1). The other engines parameters are reliable including the N2 for both engines.. Based on these information, there is no evidence of thrust assymetry existing at the time of the event and consequently this condition could be ruled out

E- External Disturbance

This condition could be ruled out based on FDR data, M- Cab Simulator Match to FDR and meteorogical data

F- Lateral control system

1- Pilot input

This condition could not be ruled out

2- Autopilot Initiated

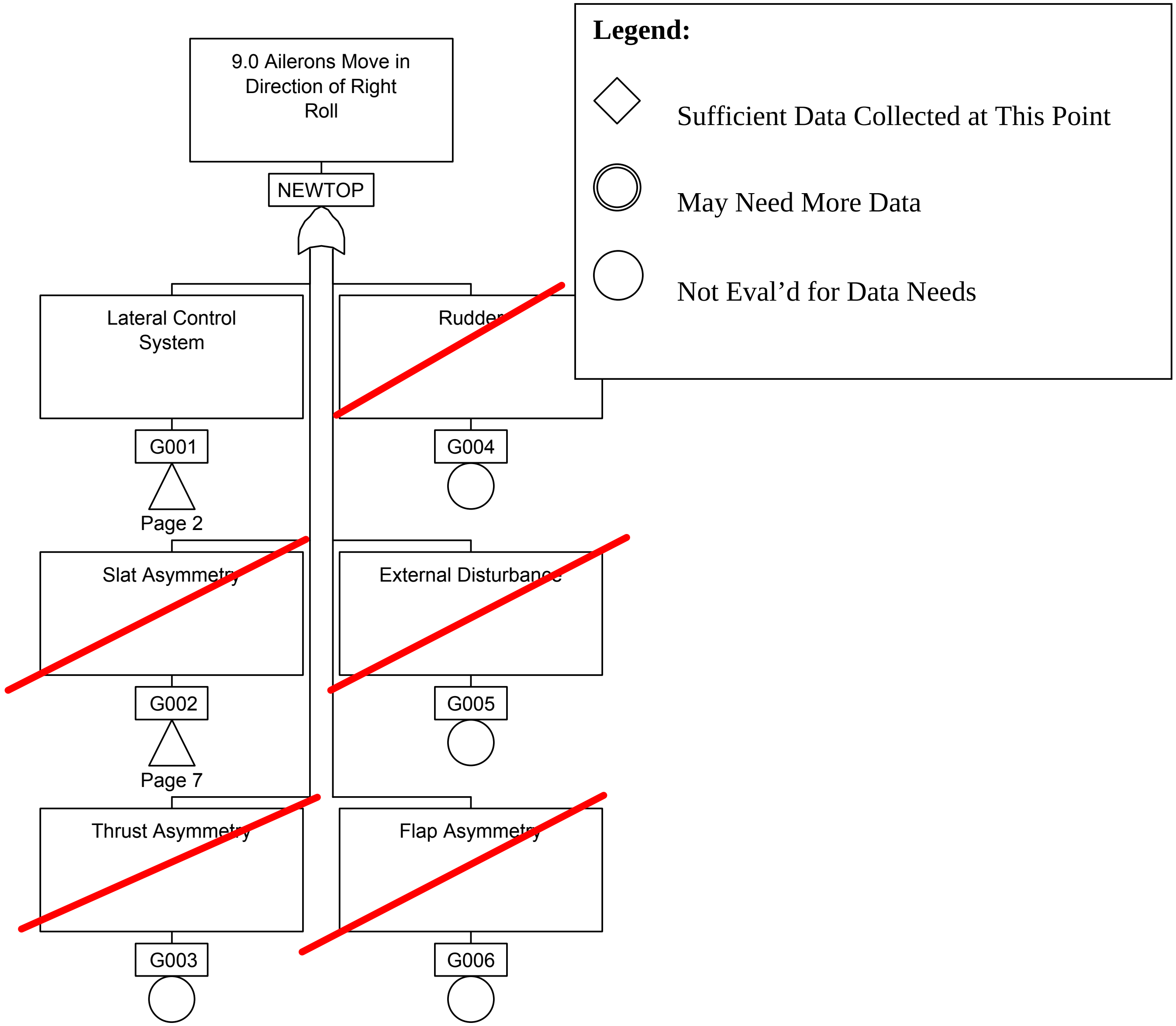
- CWS Bank Hold
  In this condition, the autopilot would command faired ailerons. Thus, this condition could be ruled out

- CWS Heading Hold
  Normally this mode would not engage past 6 deg of airplane bank. The roll angle as shown by the FDR was higher than 6 degrees. Thus, this condition could be ruled out

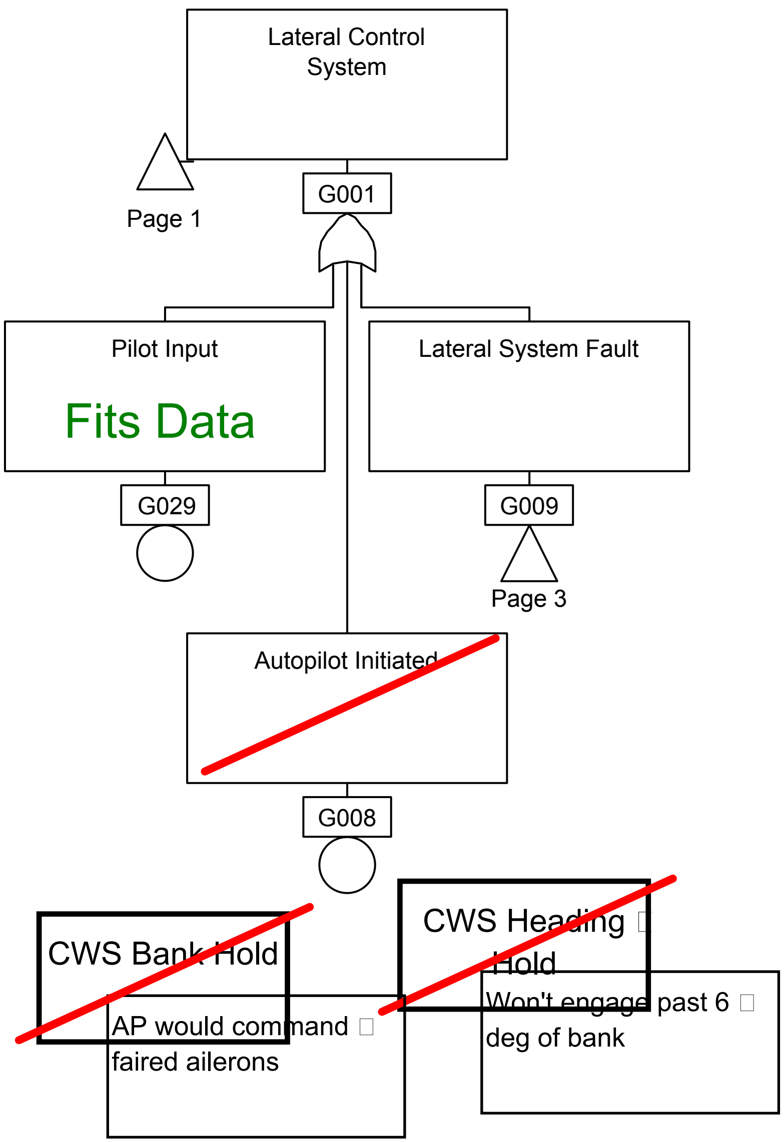
3- Lateral system fault:
See Appendix 2-1 lateral control analysis, and section 2.5.13 Right roll continues to overbank with ailerons activities, item 1.1 Lateral control system

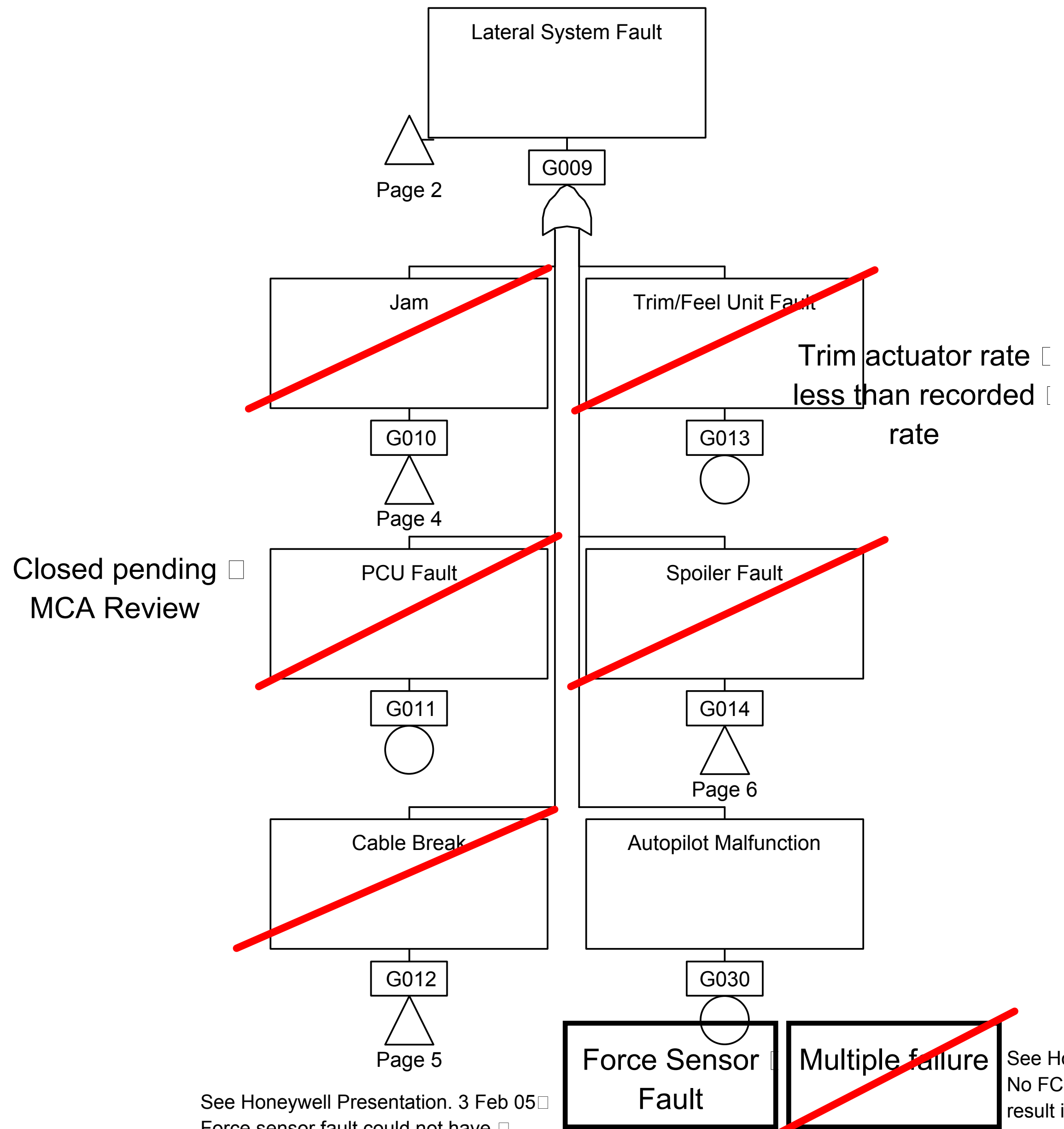
Conclusion:

The investigation could not determine a higher possibility to any of the above findings (lateral system fault, pilot input) based on the given data.



Updated: 10/1/04 (Seattle)

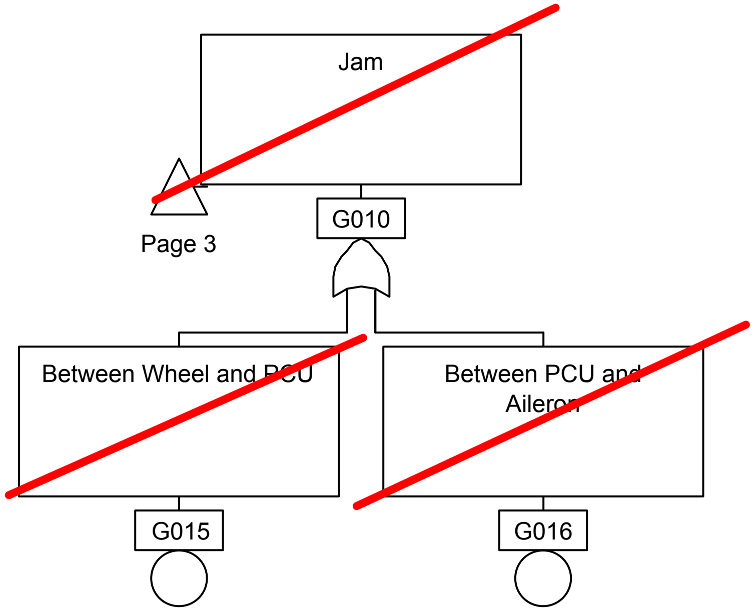

Lateral Control System
Page 1
G001
Pilot Input
Fits Data
Lateral System Fault
G029
G009
Page 3
Autopilot Initiated
G008
CWS Bank Hold
AP would command faired ailerons
CWS Heading Hold
Won't engage past 6 deg of bank

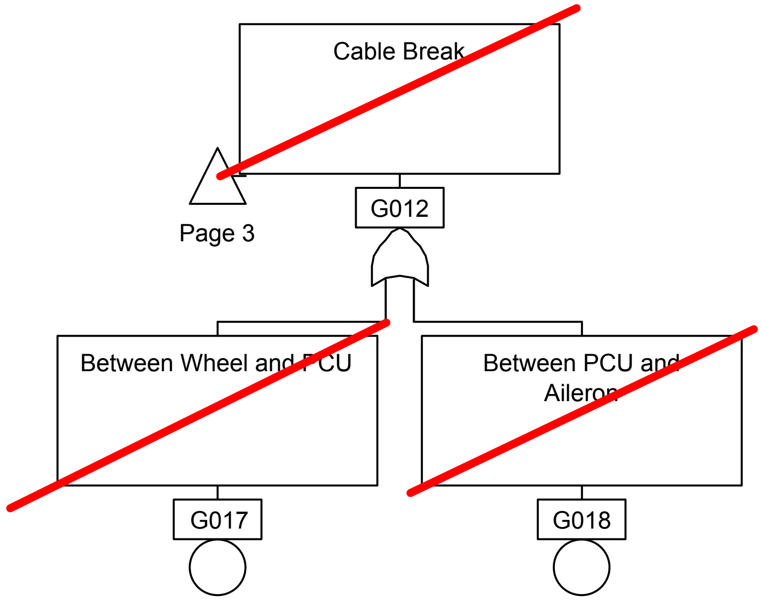


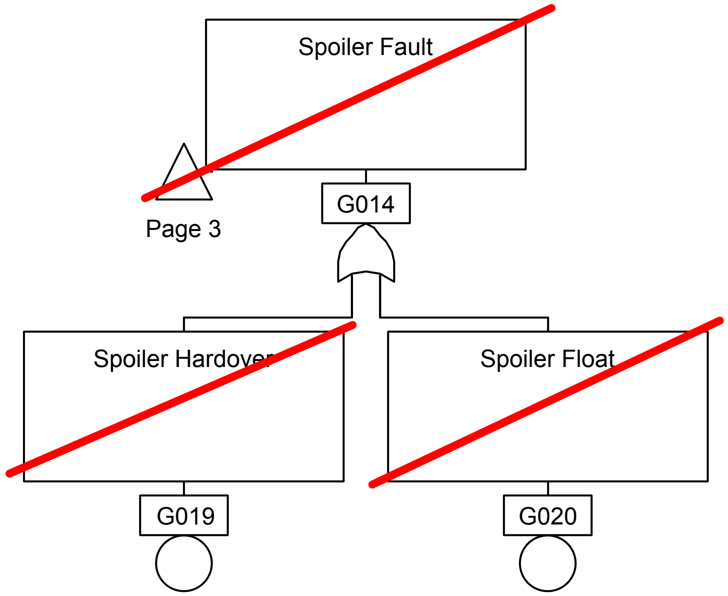
See Honeywell Presentation. 3 Feb 05
Force sensor fault could not have present at AP engagement and would have to fail subsequently.
This would also prevent subsequent AP engagement.

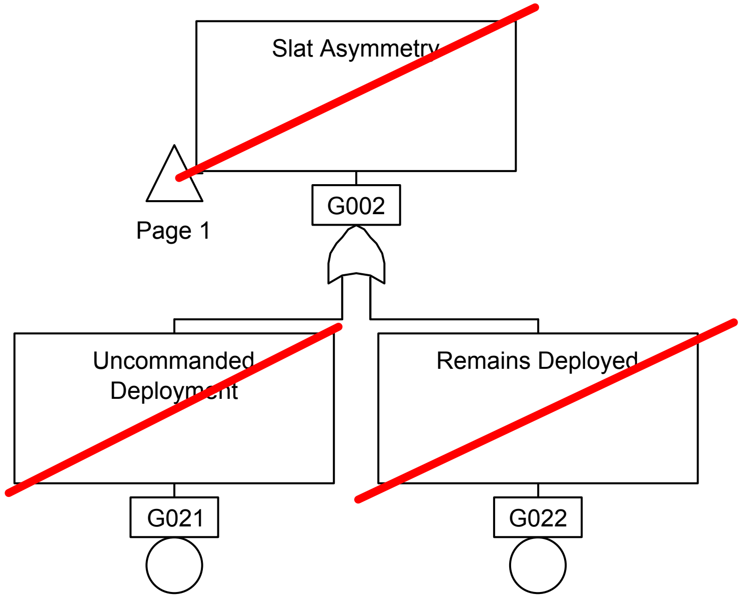
See Honeywell Presentation. 3 Feb 05
No FCC faults or combination of faults result in valid FDR data wtih erroneous commands.

Updated: 10/1/04 (Seattle)


Jam
Page 3
G010
Between Wheel and PCU
Between PCU and Aileron
G015
G016


Cable Break
Page 3
G012
Between Wheel and PCU
Between PCU and Aileron
G017
G018


Spoiler Fault
Page 3
G014
Spoiler Hardover
Spoiler Float
G019
G020


Slat Asymmetry
Page 1
G002
Uncommanded Deployment
Remains Deployed
G021
G022

2.5.10 Autopilot Disengagement indications on the FDR and CVR

Based on FDR and CVR information:

- At time 02:43:55 (92409), the Captain called "Autopilot".

- At time 02:43:58 (92412), the Captain stated "Not yet".

- At time 02:43:59 (92413), the FDR recorded the autopilot was engaged, and the roll mode transition to CWS-R[1].

- At time 02:44:00 (92414), the F/O stated "Autopilot in command sir".

- At time 02:44:01 (92415), the captain stated "EDEELO", (an Arabic exclamation expressing a sharp response of some kind). At the same time, the FDR records momentary aileron surfaces movements. The right aileron deflected to 7.2 degree TEU for one second

- At time 02:44:02 (92416), the CVR recorded the autopilot disconnect warning and the FDR recorded the autopilot disengaged. The aural warning lasted for 2.136 seconds. During this time, an increase in pitch and decay in airspeed were observed

[1] This transition would have resulted in loss of Heading Select Mode

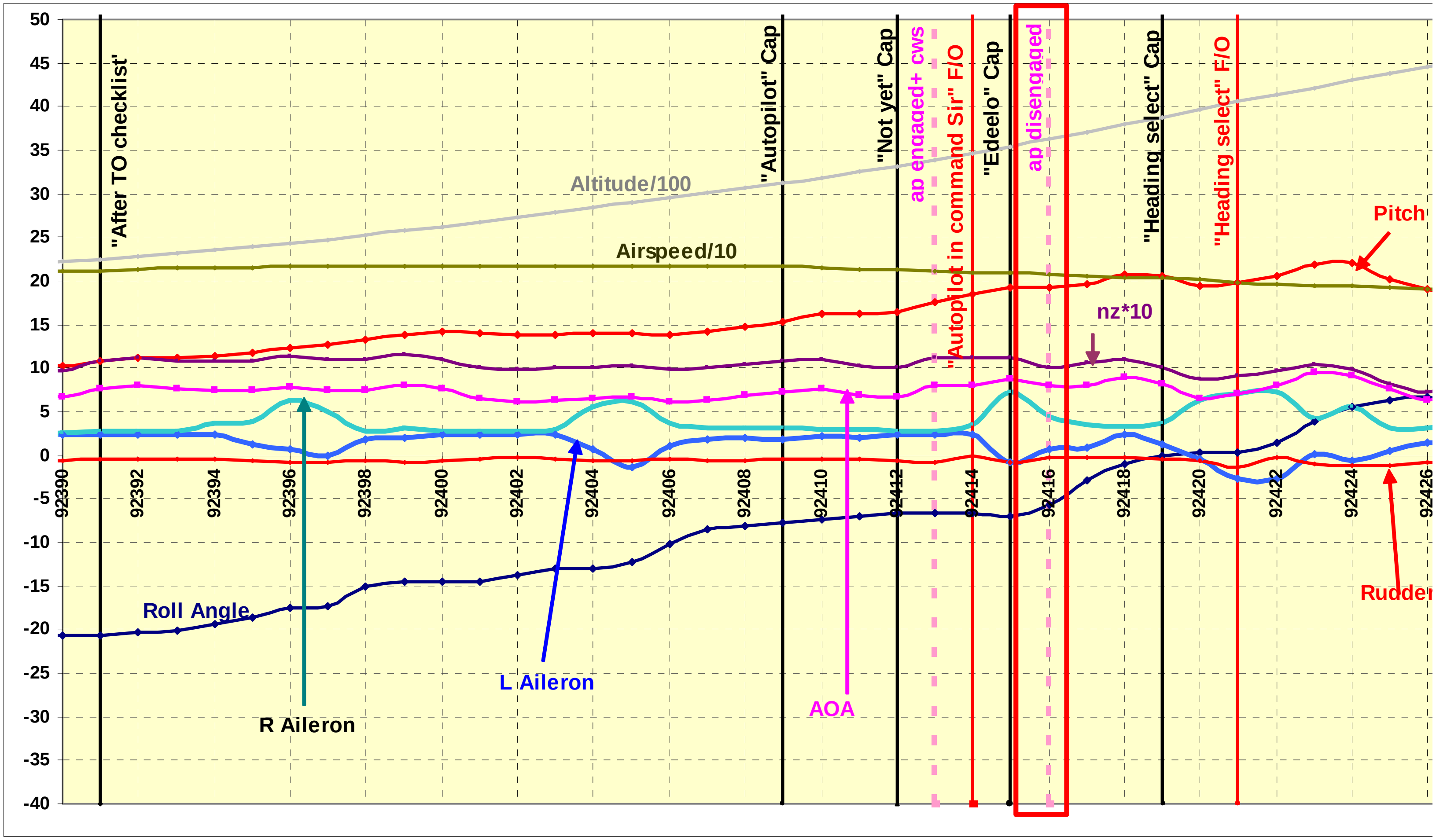


Figure 2.5.10.1 Autopilot Disengagement indications on the FDR and CVR

2.5.10.1 B737-300 Autopilot Engage/ Hold/ Disengage Logic:

737-300/400/500
MAINTENANCE MANUAL

	UNLOCK	HOLD	DISENGAGE
1. A/P STAB TRIM CUTOUT SWITCH NORMAL	X	X	
2. MAIN ELECTRIC TRIM SWITCHES (NOT PRESSED)	X	X	
3. A/P STAB TRIM MOTOR SPEED VALID (10 SEC)	X	X	
4. AILERON FORCE LIMITER AUTHORITY LIMIT VALID (10 SEC)	X	X	
5. AILERON FORCE LIMITER CLUTCH - DISENGAGE ▷4	X		
6. AILERON FORCE LIMITER CLUTCH - ENGAGE WITHIN 0.5 SEC ▷4		X	
7. A/P DISENGAGE SWITCH NOT PRESSED	X	X	
8. A/P AILERON HYD PRESSURE SWITCH - NO PRESSURE	X		
9. A/P AILERON HYD PRESSURE SWITCH - PRESSURE WITHIN 3.5 SEC AFTER ACT DET SOL ENGAGED		X	
10. A/P ELEVATOR HYD PRESSURE SWITCH - NO PRESSURE	X		
11. A/P ELEVATOR HYD PRESSURE SWITCH - PRESSURE WITHIN 3.5 SEC AFTER ELEV ACT DET SOL ENGAGED		X	
12. FCC 115V AC (0.5 SEC)	X	X	
13. (DC) ENGAGE INTLK A	X	X	
14. NOT (FGN IN CMD AND APP PB AND LRRA <800 FT)	X		
15. FCC DC AND FCC POWER SUPPLY	X	X	
16. 1800 Hz POWER SUPPLY	X	X	
17. POWER UP TEST VALID	X		
18. CONTINUOUS MONITOR	X	X	
19. A/P ONLY CONTINUOUS MONITOR VALID	X	X	
20. LESS THAN 3 LB FORCE ON CONTROL WHEEL	X		
21. LESS THAN 5 LB FORCE ON CONTROL COLUMN	X		
22. SELECTED IRU ROLL ANGLE VALID (NORM - OFF SIDE)	X	X	
23. SELECTED IRU ROLL RATE VALID (NORM - OFF SIDE)	X	X	
24. SELECTED IRU PITCH ANGLE VALID (NORM - ON SIDE)	X	X	
25. SELECTED IRU PITCH RATE VALID (NORM - ON SIDE)	X	X	
26. A/P TO CMD AND R/A <400 FT WITH LOC AND GS ENGAGED			X
27. F/D IN TO OR GA, R/A ALT <400 FEET AND A/P TO CMD			X
28. ADC CAS NOT VALID (EXCEPT WITH MONITORS ACTIVE)			X
29. IRU TRANSFER (SEE TEXT)	▷2		▷2
30. A/P ENGAGE SWITCH SWAP (SEE TEXT)			X
31. ADC CORRECTED BARO ALT VALID	X		▷1
32. ADC UNCORRECTED BARO ALT VALID	X		▷1
33. LCL AC BUS TRANSFER (SINGLE SHOT)	▷2		▷2
34. A/P DISENGAGE SWITCH PRESSED			
35. DISENGAGE BAR ON MCP PULLED DOWN ▷3			

▷1 SEE PITCH MODE DISENGAGE TABLE

▷2 DISENGAGES, CAN BE RE-ENGAGED IN ANY MODE EXCEPT APP MODE WITH FGN IN CMD

▷3 MCP WITH PUSHBUTTON ENGAGE SWITCHES

▷4 AIRPLANES WITH MECHANICAL AILERON FORCE LIMITER

22-11-01

Page 54
Nov 12/01

Table 2.5.10.1 Autopilot Unlock, Hold, Disengage Logic

Autopilot Engage & Engage Hold Interlocks

	Pre-Engage	Engage Hold
Condition	Prevent Engage	Cause Disengage
Pitch CWS force greater than 5 lbs	X	
Roll CWS force greater than 2.25 lbs	X	
Elevator Detent Pressure Switch Indicates Pressurized	X	
Aileron Detent Pressure Switch Indicates Pressurized	X	
Auto Stab Trim Cutout Switch in Cutout	X	X
Both Flap Switches and Stab Trim Motor don't agree as Flaps Up or as Flaps Down	X	X
Main Electric Trim Switch Activated	X	X
Aileron Force Limiter position does not agree with Flaps UP or Flaps Down	X	X
CAS Invalid	X	X
Uncorrected Altitude Invalid	X	X
26 VAC 400 Hz Invalid	X	X
MCP to FCC Bus Invalid	X	X
Pitch Angle Invalid	X	X
Pitch Rate Invalid	X	X
Roll Angle Invalid	X	X
Roll Rate Invalid	X	X
Baro Altitude Invalid (Prevents CMD only)	X	X
Elevator Detent Pressure Switch Indicates Non-Pressurized		X
Aileron Detent Pressure Switch Indicates Non-Pressurized		X
(Magnetic Heading OR TAS Invalid) AND (Roll CWS) AND (Bank Angle <8 degrees)	X	X

Table 2.5.10.2 Autopilot Engage, Engage Hold interlock

Autopilot "Engaged" means:

Autopilot system began an attempt to synchronize so that it could subsequently control the airplane. It does not necessarily mean that the detent pistons were pressurized and that the autopilot was controlling the airplane.

This definition is consistent with indications of autopilot engagement available to crew and FDR.

Autopilot disengagement:

Any of the following three conditions cause autopilot disengagement:

A. The engage synchronization (actuator to surface) & pressurization failed to complete
(Failure to synchronize 4.0 sec/ sync in 0+ sec but fails to pressurize 3.5 sec/ sync in 4- sec but fails to pressurize 7.5 sec)

.

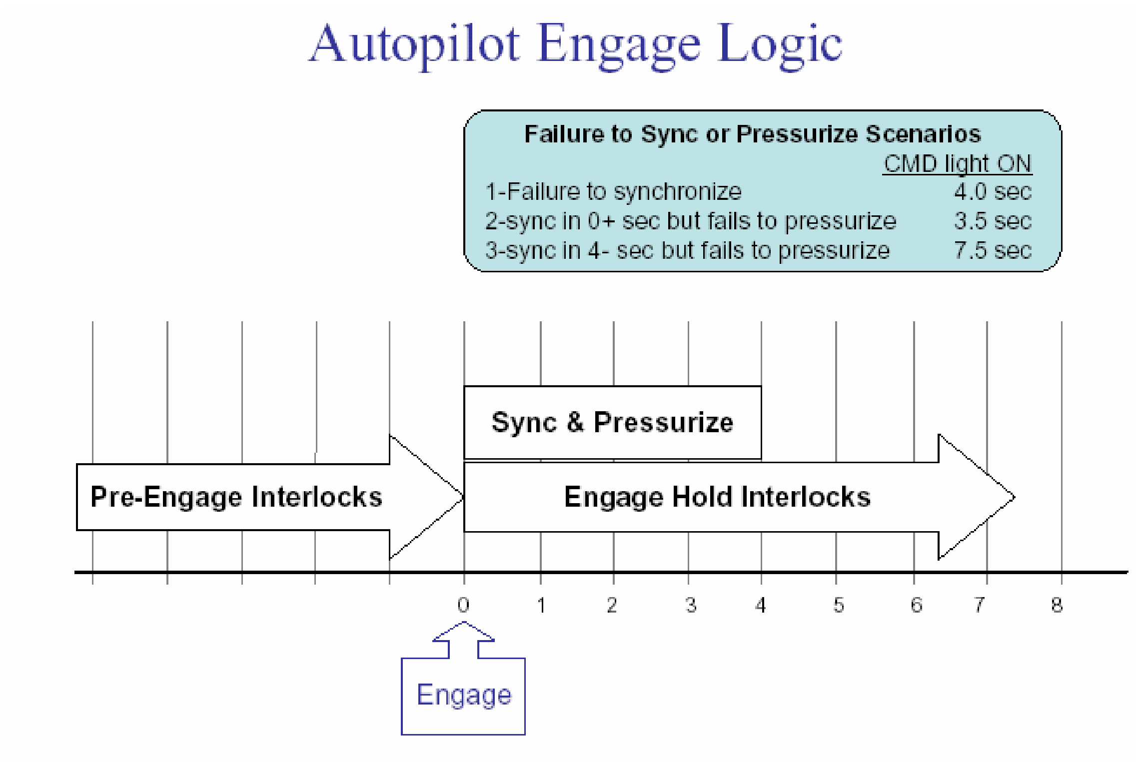


Figure 2.5.10.2 Autopilot Engage Logic

A.1 The engage synchronization:

The first step of autopilot engagement is synchronization. The arm solenoid opens and the FCC issues transfer valve commands to move the autopilot pistons to match the current location of the output crank. However, since the detent solenoid is closed, the detent pistons are free to move and the autopilot piston motion does not affect the output crank to the lateral system.
The FDR receives the ailerons position data; however, the autopilot actuator piston position is not recorded.

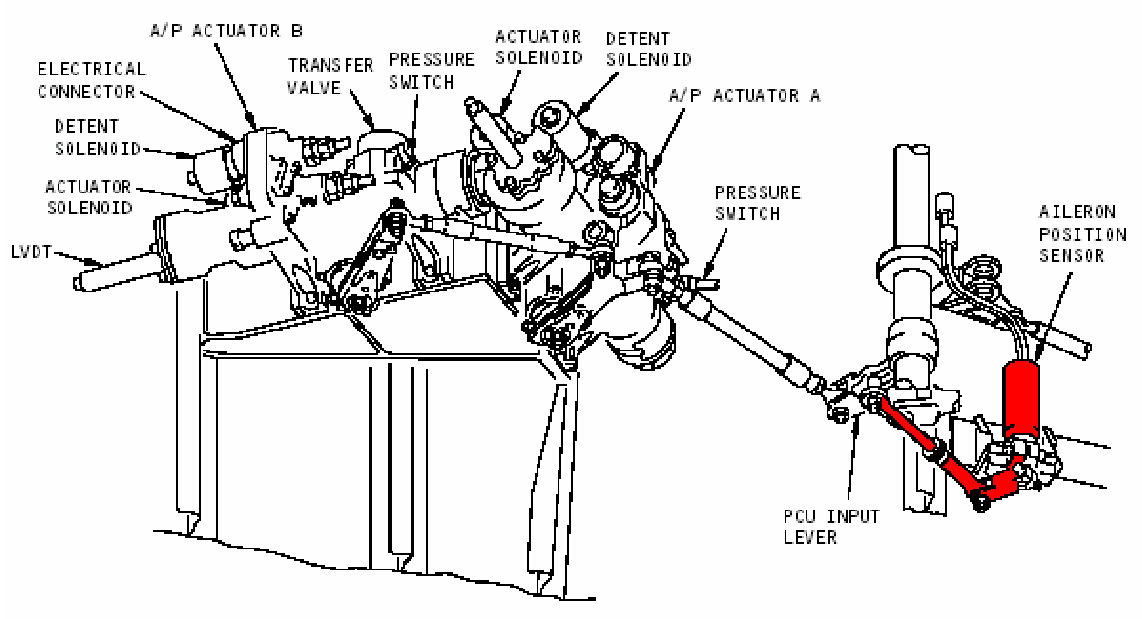


Fig 2.5.10.3 Roll channel autopilot actuator and position sensor[2]

[2] Refer to AMM *22-11-01, Page 20 for sensors description and operation*

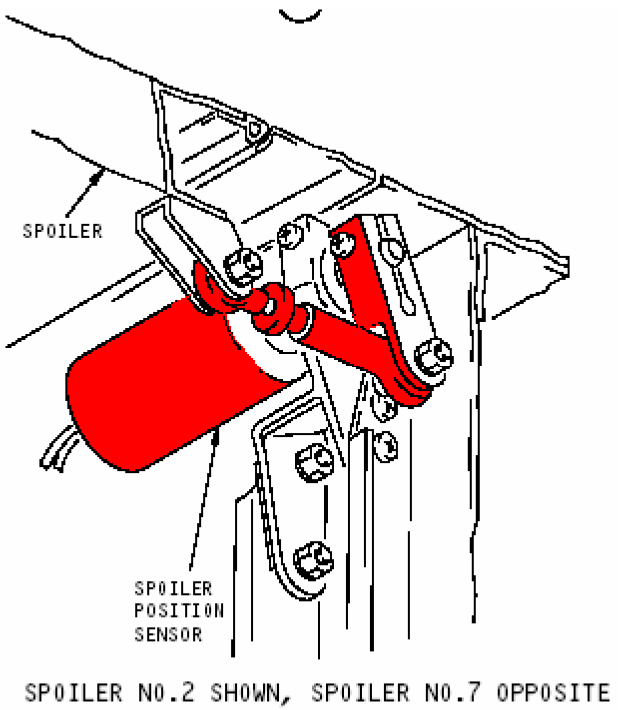


Fig 2.5.10.3 Spoiler sensor

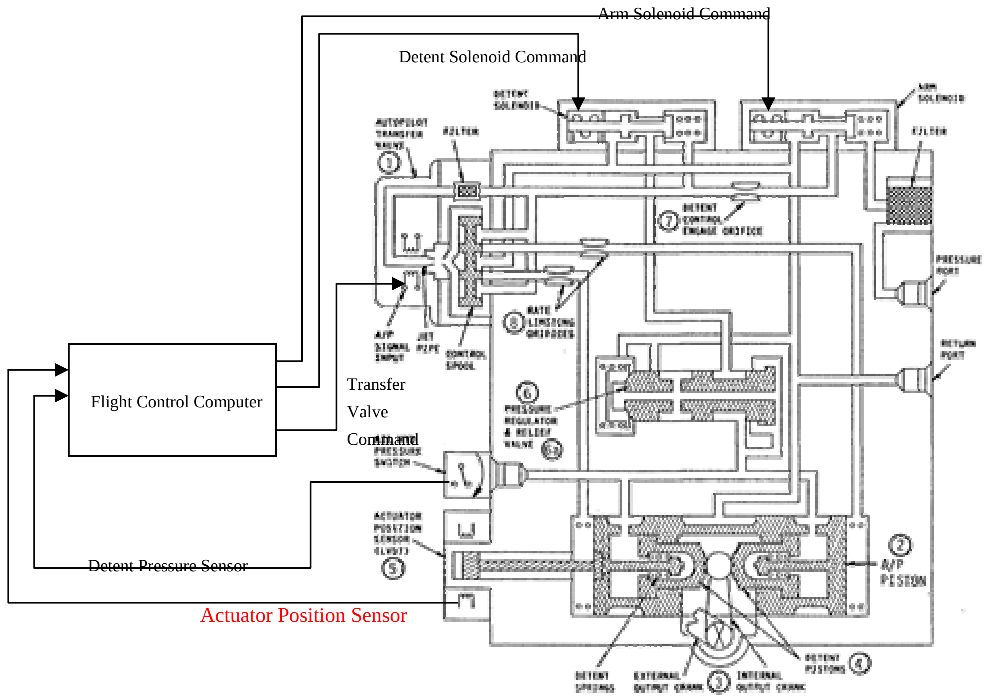


Fig 2.5.10.3 Autopilot Actuator

A.2 Pressurization:

Hydraulic pressure must be sensed at the autopilot aileron hydraulic switch (pressure switch on the autopilot actuator) within 3.5 seconds after actuator detent solenoid engaged; however, the FDR does not record data regarding the hydraulic pressure at the autopilot aileron hydraulic switch.

B. The engage hold interlocks not satisfied

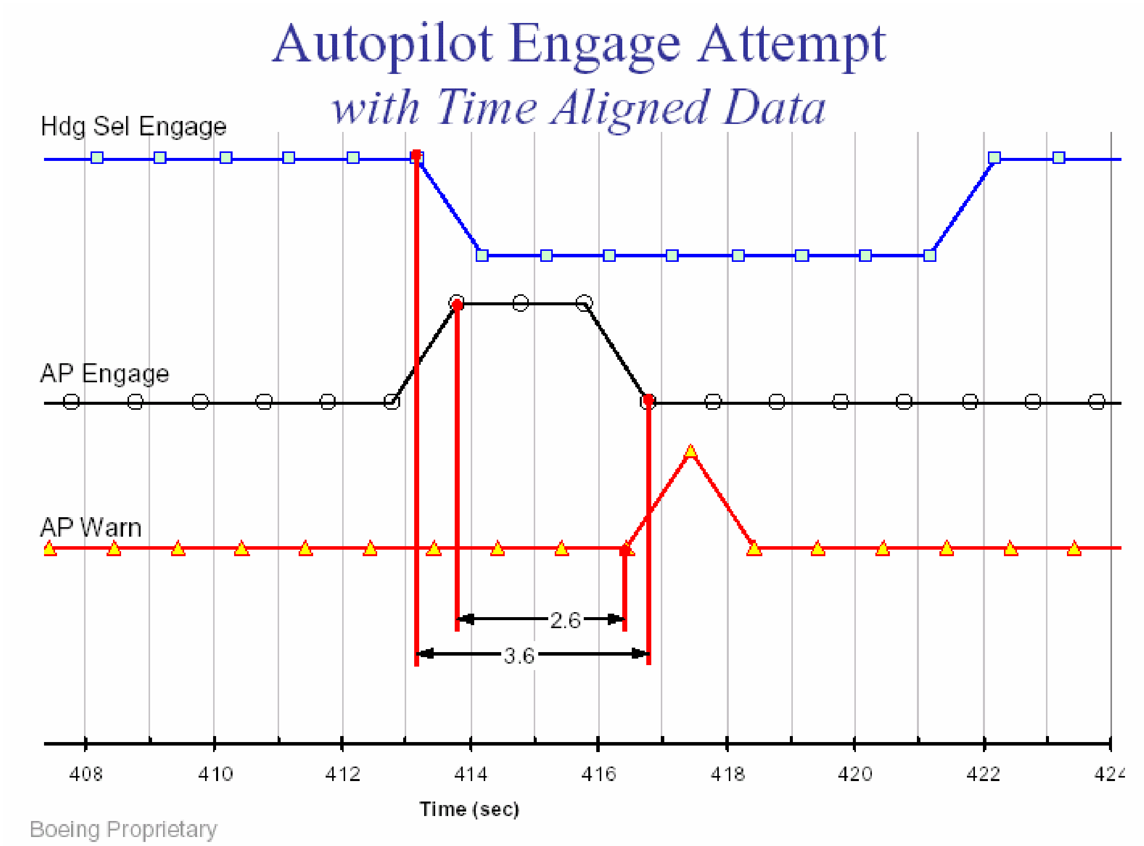
Any of the following conditions cause autopilot disengagement:

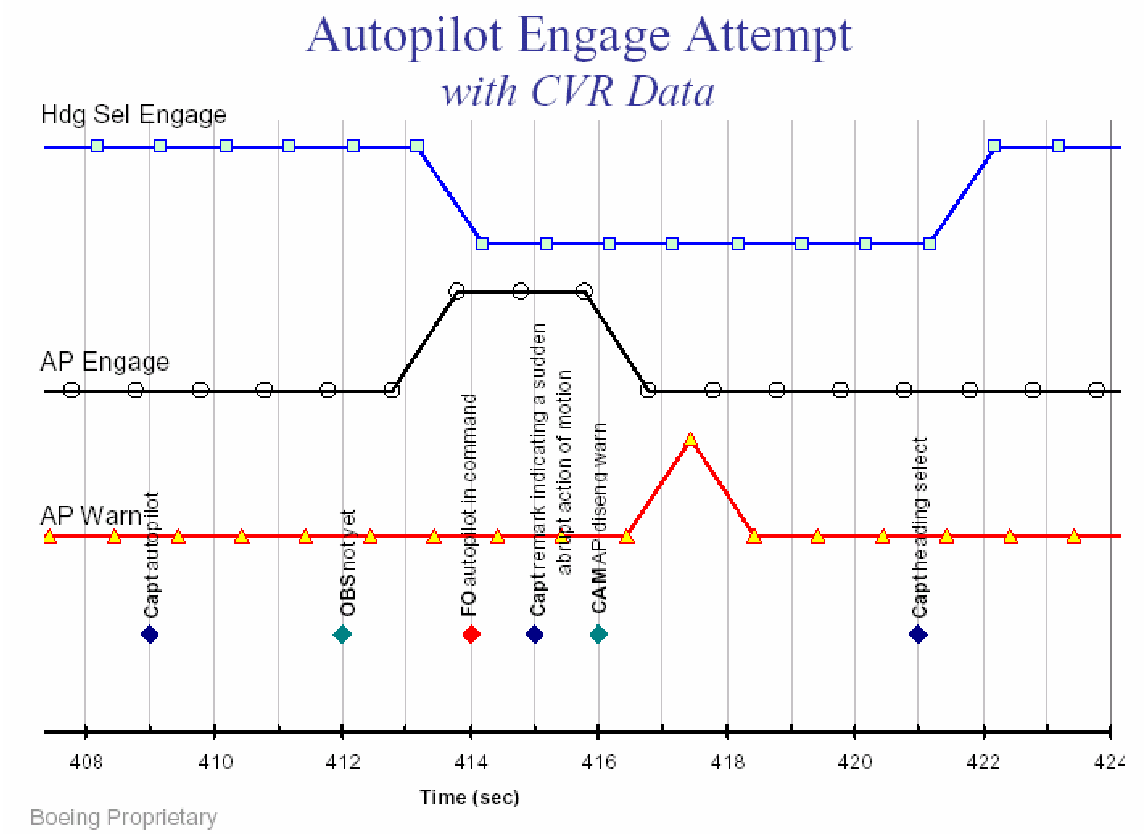
- Auto Stab Trim Cutout Switch in Cutout (status is not recorded in the FDR).
- Both Flap Switches and Stab Trim Motor don't agree as Flaps Up or as Flaps Down (switches status are not recorded in the FDR).
- Main Electric Trim Switch Activated (status is not recorded in the FDR).
- Aileron Force Limiter position does not agree with Flaps UP or Flaps Down
- CAS Invalid (status is not recorded in the FDR).
- Uncorrected Altitude Invalid (status is not recorded in the FDR).
- 26 VAC 400 Hz Invalid (status is not recorded in the FDR).
- MCP to FCC Bus Invalid (status is not recorded in the FDR).
- Pitch Angle Invalid (status is not recorded in the FDR).
- Pitch Rate Invalid (status is not recorded in the FDR).
- Roll Angle Invalid (status is not recorded in the FDR).
- Roll Rate Invalid (status is not recorded in the FDR).
- Baro Altitude Invalid (status is not recorded in the FDR).
- Elevator Detent Pressure Switch Indicates non-pressurized (status is not recorded in the FDR).
- Aileron Detent Pressure Switch Indicates non-pressurized (status is not recorded in the FDR).

C. Autopilot manually disconnected.

It is to be noted that the autopilot disconnect switches status on the control wheels horns are not recorded in the FDR.

2.5.10.2 Autopilot Disconnect Analysis (based on FDR and CVR available data):





The CVR statement "Not yet" is not attributed to the observer but to the Captain.

2.5.10.3 Probable conditions for autopilot disconnect:

1. Case of “Autopilot Engages but Disengages Approximately 3.6 seconds after Flight Crew Selects On”

1.1 Manual Disconnect

Warning length is consistent with “double click” typical of manual disconnects (within allowable warning duration tolerance). However, there is no disengagement callout by crew on CVR. In addition, the autopilot disconnect switches status on the control wheels horns are not recorded in the FDR.

Note:

- Boeing presentation (see 2.5.10.2) regarding autopilot function states that the duration of autopilot manual disconnect warning is less than 2 seconds
- Honeywell verbal information, states the duration of autopilot manual disconnect warning is max of 3 seconds
- Actual time of warning based on CVR is 2.136 seconds

Although requested, Honeywell did not supply the investigation team with any supporting evidence.

1.2 Automatic Disconnect

A. Interlock invalid

All interlocks were valid 3 sec earlier during autopilot engagement.

This scenario requires one of the interlocks to become invalid during the 3 seconds and autopilot was engaged.

B. Synchronization did not complete

(FDR shows disconnect prior to min 3.695 seconds this scenario requires)

B.1 Actuator never matches surface position

B.2 Detent pressure sensed prior to detent command

This condition presumes:

- Detent solenoid stuck open prior to engagement attempt
- Transfer valve jammed off center

(Does not match FDR data as autopilot would disconnect within 182 ms)

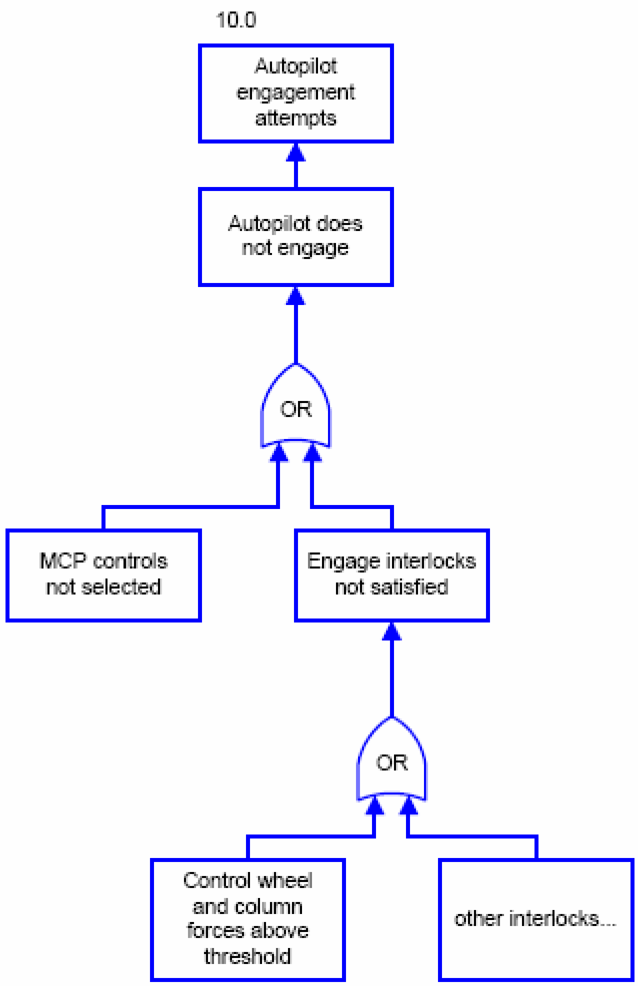
2. Case of Autopilot Does Not Engage[3]

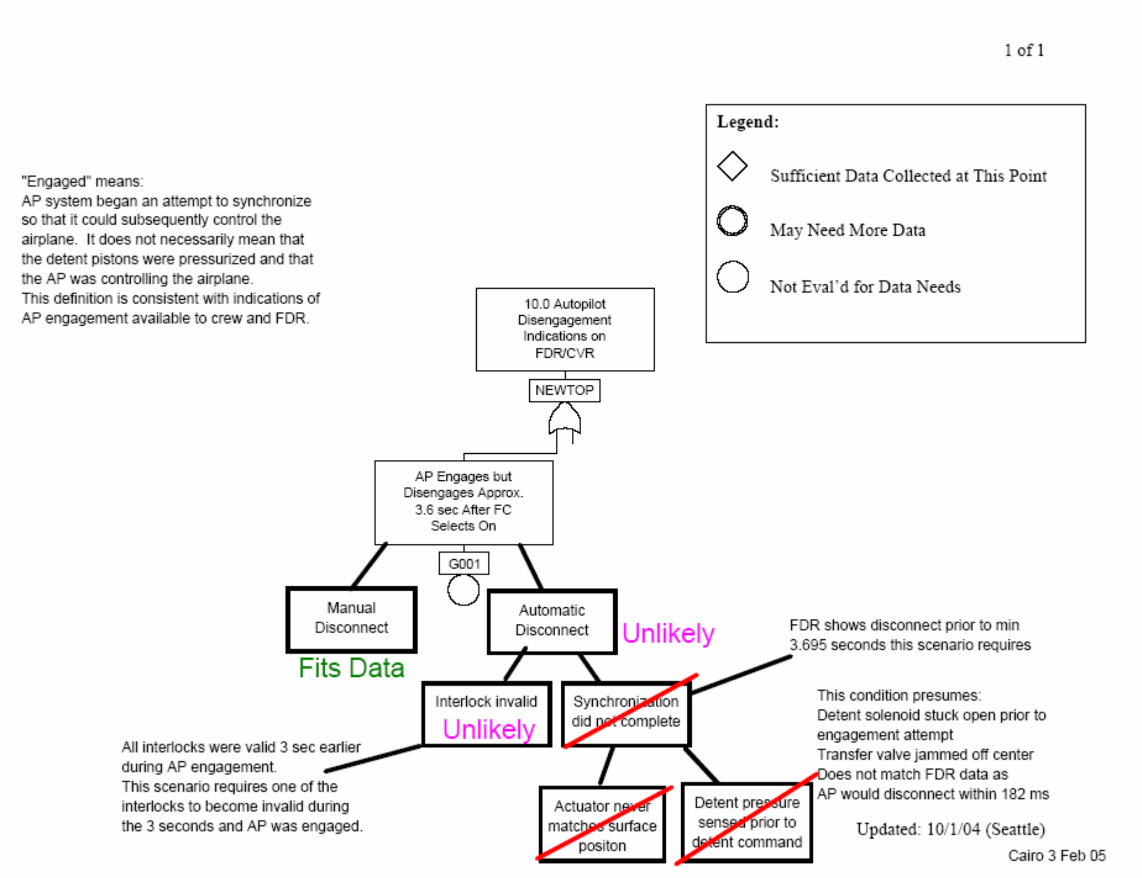
This case can be ruled out because the FDR shows that the autopilot did engage and the disconnect warning can be heard on the CVR.

Conclusion:

The investigation could not determine a higher possibility to any of the above findings (Autopilot automatically disengaged or manually disengaged), based on the given data.

[3] FDR shows status of autopilot engagement and disengagement. Cockpit indication and FDR indicate "Engaged" although the process of synchronization is still incomplete.


10.0
Autopilot engagement attempts
Autopilot does not engage
OR
MCP controls not selected
Engage interlocks not satisfied
OR
Control wheel and column forces above threshold
other interlocks...


Legend:
Sufficient Data Collected at This Point
May Need More Data
Not Eval'd for Data Needs
"Engaged" means:
AP system began an attempt to synchronize so that it could subsequently control the airplane. It does not necessarily mean that the detent pistons were pressurized and that the AP was controlling the airplane.
This definition is consistent with indications of AP engagement available to crew and FDR.
10.0 Autopilot Disengagement Indications on FDR/CVR
NEWTOP
AP Engages but Disengages Approx. 3.6 sec After FC Selects On
G001
Manual Disconnect
Fits Data
Automatic Disconnect
Unlikely
FDR shows disconnect prior to min 3.695 seconds this scenario requires
Interlock invalid
Unlikely
Synchronization did not complete
All interlocks were valid 3 sec earlier during AP engagement.
This scenario requires one of the interlocks to become invalid during the 3 seconds and AP was engaged.
This condition presumes:
Detent solenoid stuck open prior to engagement attempt
Transfer valve jammed off center
Does not match FDR data as AP would disconnect within 182 ms
Actuator never matches surface positon
Detent pressure sensed prior to detent command
Updated: 10/1/04 (Seattle)
Cairo 3 Feb 05

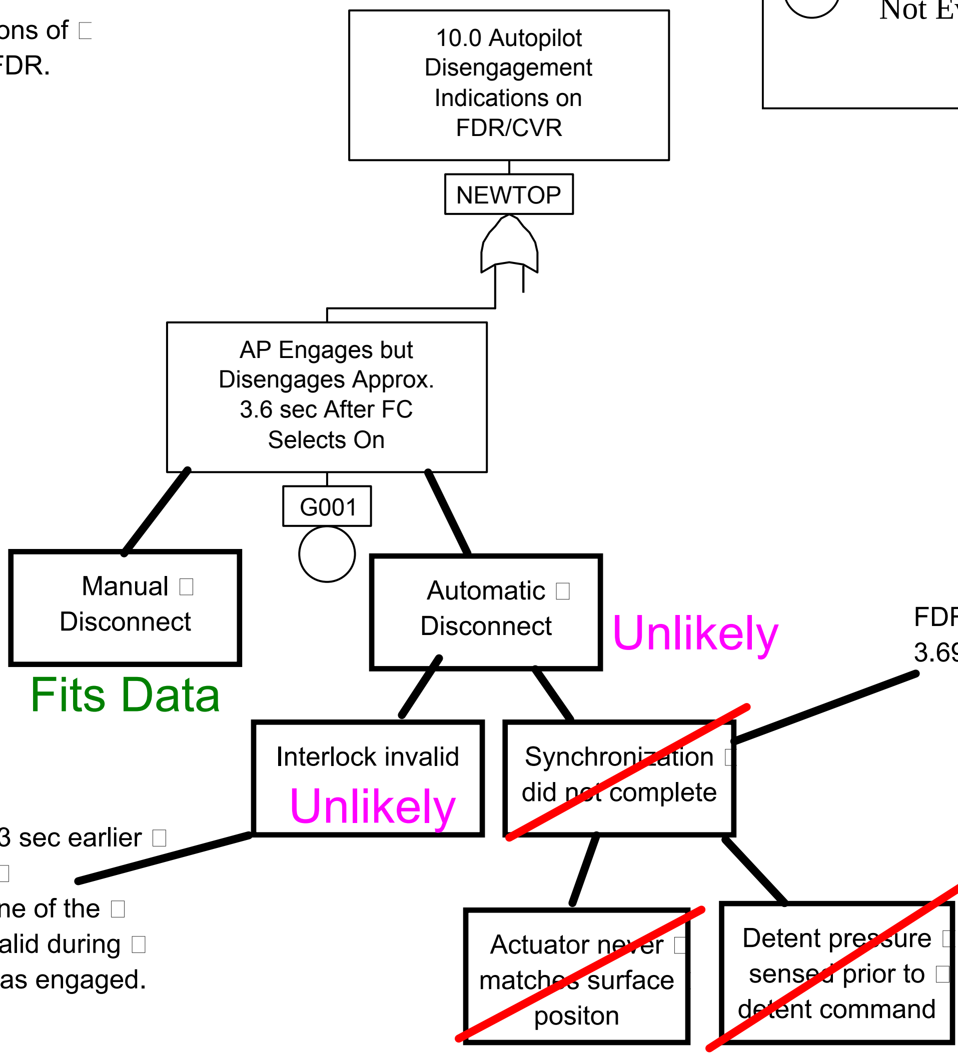
Legend:

◇ Sufficient Data Collected at This Point

◎ May Need More Data

○ Not Eval'd for Data Needs

"Engaged" means:
AP system began an attempt to synchronize so that it could subsequently control the airplane. It does not necessarily mean that the detent pistons were pressurized and that the AP was controlling the airplane.
This definition is consistent with indications of AP engagement available to crew and FDR.



FDR shows disconnect prior to min 3.695 seconds this scenario requires

All interlocks were valid 3 sec earlier during AP engagement.
This scenario requires one of the interlocks to become invalid during the 3 seconds and AP was engaged.

This condition presumes:
Detent solenoid stuck open prior to engagement attempt
Transfer valve jammed off center
Does not match FDR data as AP would disconnect within 182 ms

Updated: 10/1/04 (Seattle)

Cairo 3 Feb 05

2.5.11 Airplane begins roll to right

Based on the FDR data, the airplane stopped the left turn and started a right turn at about 92420

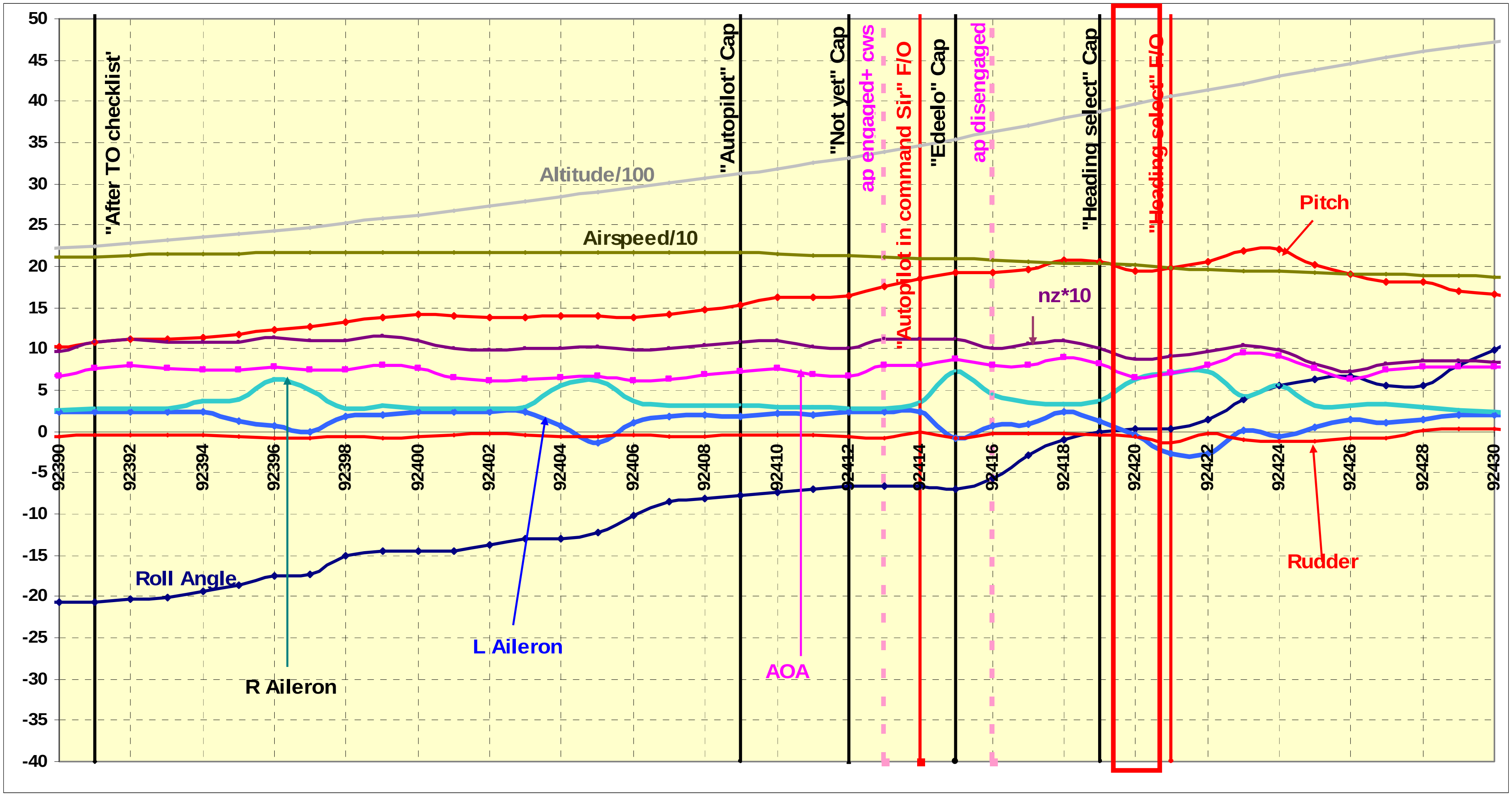


Figure 2.5.11.1 Airplane begins roll to right

2.5.11.1 Conditions which could lead to this event

A. NA

B- Flaps asymmetry:

The FDR did not show evidences of flap asymmetry. Based on these information, there is no evidence of flap asymmetry existing at the time of the event and consequently this condition could be ruled out

C- Slats asymmetry:

C.1 Uncommanded Deployment

Based on the performance evaluation, M-Cab results (Simulation match to FDR) this condition could be ruled out. (See section 2.5.13 Right roll continues to overbank with ailerons activities)

C.2 Remains Deployed (SLAT FULL DEPLOYED)

Based on the performance evaluation, M-Cab results (Simulation match to FDR) this condition could be ruled out. (See section 2.5.13 Right roll continues to overbank with ailerons activities)

D- Thrust asymmetry:

With reference to section “2.3.6. Power plants”, it is shown that all the engines parameters were recorded in the FDR. However, some parameters data were not reliable (e.g. L engine N1). The other engines parameters are reliable including the N2 for both engines.. Based on these information, there is no evidence of thrust assymetry existed at the time of the event and consequently this condition could be ruled out

E- External Disturbance

This possibility could be ruled out based on FDR data, M- Cab Simulator Match to FDR and meteorogical data

F- Flight Crew Believes Autopilot is Engaged When it is not

Reference to FDR, CVR data and Crew Behavior studies, this condition could not be ruled out
CVR clearly records F/O announcement “Autopilot in command” on later “No autopilot commander”. This strongly supports the above statement “F”

G- Lateral control system:

1- Pilot Input

1.1 Following FD
1.1.1 FD Commands Erroneous[1]
1.1.1.1Erroneous Heading
FDR records heading data used by FD - not erroneous. This condition could be ruled out
1.1.1.2 Erroneous Roll Data
FDR records roll data used by FD - not erroneous. This condition could be ruled out
1.1.1.3 Erroneous Selected Heading Data
Selected heading recorded on FDR, but only once every 64 seconds.
1.1.1.4 FD Computational Fault
Based on systems evaluation, this condition could be ruled out
1.1.1.5 Erroneous roll rate data
FDR records roll data used by FD - not erroneous
Correct roll data requires correct roll rate data.
This condition could be ruled out

1.1.2 FD Commands Correct
Unintended Direction of Selected Heading (to right of current heading)
1.1.2.1 Erroneous heading data to F/O EADI and F/O selects heading based on relative displacement to erroneous heading.
This condition could be ruled out

[1] Reference: Honeywell Presentation. 3-Feb-05. No FCC faults or combination of faults result in valid FDR data with erroneous commands.

1.1.2.2 Manual Input to MCP
This condition could be ruled out

1.1.2.3 Erroneous heading data to Captain EADI
CAPT heading data on FDR is accurate. This condition could be ruled out

1.2 Widening His Departure Pattern
N/A to this portion of flight. This condition could be ruled out

1.3 Mistaken Initial 140 Heading Interpretation
N/A to this portion of flight. This condition could be ruled out

1.4 To Level Wings Prior to Autopilot Engagement
N/A to this portion of flight. This condition could be ruled out

1.5 Following Erroneous EADI
FDR attitude data (same as left EADI data) is normal. EADI does not have failure modes which result in display of erroneous attitude data (with correct IRU input). This condition could be ruled out

1.6 Reaction to Uncommanded Roll
From the performance point of view; the FDR match w.r.t external disturbance. External disturbance is inconsistent with FDR/ Performance data. This condition could be ruled out

1.7 Pilot Loses Situational Awareness
See Section 2.6.1 Crew Behavior Subcommittee, this condition could not be ruled out

2- Autopilot Initiated
2.1 Commanded
Based on FDR, this condition could be ruled out

2.2 Uncommanded (actuator faults only)
(See section 2.5.13 Right roll continues to overbank with ailerons activities, item 6.2.2.3.1 Actuator Hardover without Force Limiter 17 to 20 lb Force) This condition could not be ruled out.

3- Lateral System Fault
3.1 Jam
3.1.1 Between Wheel and PCU
(FDR showed ailerons movements in both directions (both ailerons)

Performance; FDR Match)
These conditions could be ruled out

3.1.2 Between PCU and Aileron
(FDR showed ailerons movements in both directions (both ailerons)
Performance; FDR Match)
These conditions could be ruled out

3.2 PCU Fault
This condition could be ruled out (Systems Evaluation)
See Appendix 2-1 lateral control analysis.
This condition could be ruled out

3.3 Cable Break
3.3.1 Between Wheel and PCU
(FDR showed ailerons movements in both directions (both ailerons)
Performance; FDR Match)
These conditions could be ruled out

3.3.2 Between PCU and Aileron
(FDR showed ailerons movements in both directions (both ailerons)
Performance; FDR Match)
These conditions could be ruled out

3.4 Trim/Feel Unit Fault
This condition could not be ruled out
(See Section 2.5.13 Right roll continues to overbank with ailerons activities, item 6.3.4 Trim/Feel Unit Fault.)

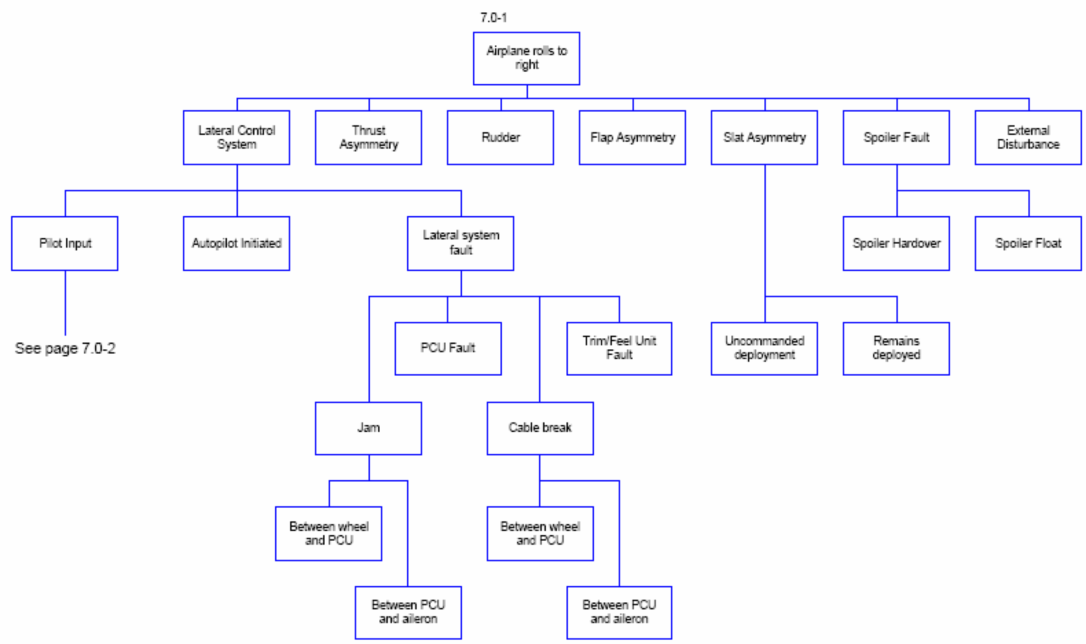
3.5 Spoiler Fault

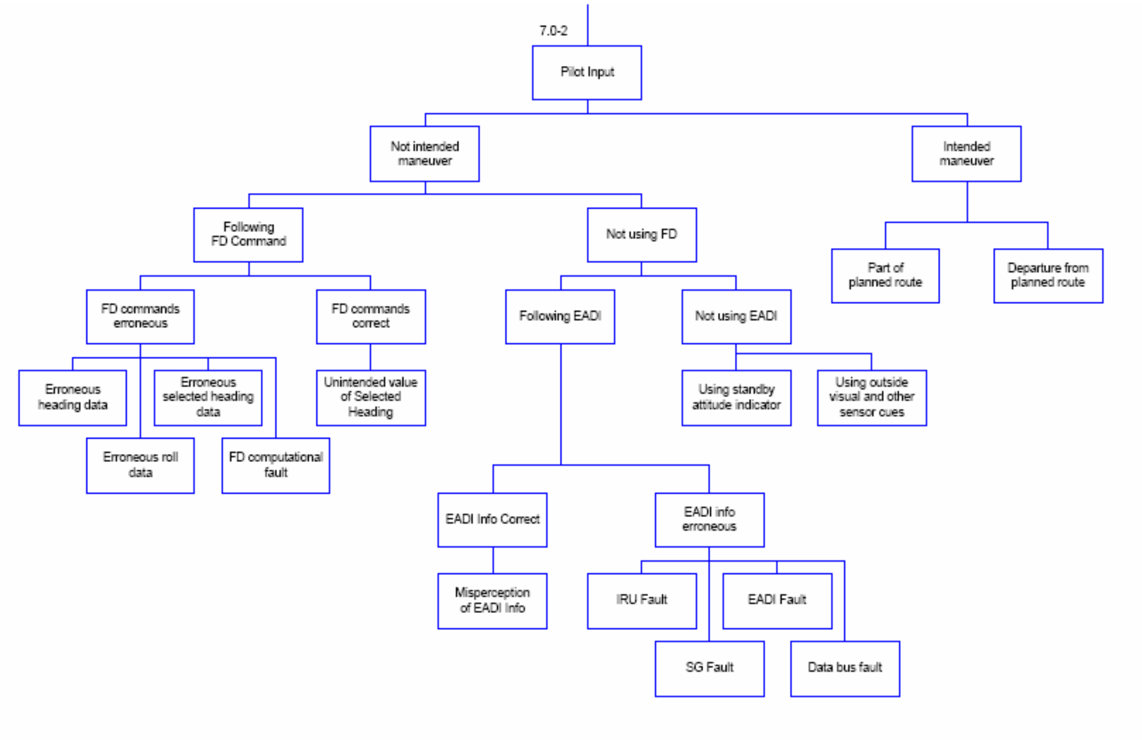
3.5.1 Spoiler Hardover
These conditions could be ruled out based on M-Cab results
See Section 2.5.13 Right roll continues to overbank with ailerons activities, item 6.3.5 Spoiler Fault

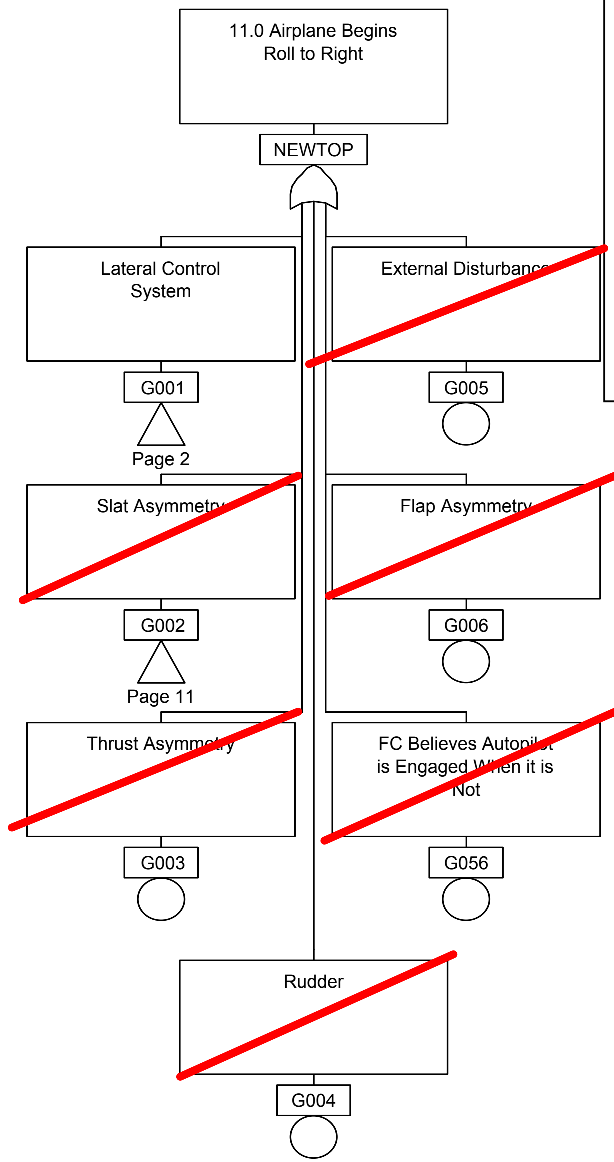
3.5.2 Spoiler Float
These conditions could be ruled out based on M-Cab results
See Section 2.5.13 Right roll continues to overbank with ailerons activities, item 6.3.5 Spoiler Fault

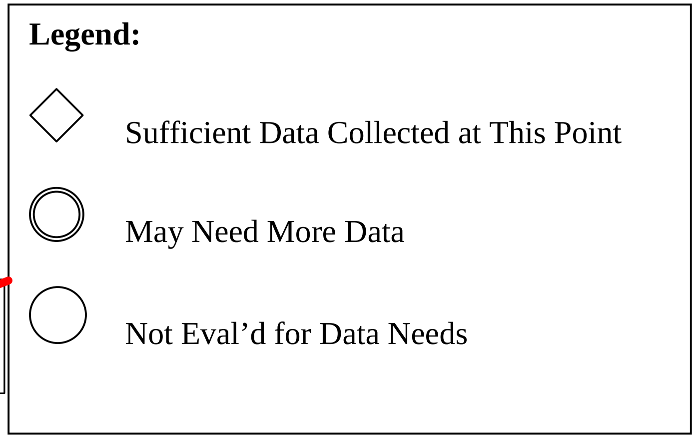
Conclusion

After completing the process of elimination of the unlikely conditions shown above, the investigation could not determine a higher possibility to any of the above findings based on the given data.

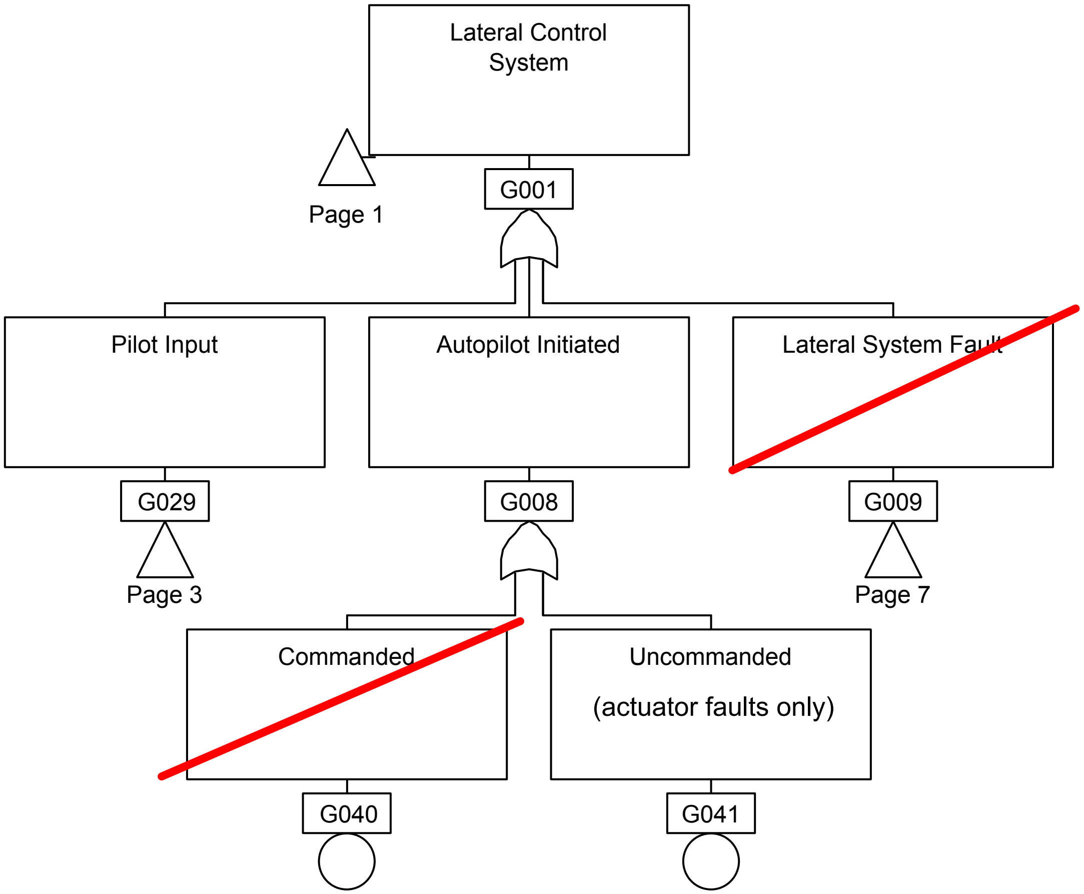

7.0-1
Airplane rolls to right
Lateral Control System
Thrust Asymmetry
Rudder
Flap Asymmetry
Slat Asymmetry
Spoiler Fault
External Disturbance
Pilot Input
Autopilot Initiated
Lateral system fault
Spoiler Hardover
Spoiler Float
See page 7.0-2
PCU Fault
Trim/Feel Unit Fault
Uncommanded deployment
Remains deployed
Jam
Cable break
Between wheel and PCU
Between wheel and PCU
Between PCU and aileron
Between PCU and aileron


7.0-2
Pilot Input
Not intended maneuver
Intended maneuver
Following FD Command
Not using FD
Part of planned route
Departure from planned route
FD commands erroneous
FD commands correct
Following EADI
Not using EADI
Erroneous heading data
Erroneous selected heading data
Unintended value of Selected Heading
Using standby attitude indicator
Using outside visual and other sensor cues
Erroneous roll data
FD computational fault
EADI Info Correct
EADI info erroneous
Misperception of EADI Info
IRU Fault
EADI Fault
SG Fault
Data bus fault

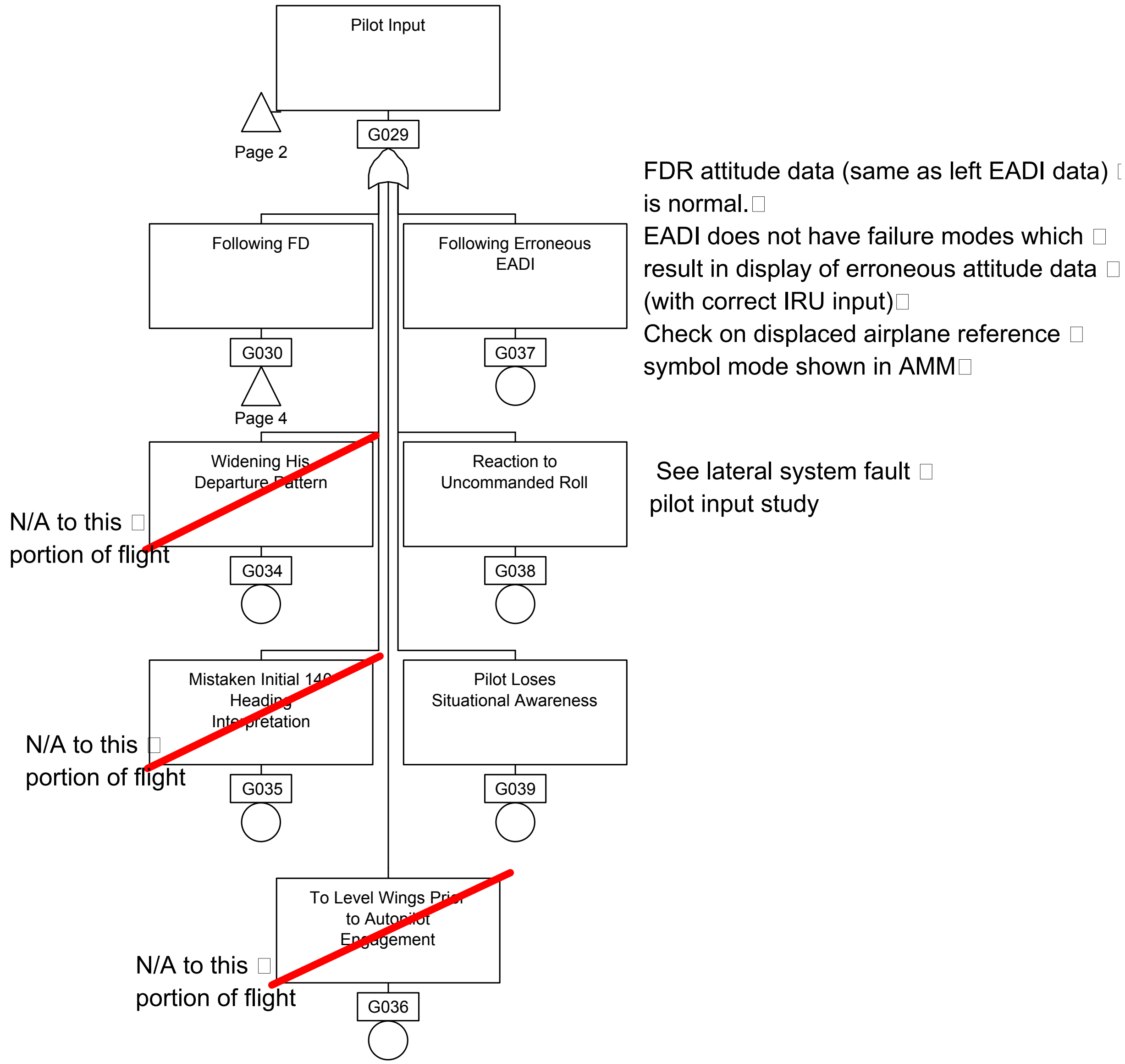


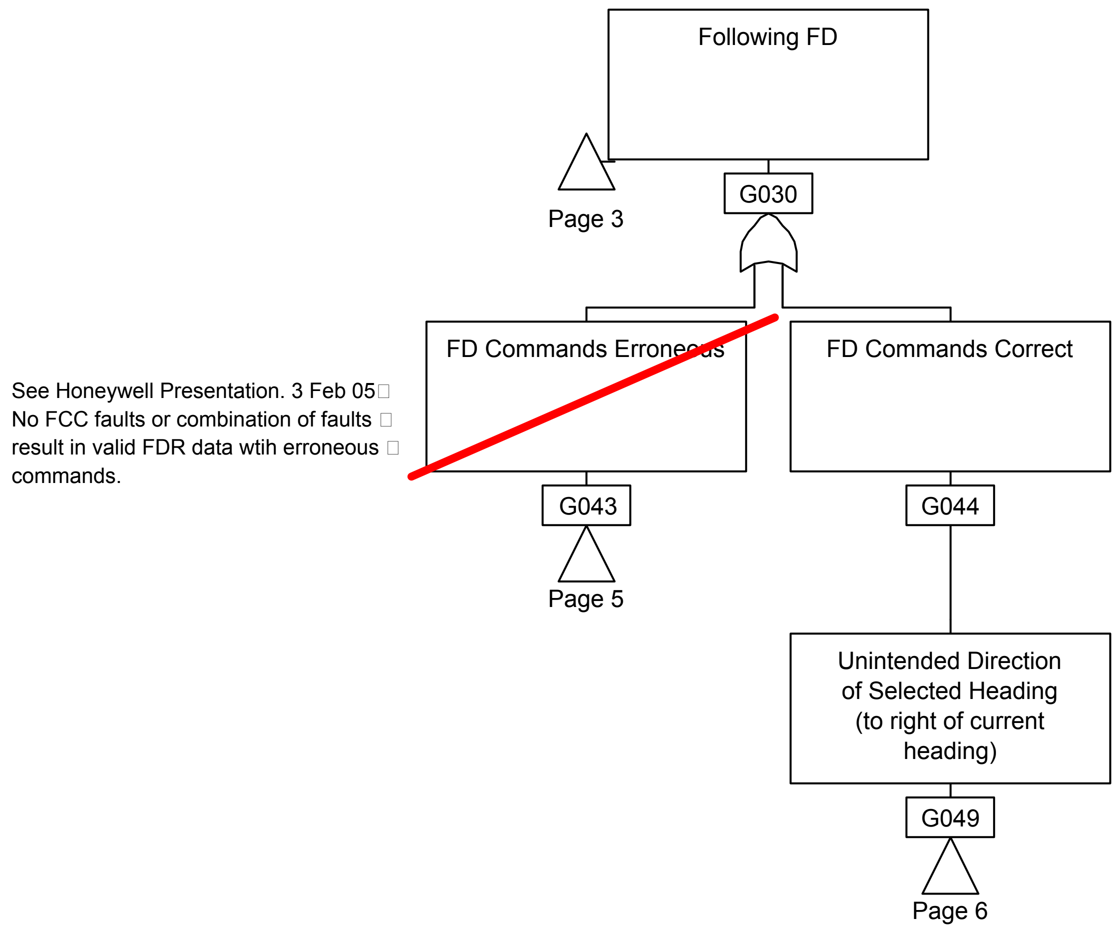


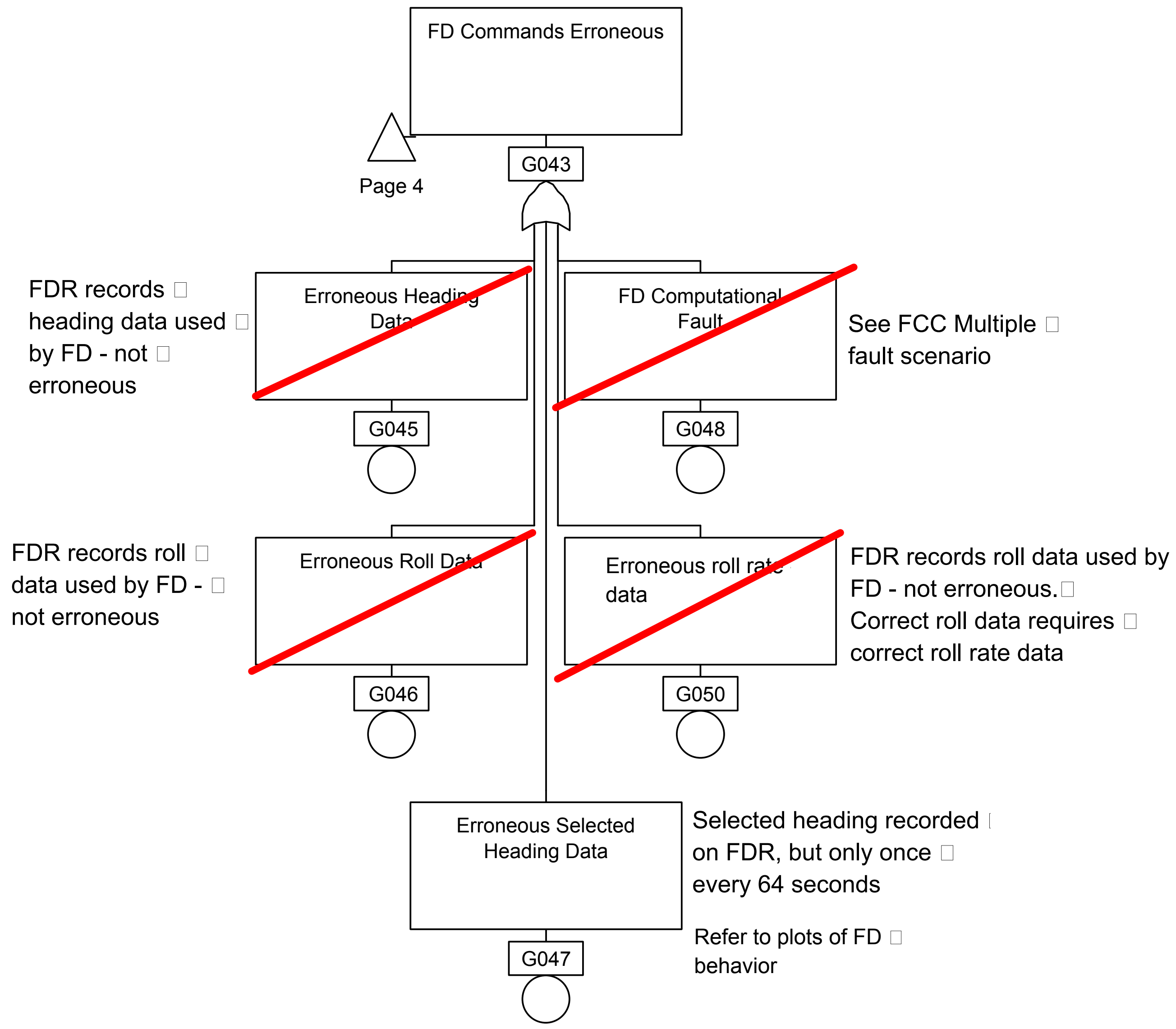
Updated: 10/1/04 (Seattle)

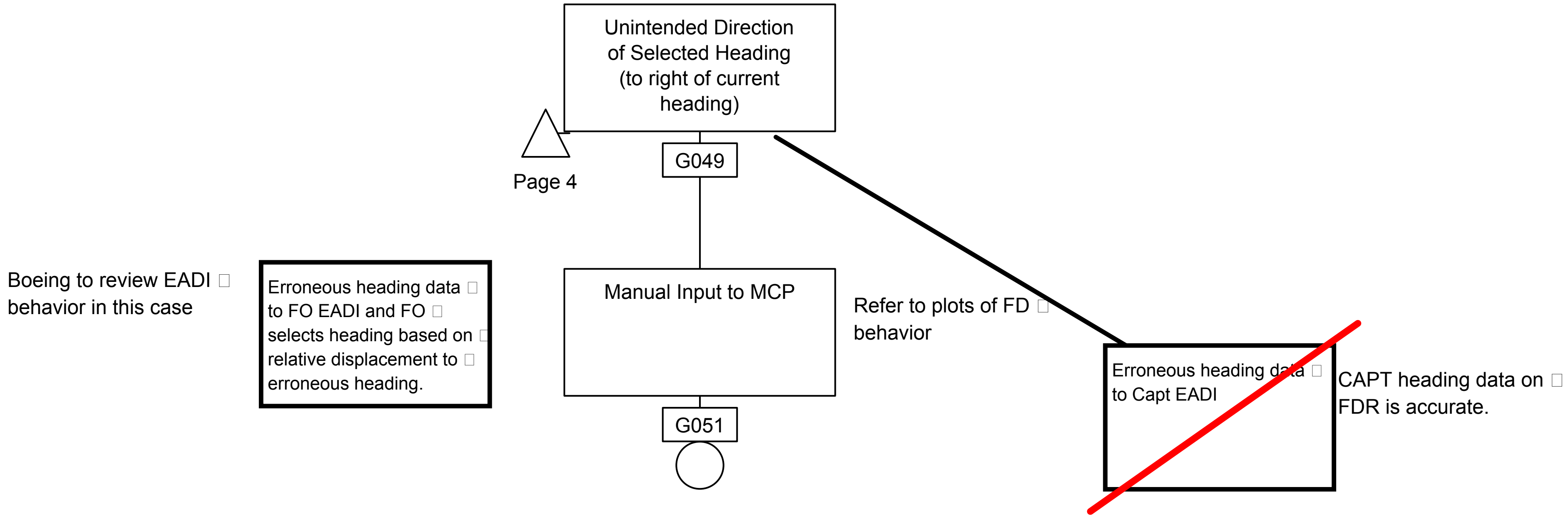


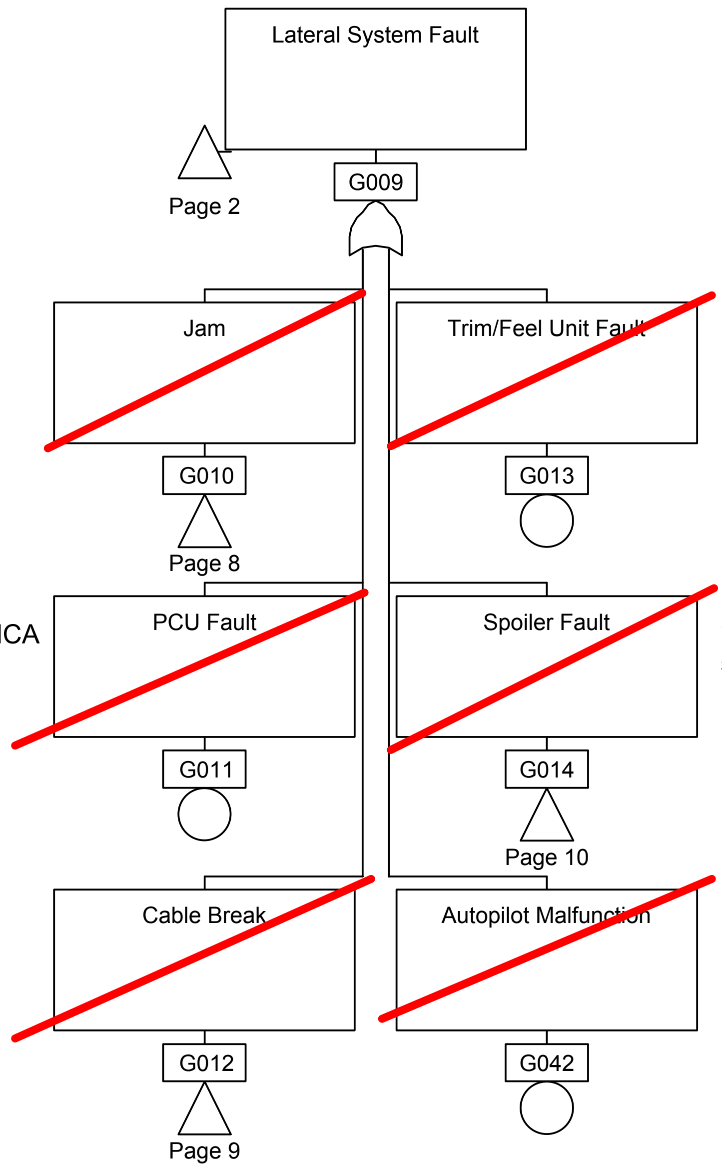
Lateral Control System
Page 1
G001
Pilot Input
Autopilot Initiated
Lateral System Fault
G029
G008
G009
Page 3
Page 7
Commanded
Uncommanded
(actuator faults only)
G040
G041


Pilot Input
G029
Page 2
Following FD
G030
Page 4
Following Erroneous EADI
G037
FDR attitude data (same as left EADI data) is normal.
EADI does not have failure modes which result in display of erroneous attitude data (with correct IRU input)
Check on displaced airplane reference symbol mode shown in AMM
Widening His Departure Pattern
G034
N/A to this portion of flight
Reaction to Uncommanded Roll
G038
See lateral system fault pilot input study
Mistaken Initial 140 Heading Interpretation
G035
N/A to this portion of flight
Pilot Loses Situational Awareness
G039
To Level Wings Prior to Autopilot Engagement
G036
N/A to this portion of flight


Following FD
Page 3
G030
FD Commands Erroneous
FD Commands Correct
See Honeywell Presentation. 3 Feb 05
No FCC faults or combination of faults
result in valid FDR data wtih erroneous
commands.
G043
G044
Page 5
Unintended Direction of Selected Heading (to right of current heading)
G049
Page 6

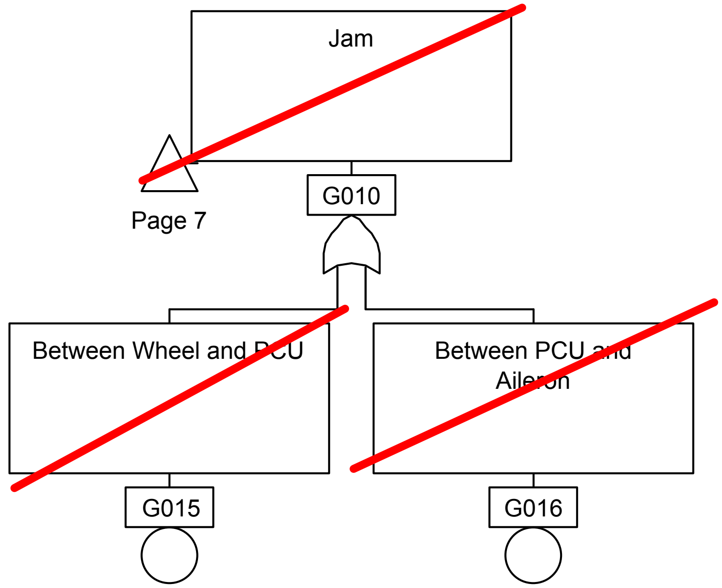

FD Commands Erroneous
Page 4
G043
FDR records heading data used by FD - not erroneous
Erroneous Heading Data
G045
FD Computational Fault
G048
See FCC Multiple fault scenario
FDR records roll data used by FD - not erroneous
Erroneous Roll Data
G046
Erroneous roll rate data
G050
FDR records roll data used by FD - not erroneous.
Correct roll data requires correct roll rate data
Erroneous Selected Heading Data
G047
Selected heading recorded on FDR, but only once every 64 seconds
Refer to plots of FD behavior

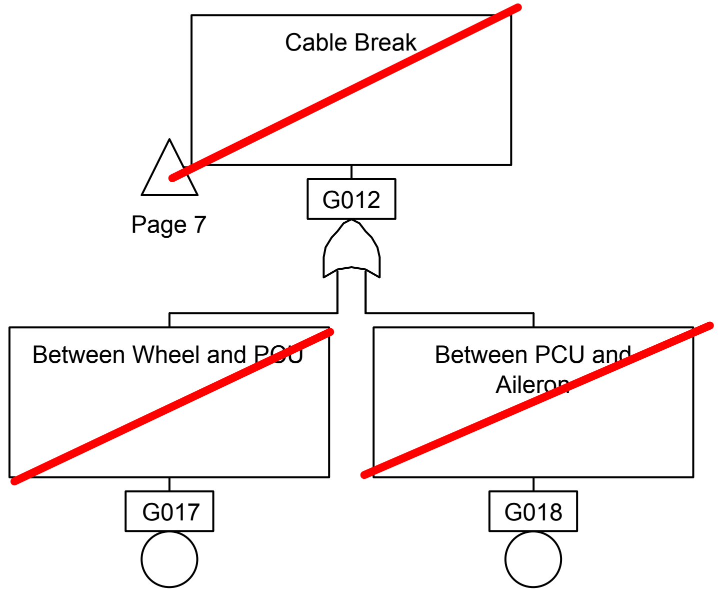

Unintended Direction of Selected Heading (to right of current heading)
G049
Page 4
Boeing to review EADI behavior in this case
Erroneous heading data to FO EADI and FO selects heading based on relative displacement to erroneous heading.
Manual Input to MCP
G051
Refer to plots of FD behavior
Erroneous heading data to Capt EADI
CAPT heading data on FDR is accurate.

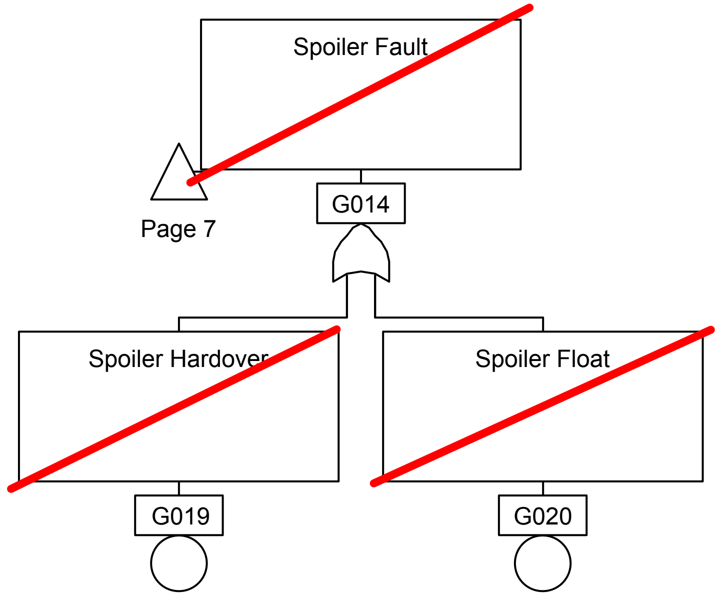


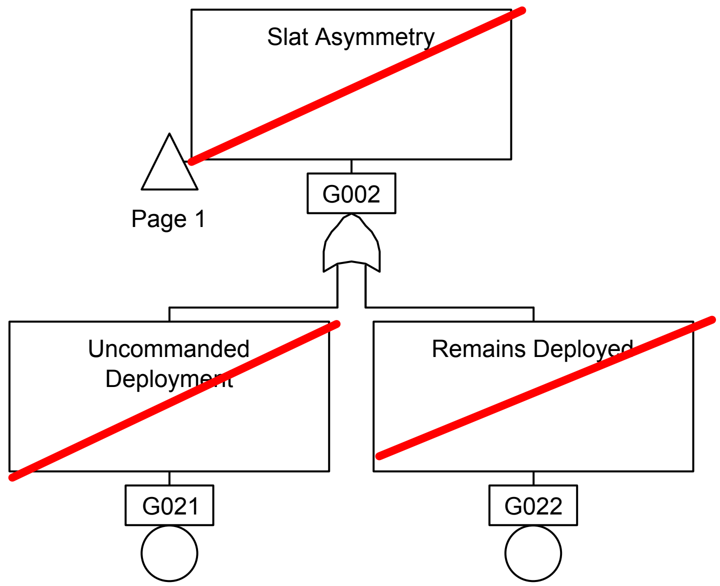
Closed pending MCA review

Closed pending MCA review of simulation results from cable jam resulting in faired spoilers.


Jam
G010
Page 7
Between Wheel and PCU
Between PCU and Aileron
G015
G016


Cable Break
Page 7
G012
Between Wheel and PCU
Between PCU and Aileron
G017
G018


Spoiler Fault
Page 7
G014
Spoiler Hardover
Spoiler Float
G019
G020


Slat Asymmetry
Page 1
G002
Uncommanded Deployment
Remains Deployed
G021
G022

2.5.12 Heading Select engaged

- At time 02:44:05 (92419), the Captain requested “heading select”.

- At time 02:44:07 (92421), the F/O states "heading select" and the FDR records heading select mode engaging.

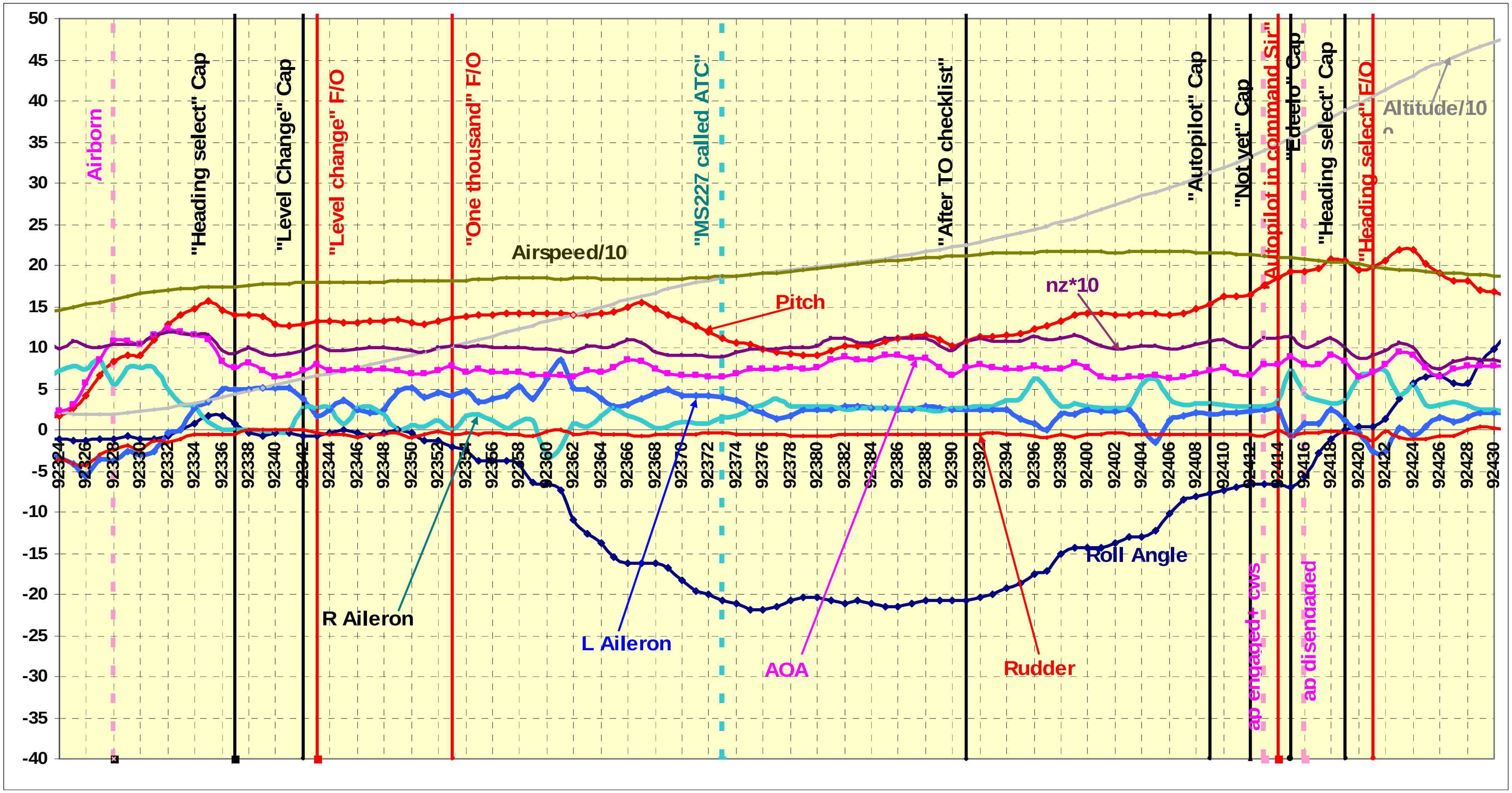


Figure 2.5.12.1 Heading Select engaged

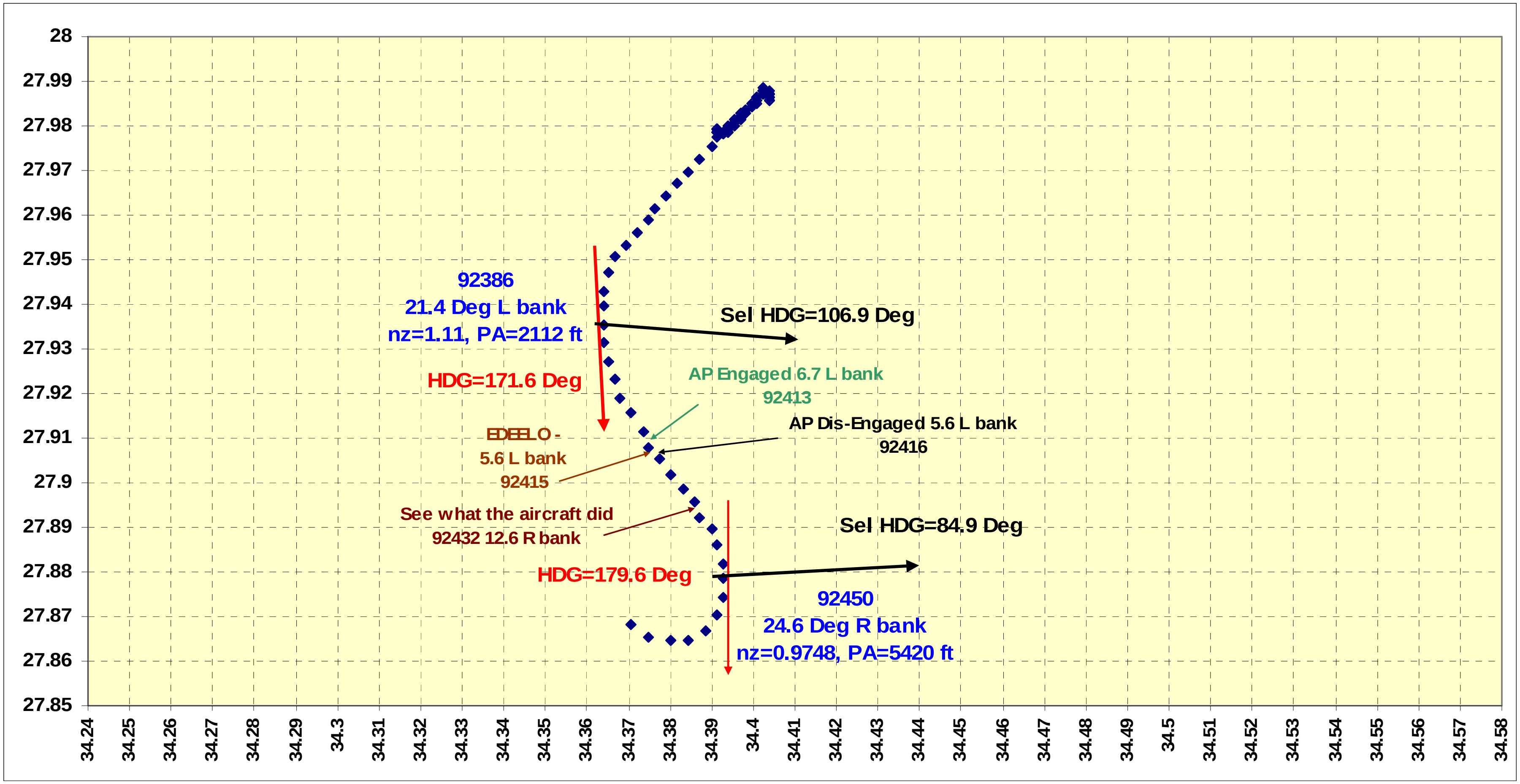


Figure 2.5.12.2 Heading Select (FDR, CVR)

Heading Select engaged might be engaged as a result of the following:

- Manual selection

  (Supported by CVR informatio)

2.5.13 Right roll continues to overbank with ailerons activities

Based on the FDR and the CVR data, the airplane continued the right overbank until a maximum of 111 degree at about 92472.

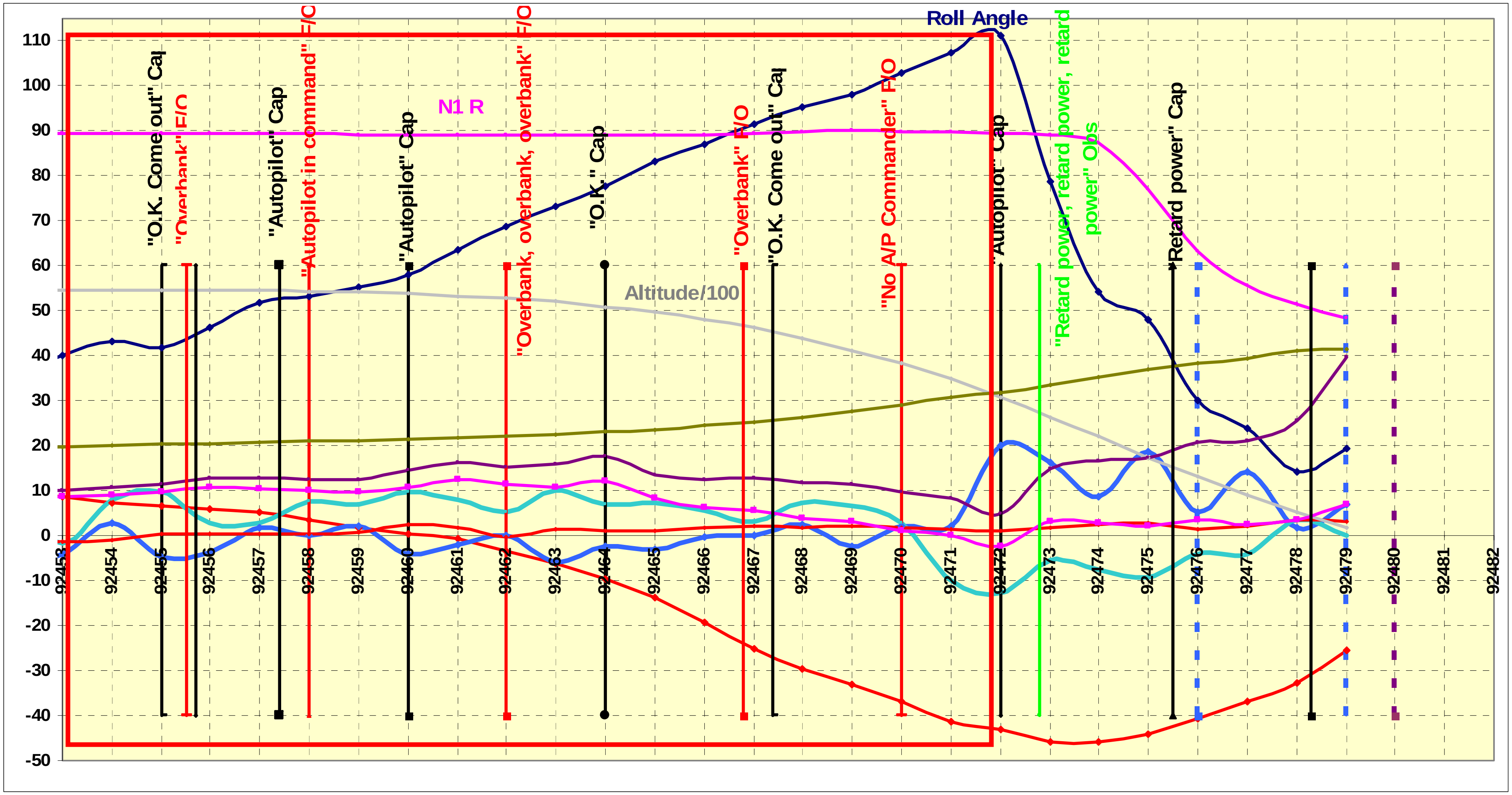


Figure 2.5.13.1a Right roll continues to overbank with ailerons activities

The conditions which may lead to the event are presented in the following:

1. Slat Asymmetry
    1.1 Uncommanded Deployment

        Based on the performance evaluation, M-Cab results (Simulation match to FDR) this condition could be ruled out. (See following M-Cab results figures)

    1.2 Remains Deployed (SLAT FULL DEPLOYED)

        Based on the performance evaluation, M-Cab results (Simulation match to FDR) this condition could be ruled out. (See following M-Cab results figures)

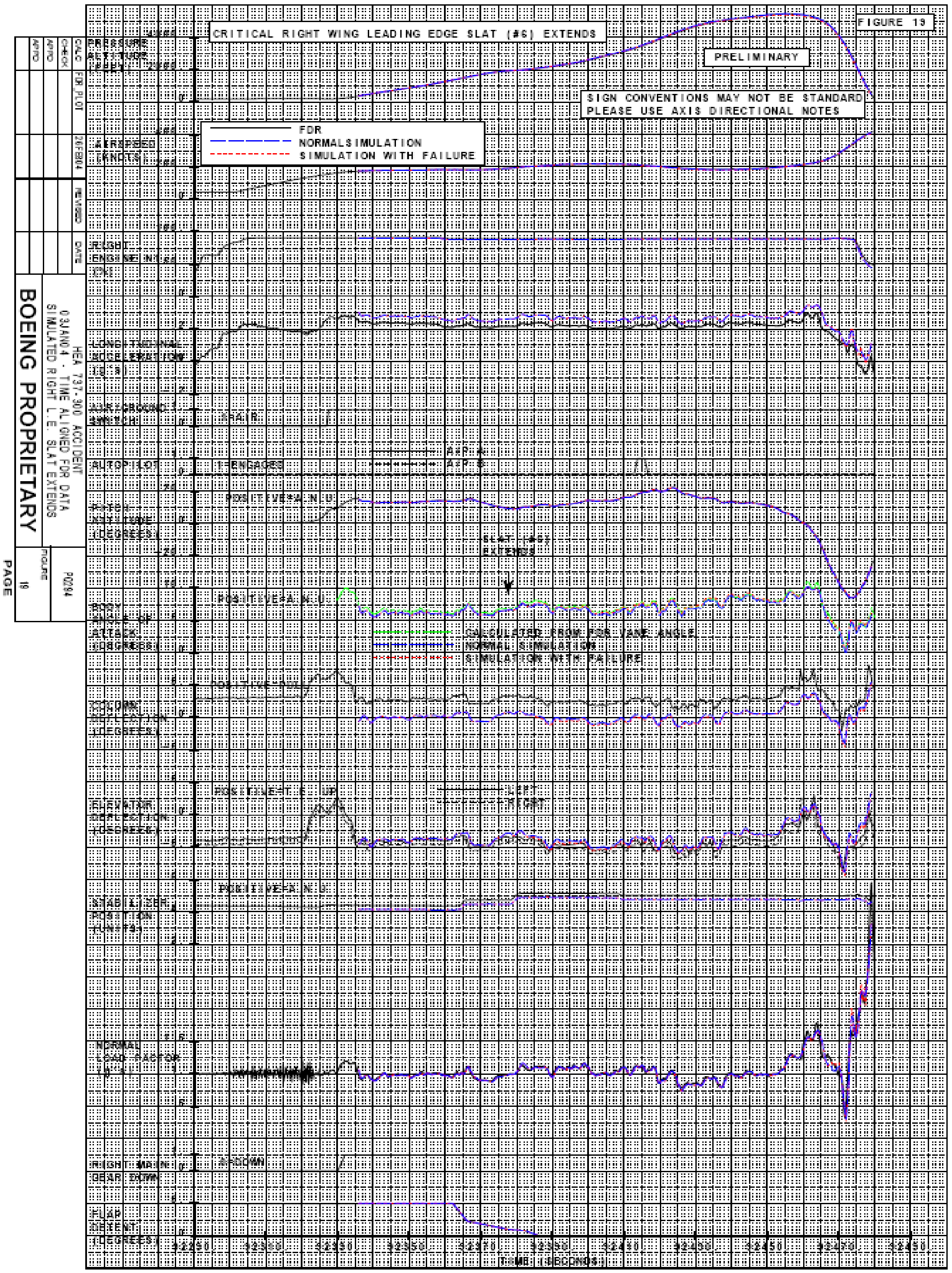


Figure 2.5.13.2a Critical right L.E. Failure- Slat #6 extends (longitudinal)

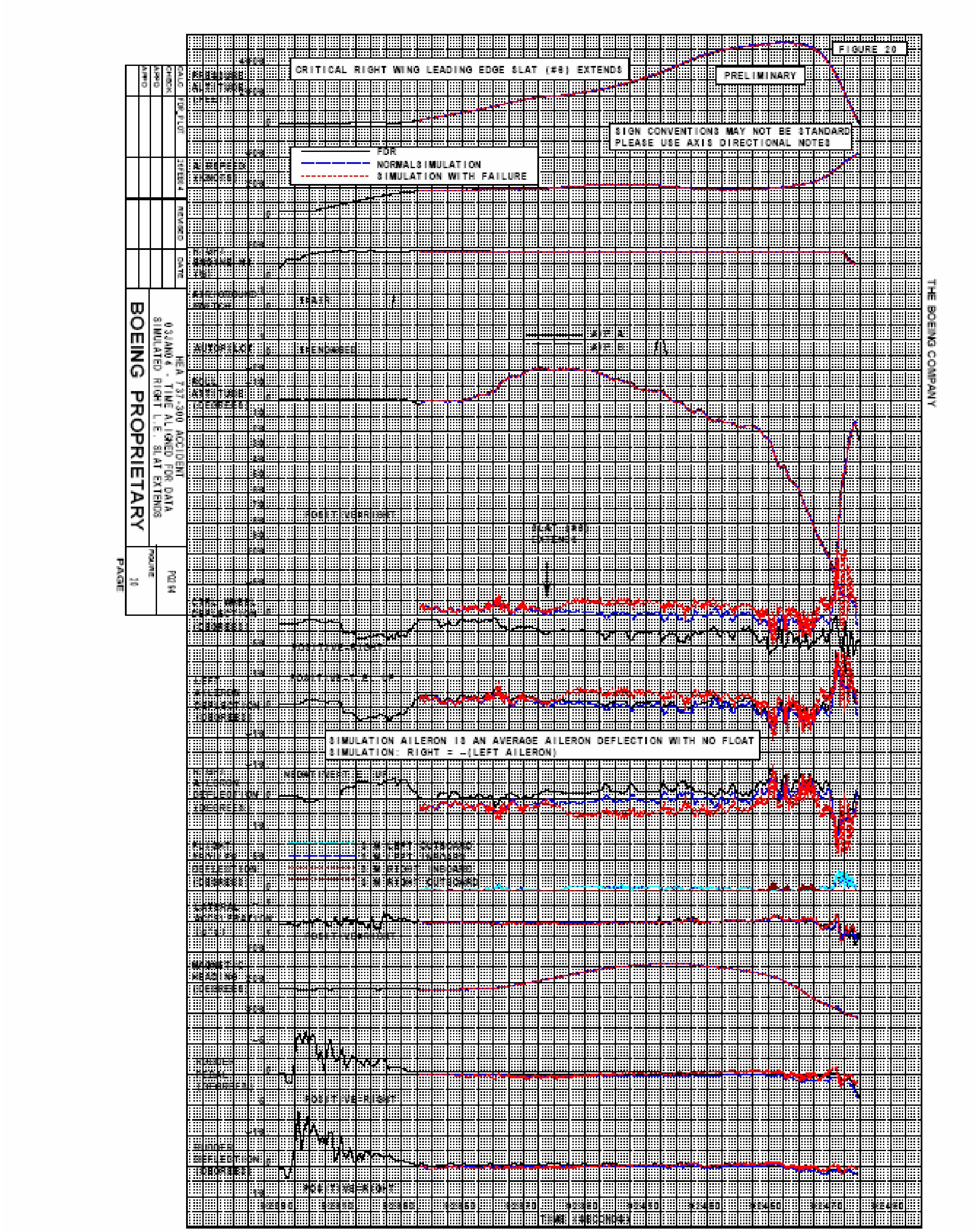


Figure 2.5.13.2b Critical right L.E. Failure- Slat #6 extends (lateral)

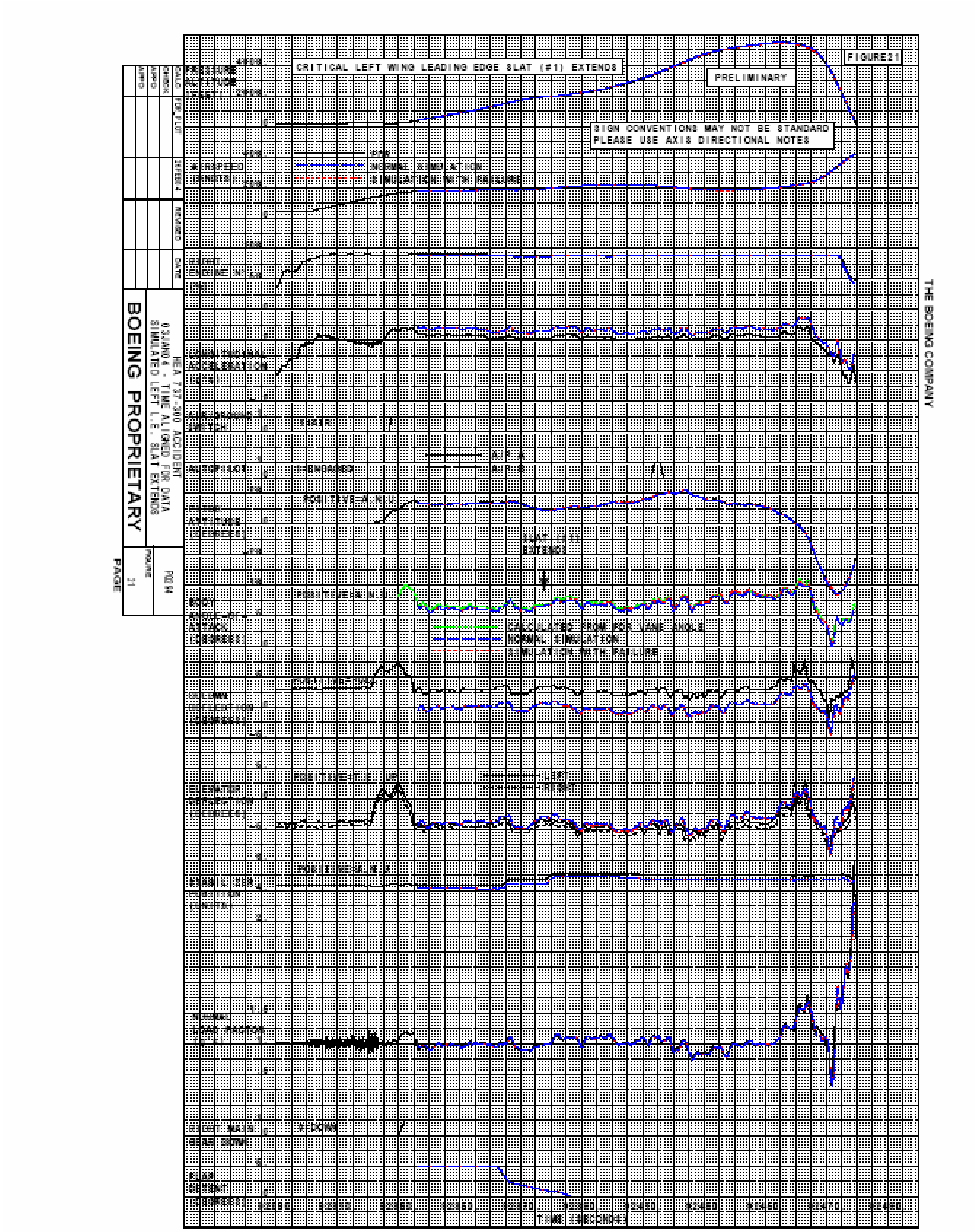


Figure 2.5.13.3a Critical left L.E. Failure- Slat #1 extends (longitudinal)

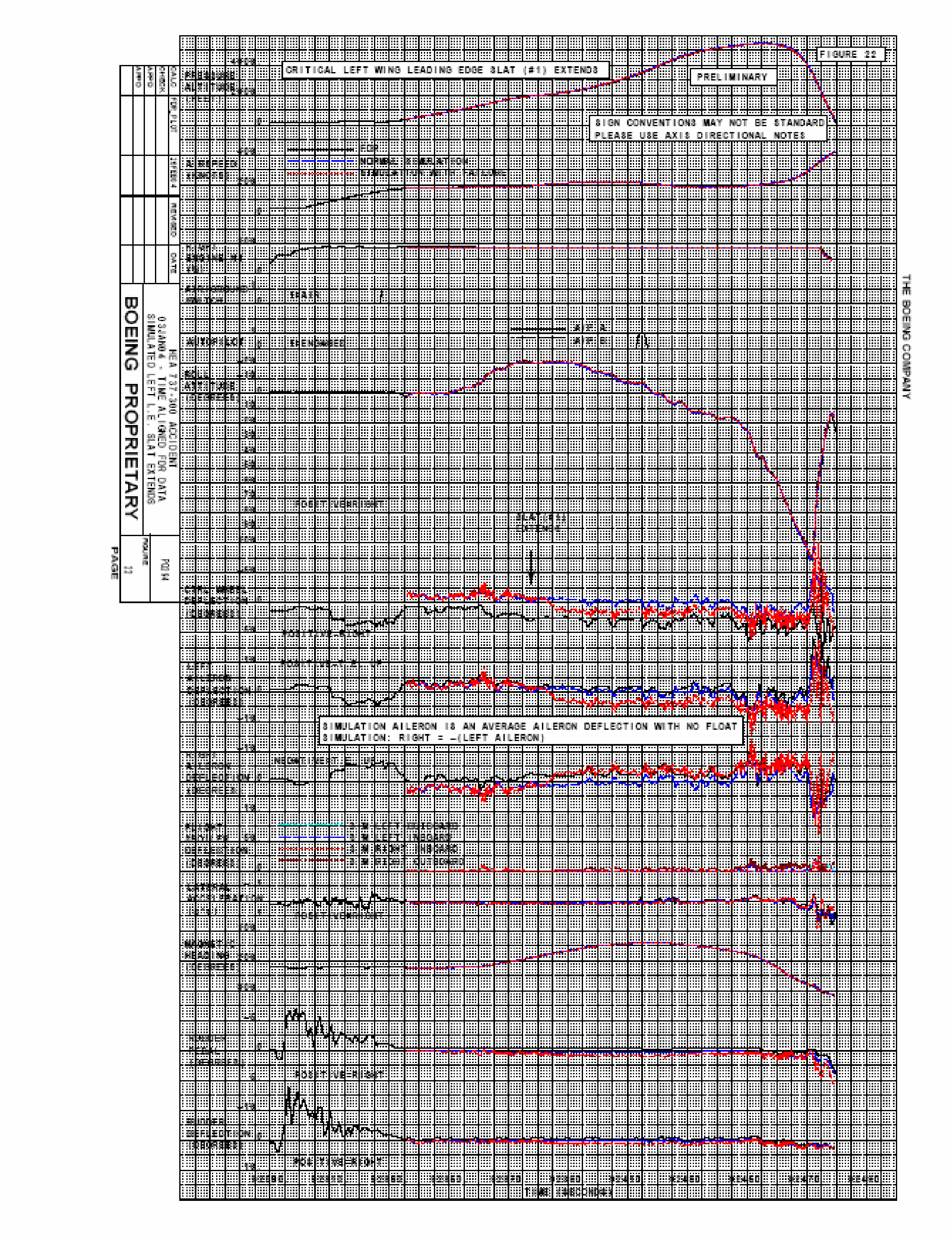


Figure 2.5.13.3b Critical left L.E. Failure- Slat #1 extends (lateral)

2. Thrust Asymmetry

With reference to section “2.3.6. Power plants”, it is shown that all the engines parameters were recorded in the FDR. However, some parameters data were not reliable (e.g. L engine N1). The other engines parameters are reliable including the N2 for both engines.. Based on these information, there is no evidence of thrust assymetry existing at the time of the event and consequently this condition could be ruled out

3. NA

4. External Disturbance

This condition could be ruled out based on FDR data, M- Cab Simulator Match to FDR and meteorogical data

5. Flap Asymmetry

The FDR did not show evidences of flap asymmetry. Based on these information, there is no evidence of flap asymmetry existing at the time of the event and consequently this condition could be ruled out

6. Lateral Control System

6.1 Flight Crew Behavior

6.1.1 Pilot Input

6.1.1.1 Following FD

6.1.1.1.1 FD Commands Erroneous

6.1.1.1.1.1 Erroneous Heading Data
This condition will not command past bank angle limit, thus this condition could be ruled out

6.1.1.1.1.2 Erroneous Roll Data
(L IRU roll data on FDR is correct), , thus this condition could be ruled out

6.1.1.1.1.3 FD Computational Fault; FCC computer fault
Based of the analysis of the A/P faults, this condition could be ruled out

6.1.1.1.1.4 Erroneous Roll Rate Data
L IRU roll data on FDR is correct; therefore roll rate data must be accurate.
(Supported by M-Cab test results), thus this condition could be ruled out

6.1.1.1.1.5 Erroneous Selected Heading Data
This condition will not command past bank angle limit. Supported by system evaluation; (Supported by M-Cab test results), thus this condition could be ruled out

6.1.1.1.2 FD Commands Correct

6.1.1.1.2.1 Unintended Direction of Selected HDG (to right of current HDG)

6.1.1.1.2.1.1 Manual Input to MCP
FD would not command overbank if correct. (Supported by System Evaluation; M-Cab test results), thus this condition could be ruled out

6.1.1.2 Following Erroneous EADI

6.1.1.2.1 Captain EADI Erroneous

6.1.1.2.1.1 Erroneous Attitude Data from IRU
L IRU data is correct on FDR, (Supported by system evaluation; FDR data common), thus this condition could be ruled out

6.1.1.2.1.2 Symbol Generator Fault

6.1.1.2.1.2.1 Blanking; SG Fail
Based on System Evaluation, no indication would occur, thus this condition could be ruled out

6.1.1.2.1.2.2 Offset Airplane Reference
Based on systems evaluation, this condition could be ruled out

6.1.1.2.2 Alternate Instruments Not Cross-Checked

No information was available to exclude this condition, therefore this condition could not be ruled out

6.1.1.3 Reaction to Uncommanded Roll (pilot interaction with fault)
From the performance point of view; the FDR match with respect to external disturbance. External disturbance is inconsistent with FDR/ Performance data, this condition could be ruled out

6.1.1.4 Pilot Loses Situational Awareness

6.1.1.4.1 Captain experiences SD Type II

Based on the outcome of the Crew Behavior Subcommittee studies, this condition could not be ruled out

6.1.1.4.2 Captain misinterprets ADI indications

See Section 2.6 Crew Behavior

6.2 Autopilot Initiated

6.2.1 Commanded

6.2.1.1 CWS-R

Autopilot does not command past bank angle limit. Therefore this condition will not cause overbank. (Supported by M-Cab evaluation), thus this condition could be ruled out

6.2.1.2 All Other Modes

Autopilot does not command past bank angle limit. Therefore does not cause overbank. (Supported by Systems Evaluation; FDR Data), thus this condition could be ruled out

(It is to be noted that the A/P does not command past bank angle limit. Therefore this condition will not cause overbank).

6.2.2 Autopilot Malfunction

6.2.2.1 FCC Fault

6.2.2.1.1 Failure of Bank Angle Limit Function

No FCC internal faults can lead to autopilot engagement or erroneous commands FCC Fault Monitoring Disconnected, thus this condition could be ruled out[1]

6.2.2.1.2 Other FCC Internal Faults

No FCC internal faults can lead to autopilot engagement or erroneous commands FCC Fault Monitoring Disconnected, thus this condition could be ruled out (see footnote #1)

6.2.2.2 MCP Fault (SCENARIO 9 10A, 10B, 10C Erroneous Selected Heading)

This scenario requires:
Autopilot failure to engaged state but outputting disengaged status data to FDR
FDR Bank data-fault does not affect bank angle limits
Thus this condition could be ruled out

6.2.2.3 Autopilot Actuator Fault

[1] According to information supplied by Honeywell

6.2.2.3.1 Actuator Hardover without Force Limiter 17 to 20 lb Force

6.2.2.3.1.1 Both Solenoids and Transfer Valve Jammed (Autopilot actuator, both Solenoids and Transfer Valve Jammed (Actuator Hardover without Force Limiter 17 to 20 lb Force))

(Refer to appendix 2-1 lateral control analysis, Table 3 Hypothetical failures scenarios [Autopilot Actuator], Scenario 4)

Assumptions:

- These faults require 3 concurrent faults. Detent solenoid was in correct position at autopilot engagement. Arm solenoid could be latent failure. Transfer was working on previous flight and could have occurred anytime after last use of autopilot and would have been latent from that point.
- Both the Arm and the Detent solenoid are assumed to fail (stuck open). The transfer valve is assumed to fail in the position commanding right bank

The cause of these failures can not be conclusively identified. However the failure of the arm solenoid (stuck open solenoid) might have been the result of a stuck closed contact (MCP engage relay A). Also these failures might be the result of an electric short within the electrical socket on the autopilot actuator.

Consequences of the hypothetical failures:

- This triple fault will result in an A/P actuator hardover.
- The autopilot can not be engaged.

- Detent pressure switch will sense hydraulic pressure before engagement; therefore, the pre-engagement logic will not be valid preventing engagement of autopilot.
- With autopilot disengaged, both aileron wheels will be driven away of the neutral position and will be positioned at about 60 degrees wheel position (Refer to figure 2.5.13.5, forces versus wheels position)
- The ailerons and flight spoilers will follow movement of the ailerons control wheels.
- The affected autopilot actuator will always try to drive the ailerons and spoilers towards the actuator hardover position
- The authority of the autopilot is shown in Figure ".5.13.5 "Ailerons and spoilers behavior with autopilot actuator hardover"
- The Captain will be able to control the ailerons and flight spoilers with an additional force of 17 lbs to overcome detent piston pressure and override the autopilot actuator.
- Whenever the control wheels are released, the control wheel will tend to return to the relevant autopilot actuator hardover position (60 degrees wheel position), resulting in an aileron deflection of about ± 13 degrees and spoilers deflection.
- This fault will not be associated with any visual or audio warning in the cockpit

This condition could not be ruled out, based on the following:

- The results obtained from the analytical studies and the M-Cab test show a very close consistency with the available data.
- With reference to FDR data and after autopilot disconnect, the FDR shows tendency for the ailerons to move towards right turn direction. Movement of the aileron surfaces as shown in the FDR towards the neutral

position could be explained by crew attempts to control the airplane attitude with the existence of the failure. The rate of airplane rolling to the right is always reduced with these attempts. The forces required to move the ailerons by the captain are higher than the forces required in normal condition with no fault.

- Whenever the control wheels are released, the ailerons move towards the offset position showing high consistency with the fault existence. The fault was continually driving the airplane towards more right roll
- The movements of the ailerons throughout the last recovery phase highly support this scenario. The FDR data shows that even with the captain attempt to recover the airplane at the last stages, the ailerons always had the trend to move towards the opposite direction of correction which is highly consistent with the fault existence when the captain effort to restore the airplane is reduced.

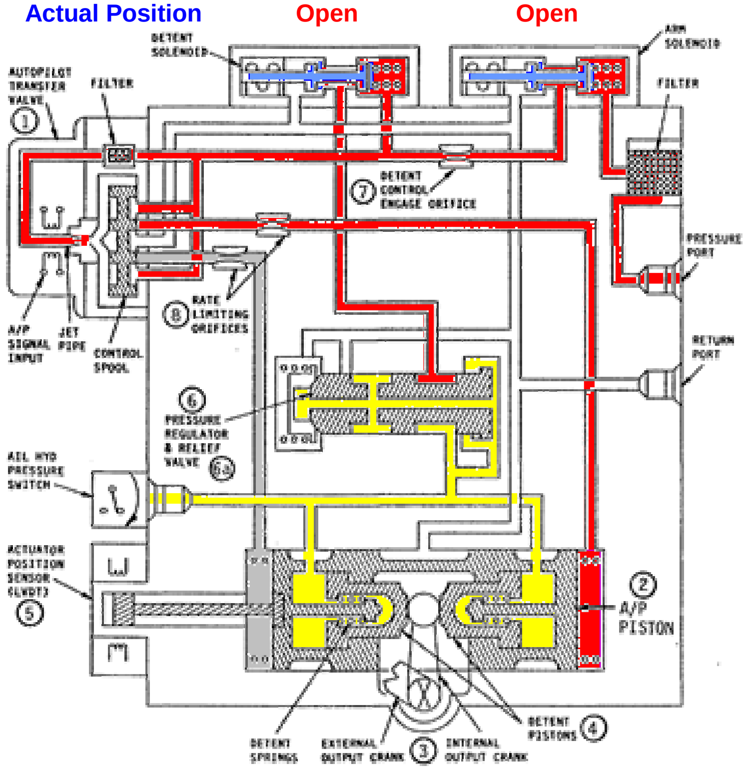
Therefore, it could be concluded that this hypothetical condition shows close consistency with the event. This condition is also consistent with the possibility of recovering the airplane when appropriate quantity of input is applied timely on the airplane (M- Cab tests).

(See also section 2.6 Crew Behavior)
This condition could not be ruled out

Scenario 12d – Both Solenoids Stuck Open with Transfer Valve Jammed

Solenoid Valve	Detent	Arm
Command	Closed	Closed
Actual Position	Open	Open

This triple fault will result in an A/P actuator hardover. The force limit of the actuator still operates normally.



Hyd System Pressure

Mod Piston Command Pressure

Detent Piston Reduced Pressure

Return Pressure

Figure 2.5.13.4 Autopilot Actuator

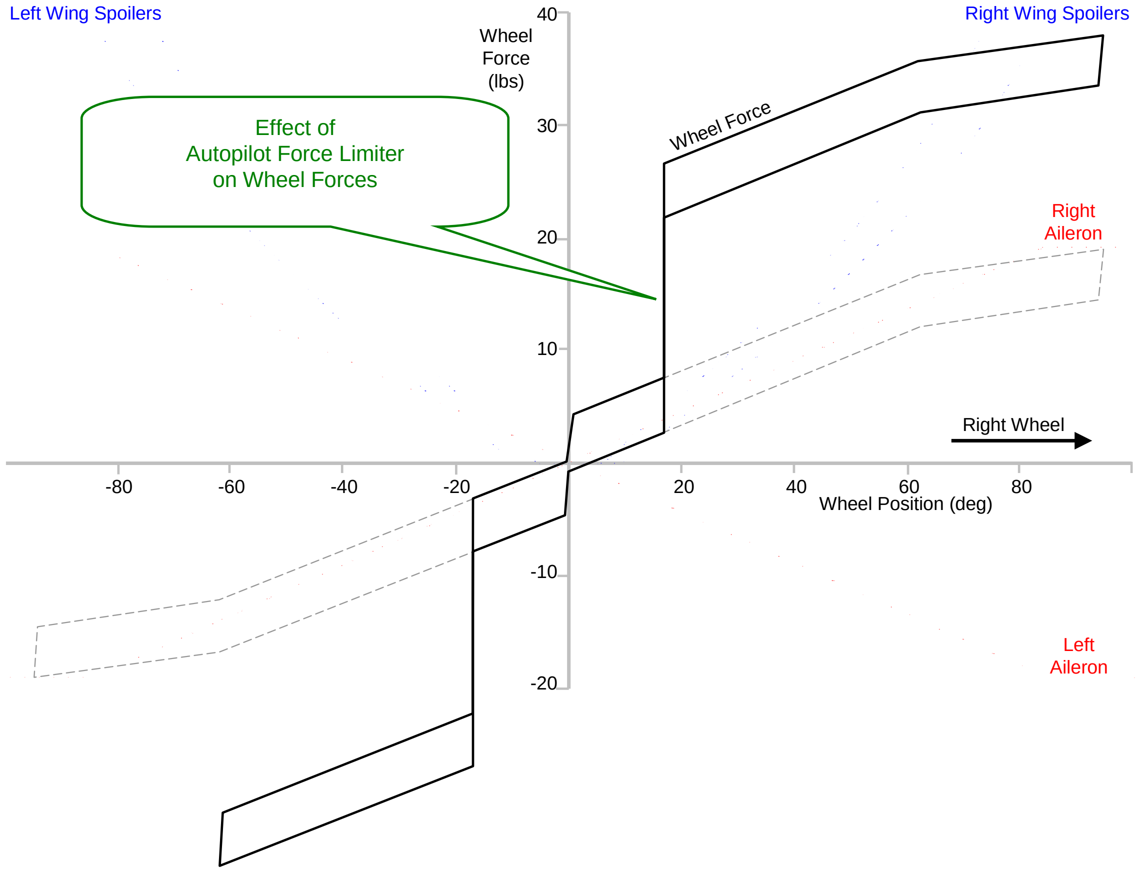


Figure 2.5.13.5 Ailerons and spoilers behavior with autopilot actuator hardover

6.2.2.3.1.2 Both Solenoids, Transfer Valve, and Pressure Regulator Jammed

Inconsistent, based on M-Cab results and systems evaluation, thus this condition could be ruled out

6.2.2.3.1.3 Both Solenoids, Transfer Valve, and Relief Valve Jammed

Inconsistent, based on M-Cab results and systems evaluation, thus this condition could be ruled out

6.2.2.3.2 Actuator Hardover with 80 lb Force

6.2.2.3.2.1 Both Solenoids, Transfer Valve, Pressure Regulator, and Relief Valve

Fighting 80 lbs of wheel force is a significant effort which prohibits normal breathing/ speech patterns (inconsistent with CVR data), thus this condition could be ruled out

6.2.2.3.2.2 Shearout Does Not Break

Fighting 80 lbs of wheel force is a significant effort which prohibits normal breathing/ speech patterns (inconsistent with CVR data), thus this condition could be ruled out

6.2.2.3.3 No Autopilot Input to Lateral Control System (Latent Fault)

6.2.2.3.3.1 Arm Solenoid Stuck Open

Based on system evaluation, this fault is latent and does not cause any anomalous system operation. (having no lateral system input).

6.2.2.3.3.2 Detent Solenoid Stuck Open

(Sys Evaluation; this fault has no lateral system input)

Based on system evaluation, this fault is latent and does not cause any anomalous system operation. (having no lateral system input).

6.2.2.3.4 Additional 17 lb Centering Force on CW, Arm and Detent Solenoid Stuck Open (SCENARIO 12C)

This fault causes an increase in centering force, but does not create any tendency for right roll, thus this condition could be ruled out

6.2.2.4 Sensor Faults

6.2.2.4.1 Spoiler Sensor Fault

This scenario requires:
Autopilot failed to “engaged" state but outputting disengaged status data to FDR (System Evaluation).

Spoiler sensor data is not used with flaps up.
Autopilot not engaged.

Autopilot would not command overbank and would still follow correct path command (if it was engaged).
(Supported by system evaluation)

Thus this condition could be ruled out

6.2.2.5 IRU Faults

All the following scenarios require:
1. Autopilot failed to “engaged state” but outputting disengaged status data to FDR
2. FCC must command airplane to bank angle above 30 degrees

No FCC internal faults can lead to A/P engagement or erroneous commands)

6.2.2.5.1 IRU Shutdown

Not supported by FDR Data, thus this condition could be ruled out

6.2.2.5.2 Erroneous L IRU Output of Roll Rate

FDR records roll data used by FD - not erroneous
Correct roll data requires correct roll rate data (Supported by System Evaluation + FDR data), thus this condition could be ruled out

6.2.2.5.3 R IRU of NCD for Roll Rate

(This scenario requires-
1 Autopilot failed to “engaged” state but outputting disengaged status data to FDR.
2 Internal faults within IRU that allow incorrect roll data to be transmitted to FCC, EADI
(Supported by System evaluation + FDR)
Thus this condition could be ruled out

6.2.2.5.4 Erroneous R IRU Output of Straight and level flight during bank

Would result in:

1. Autopilot actuator hardover.
2. Captain FD would provide correct steering cues
3. F/OEADI would display straight and level flight ("Overbank annunciations must therefore be based on some other source")
4. F/OFD would display erroneous steering cues
5. Roll comparator annunciated

Thus this condition could be ruled out

6.3 Lateral System Fault

(See Appendix 2-1 analysis for lateral control system)

6.3.1 Jam

6.3.1.1 Between Wheel and PCU

Both ailerons showed movements through the whole flight. (Supported by performance; FDR Match)
This condition could be ruled out

6.3.1.2 Between PCU and Aileron

Both ailerons showed movements through the whole flight. (Supported by performance; FDR Match)
This condition could be ruled out

6.3.2 Aileron PCU Hardover

Based on Performance; FDR Match + M-Cab test results, this condition could be ruled out

6.3.3 Cable Break

6.3.3.1 Between Wheel and PCU

Aileron movement in both directions noted on FDR

Based on Performance; FDR Match, this condition could be ruled out

6.3.3.2 Between PCU and Aileron

Aileron movement in both directions noted on FDR

Based on Performance; FDR Match, this condition could be ruled out

6.3.4 Trim/Feel Unit Fault

6.3.4 .1 Aileron Trim Runaway to Approx. 25 deg.

6.3.4 .2 Aileron Trim Runaway to 60 deg.

(See Appendix 2-1 lateral control analysis, Table 2 Hypothetical double failures scenarios (Ailerons/ Spoilers Systems), Scenario 2)

Assumptions:

- One trim switch stuck at closed position (could be a latent failure).
- Second trim switch might have stuck at closed position with trim input from the flying crew, leading to trim motor hardover position driving the ailerons to 15 degrees (maximum trim authority) towards right turn.
- This failure is assumed to occur after autopilot disconnect.

- Fault combined with pilot interference

The consequences of the hypothetical failure:

- The aileron trim actuator will reach its hardover position driving the ailerons to 15 degrees (maximum trim authority) at no load on the aileron control wheels.
- Both aileron wheels will be driven away from the neutral position. The ailerons and flight spoilers will always follow the aileron wheels. The new position for the wheel will be about 65 degrees at no load on the aileron control wheels. The force-wheels relation will change (refer to Figure 2.5.13.6 Ailerons and spoilers behavior with aileron trim actuator at its hardover position)
- Whenever the aileron wheels are released, the wheels will move to the hardover position (65 degree). The ailerons wheels will always follow each others simultaneously.
- No cockpit visual or audio warning
- The Captain and F/O will be able to resist the trim action and control the ailerons and spoilers but with additional force (Refer to Fig Figure 2.5.13.6)
- Whenever the Captain and F/O release the ailerons control wheels, the ailerons will tend to move towards right turn unless one of the flying crew exerts forces on the aileron control wheels to restore the airplane attitude

This condition could not be ruled out based on the following:

- With reference to the FDR data and after autopilot disconnect, the FDR shows tendency for the ailerons to move towards right turn direction. Movement of the aileron surfaces as shown in the FDR towards the neutral position could be explained by Captain attempts to control the airplane attitude with the existence of the failure.
- The movements of the ailerons throughout the last recovery phase highly support this scenario. The FDR data shows that even with the captain attempt to recover the airplane at the last stages, the ailerons always had the trend to move towards the opposite direction of correction which is highly consistent with the fault existence when the captain effort to restore the airplane is reduced. Forces are

higher than normal to overcome the centering springs.

- Based on evaluation in M-Cab, this event fits the data. However, trim fault must have occurred after autopilot engagement (zero force, zero aileron engagement indicates zero trim at that point).
- This hypothetical condition shows close consistency with the event. This condition is also consistent with the possibility of recovering the airplane when appropriate quantity of input is applied timely on the airplane (M- Cab tests).
- Consistent with Crew Behavior study

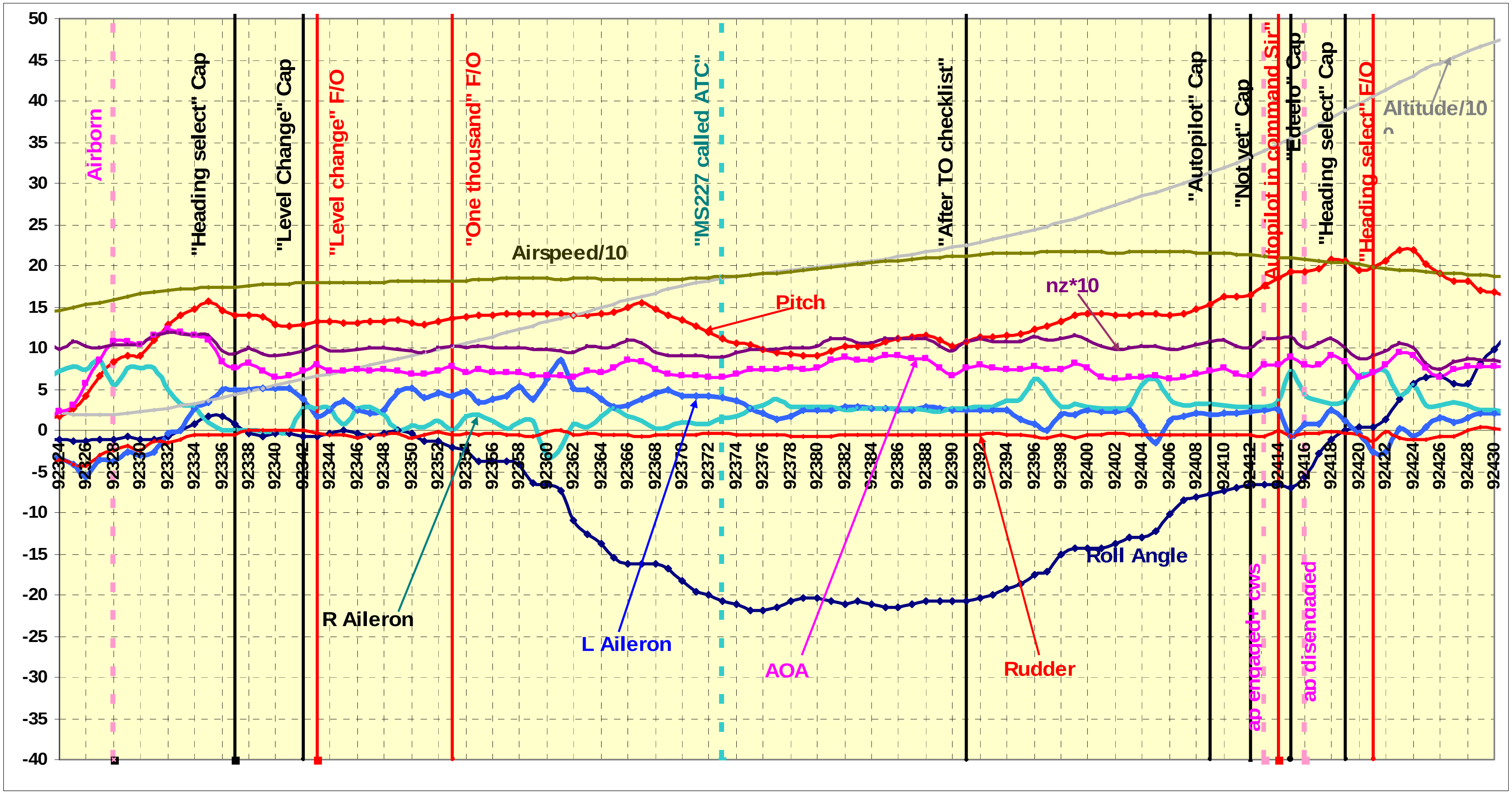


Figure 2.5.13.1b Right roll continues to overbank with ailerons activities

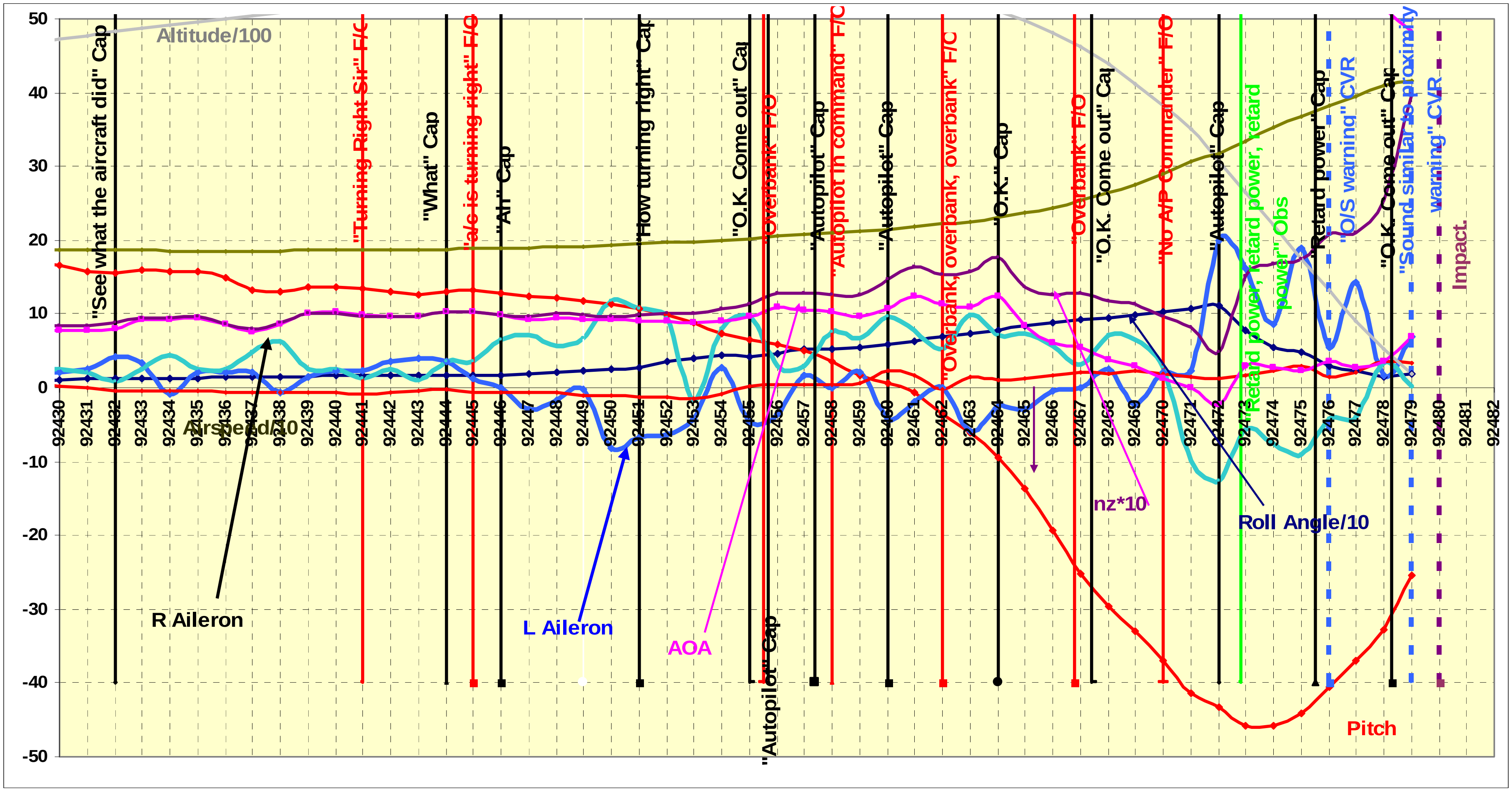


Figure 2.5.13.1c Right roll continues to overbank with ailerons activities

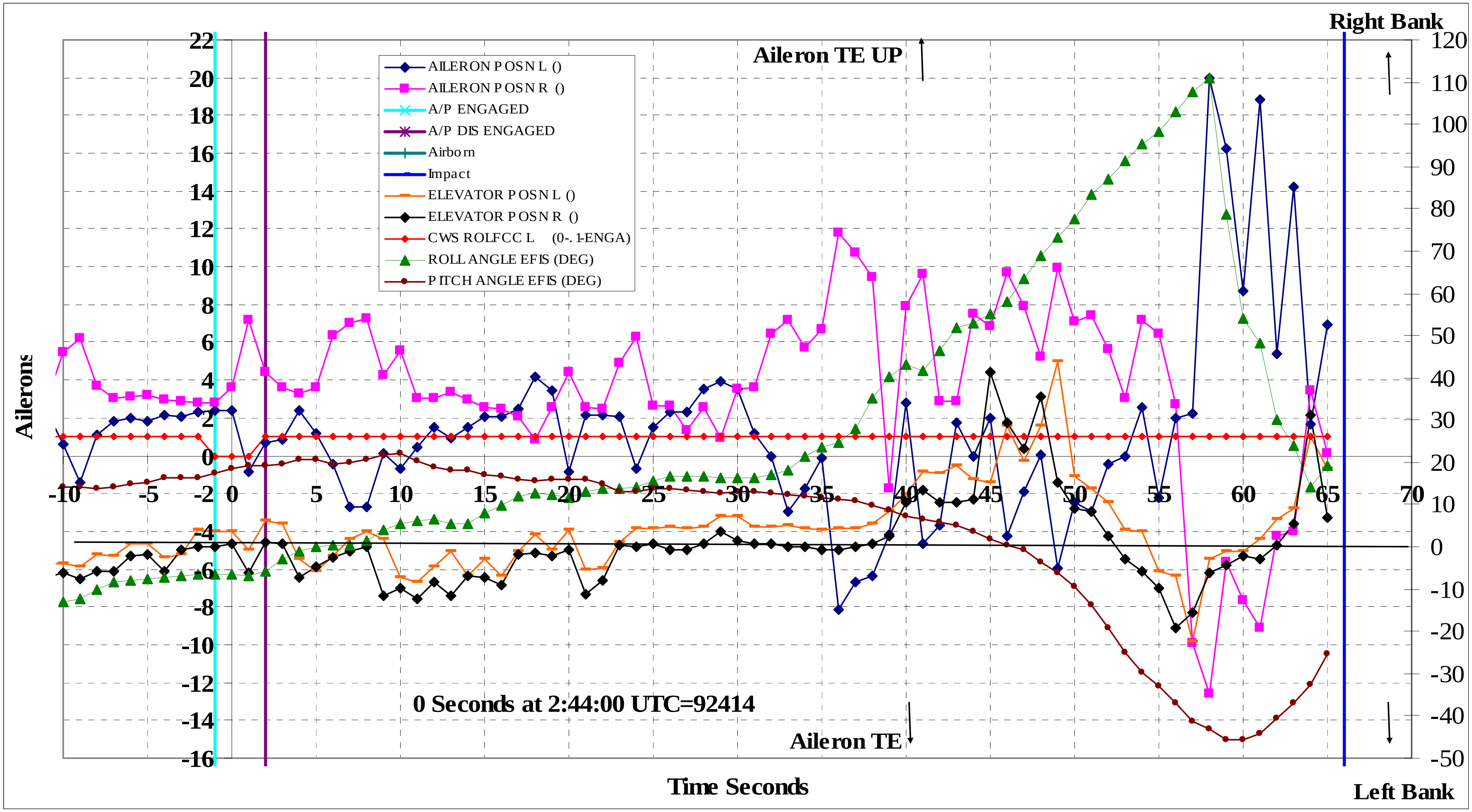


Figure 2.5.13.1d Right roll continues to overbank with ailerons activities

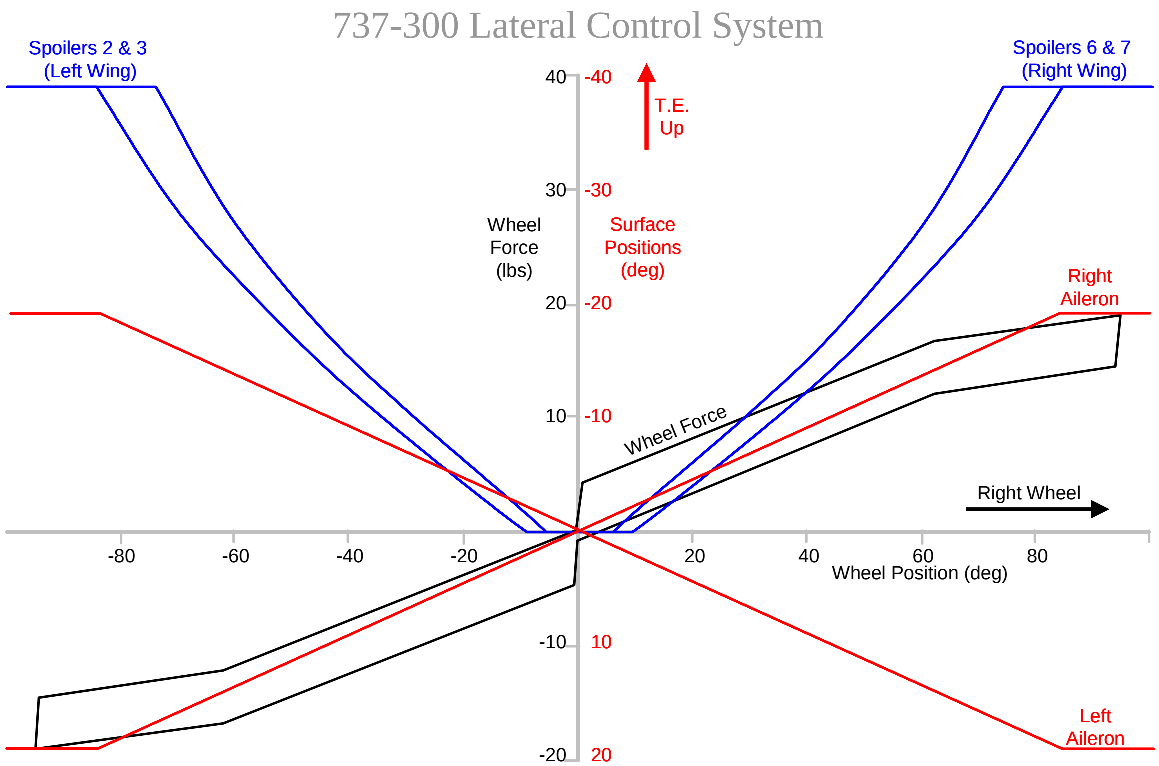


Figure 2.5.13.6 Ailerons and spoilers behavior with zero ailerons trim actuator

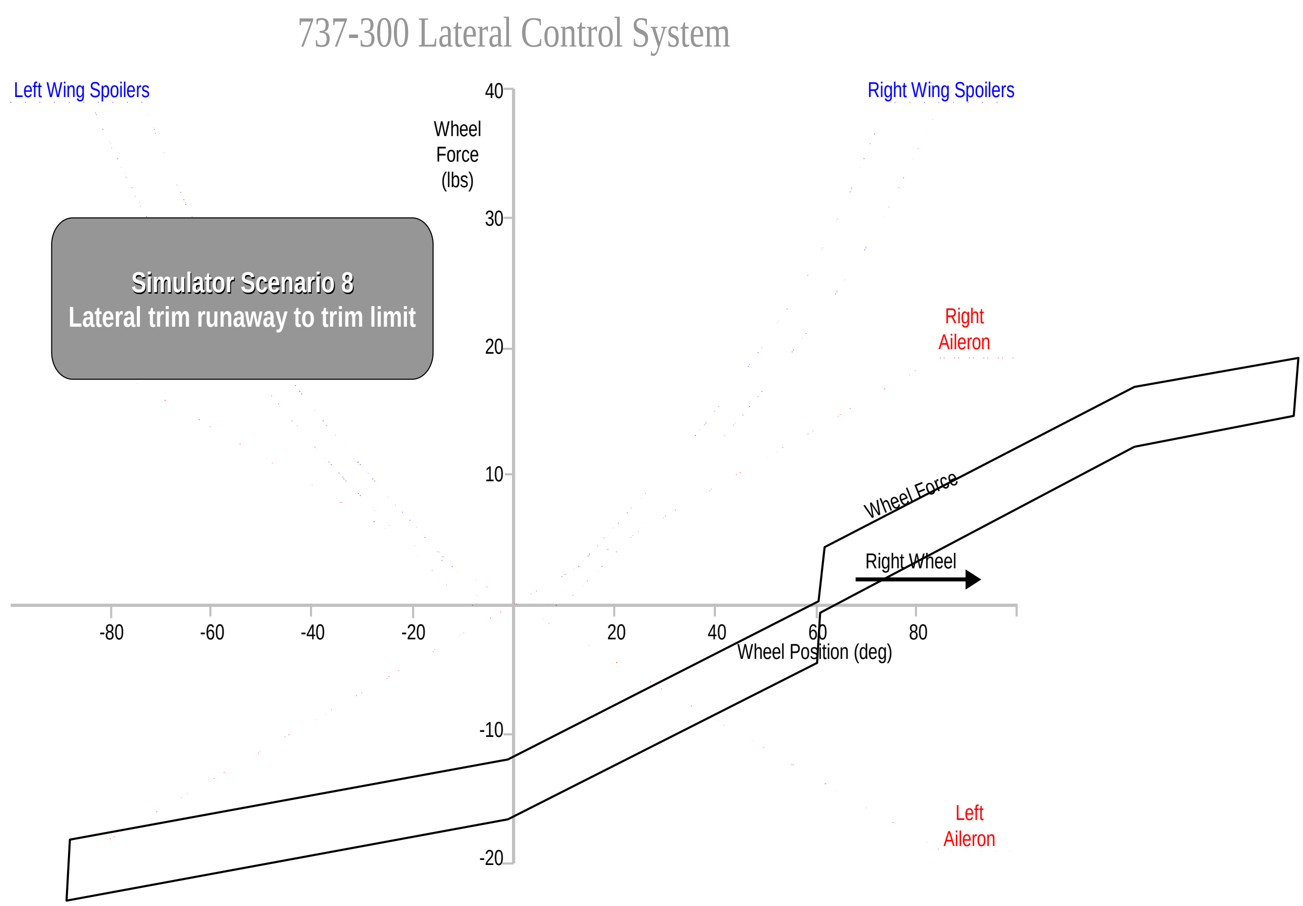


Figure 2.5.13.7 Ailerons and spoilers behavior with aileron trim actuator at its hardover position

6.3.5 Spoiler Fault

6.3.5.1 Spoiler Hardover

Based on the M- Cab results (Simulator match to FDR, Faults Simulations, results of spoilers' hardover conditions are shown hereafter), this condition shows inconsistency with the accident scenario. Therefore, this fault could be ruled out.

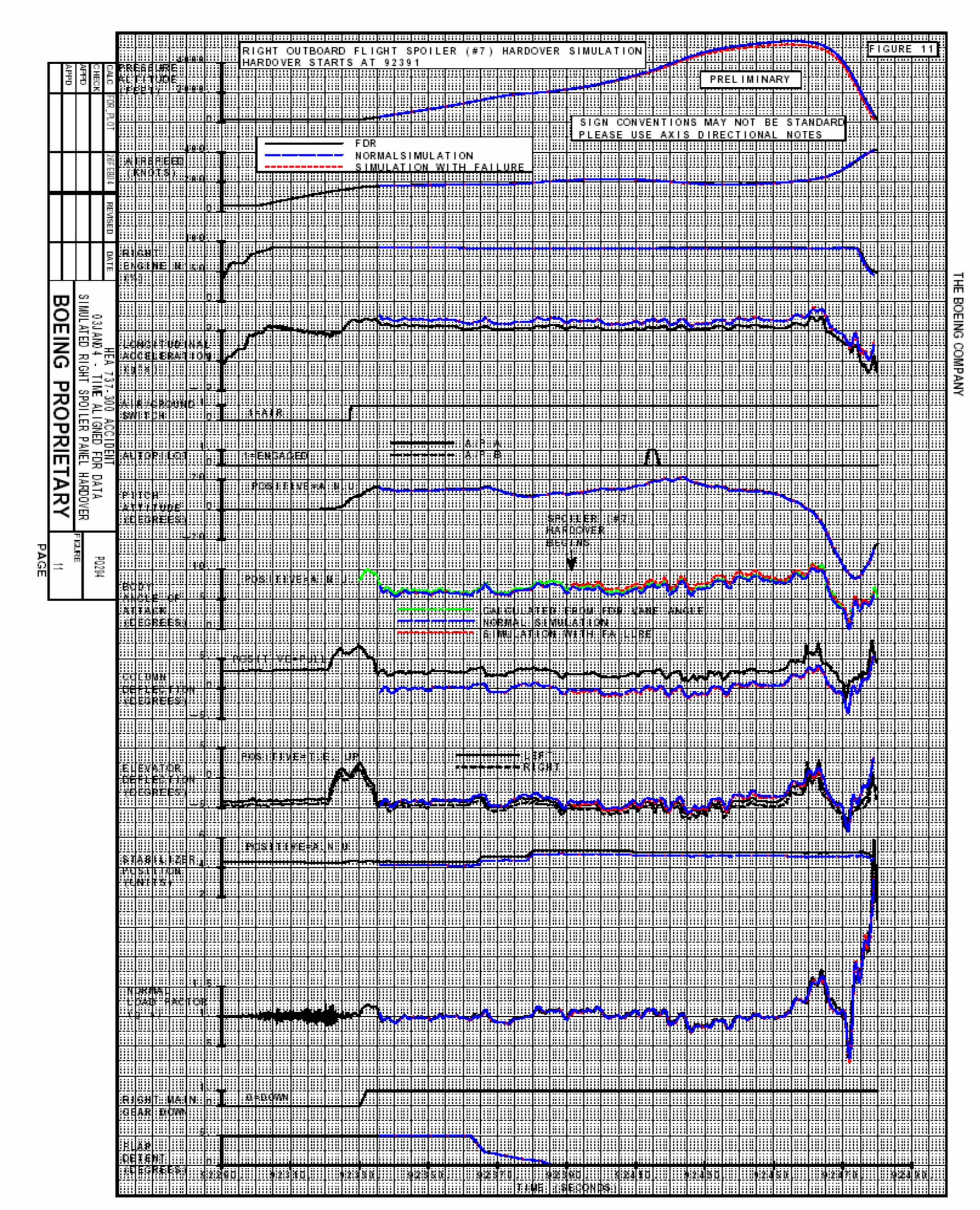


Figure 2.5.13.8a Right outboard flight spoilers (#7) Hardover simulation (hardover starts at 92391) (longitudinal)

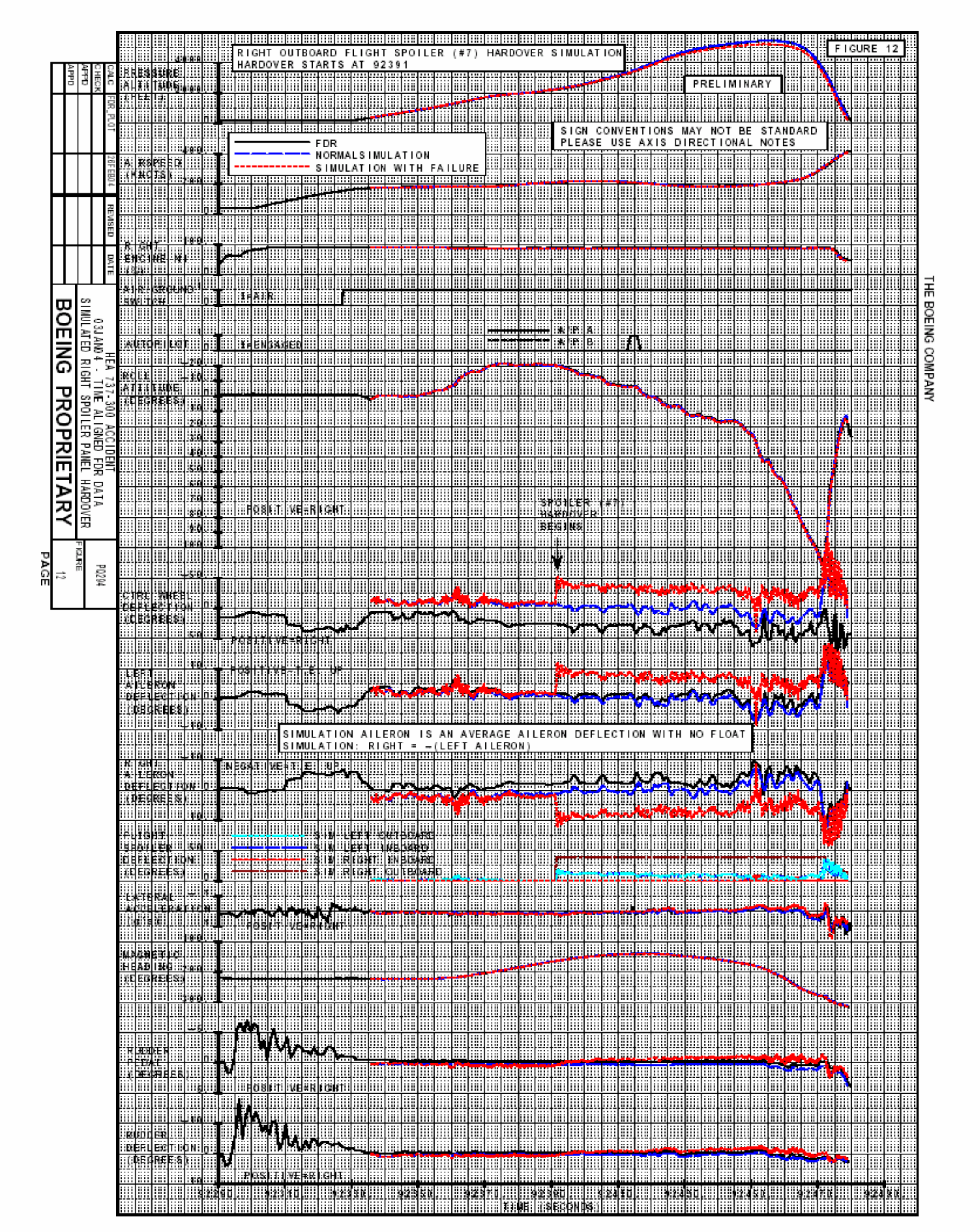


Figure 2.5.13.8b Right outboard flight spoilers (#7) Hardover simulation (hardover starts at 92391) (lateral)

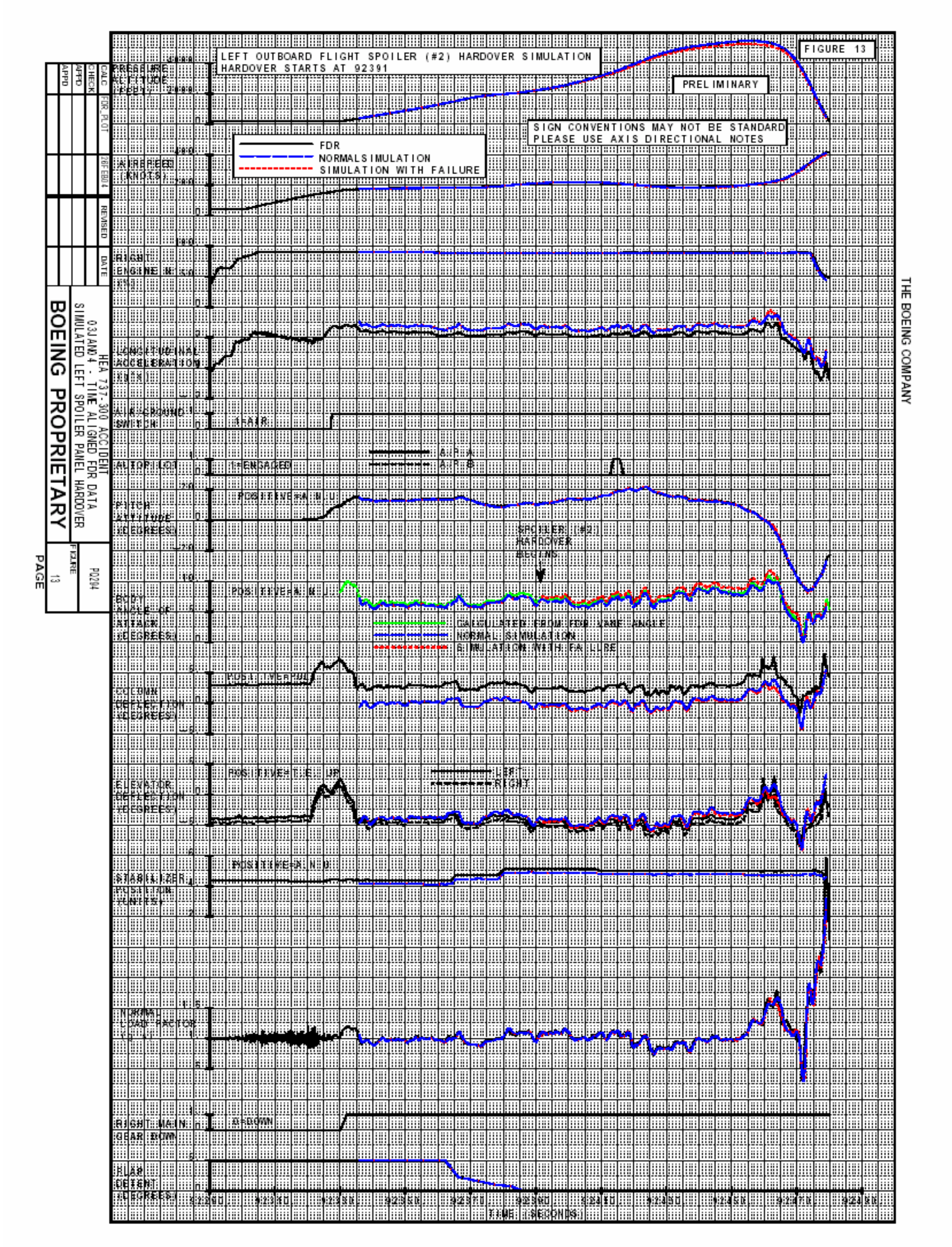


Figure 2.5.13.9a Left outboard flight spoilers (#2) Hardover simulation (hardover starts at 92391) (Longitudinal)

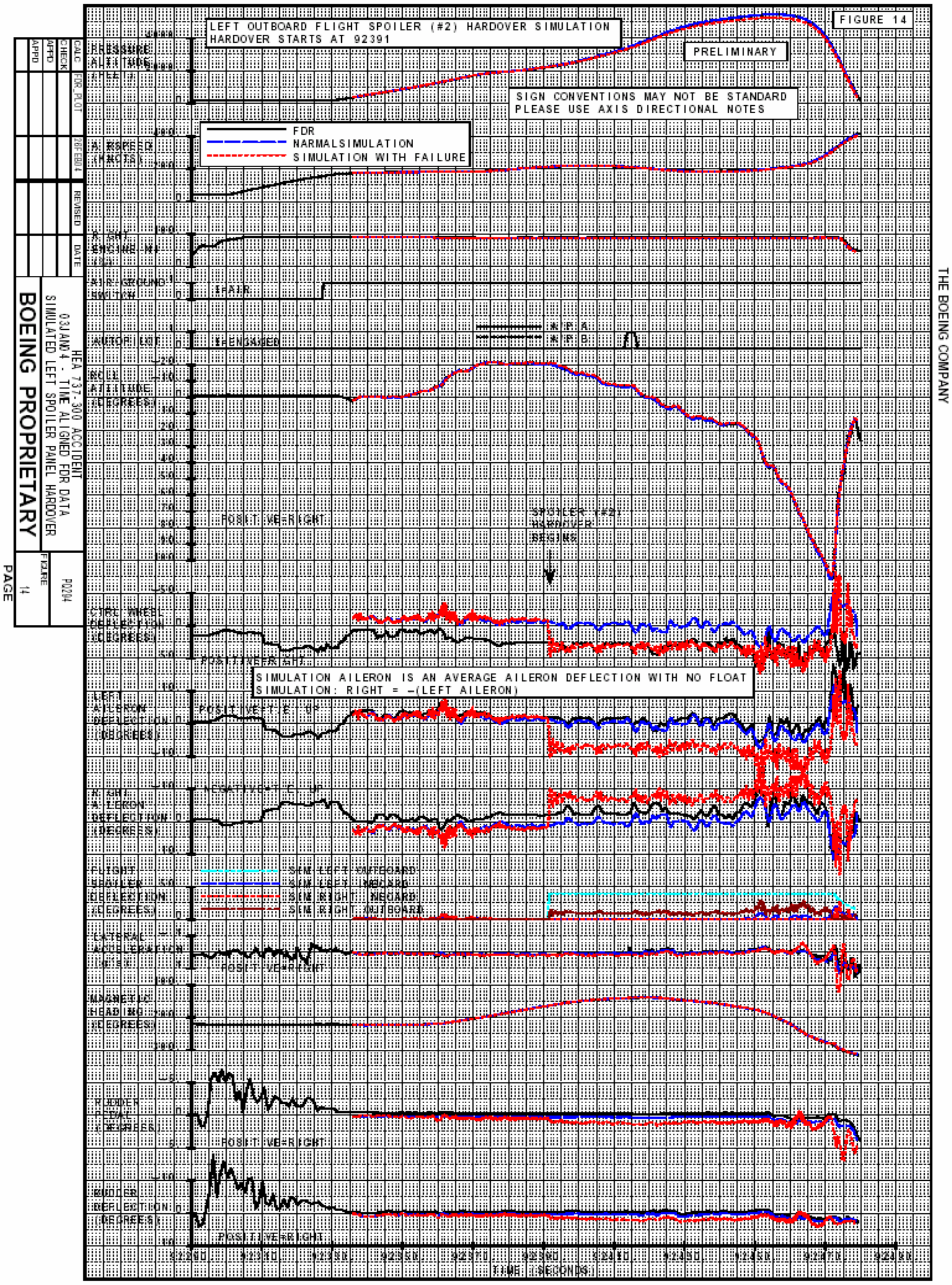


Figure 2.5.13.9b Left outboard flight spoilers (#2) Hardover simulation (hardover starts at 92391) (Lateral)

6.3.5.2 Spoiler Float

Based on the M- Cab results (Simulator match to FDR, Faults Simulations, results of spoilers' float conditions are shown hereafter), this condition shows inconsistency with the accident scenario. Therefore, this fault could be ruled out.

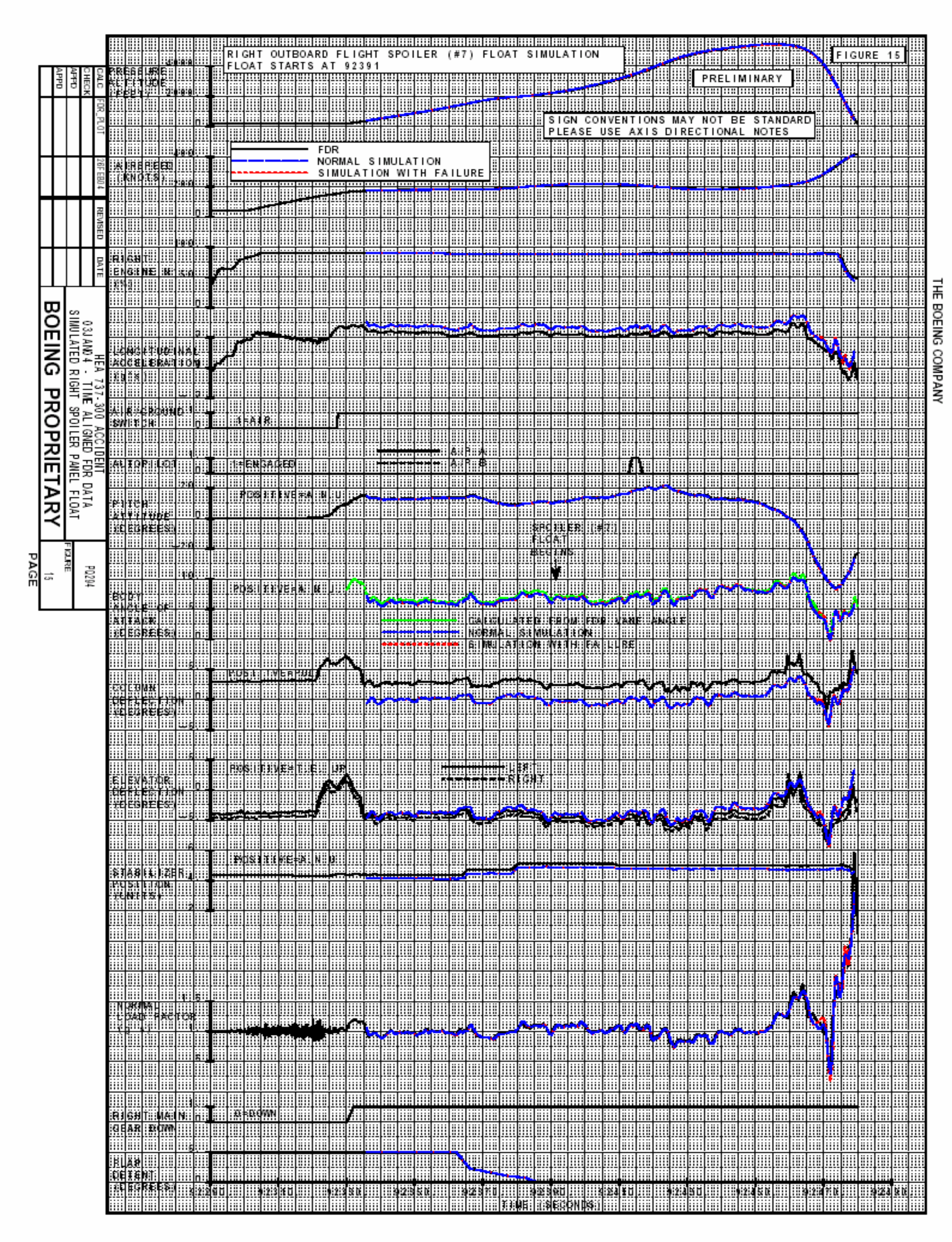


Figure 2.5.13.10a Right outboard flight spoilers (#7) Float simulation (floats starts at 92391) (Longitudinal)

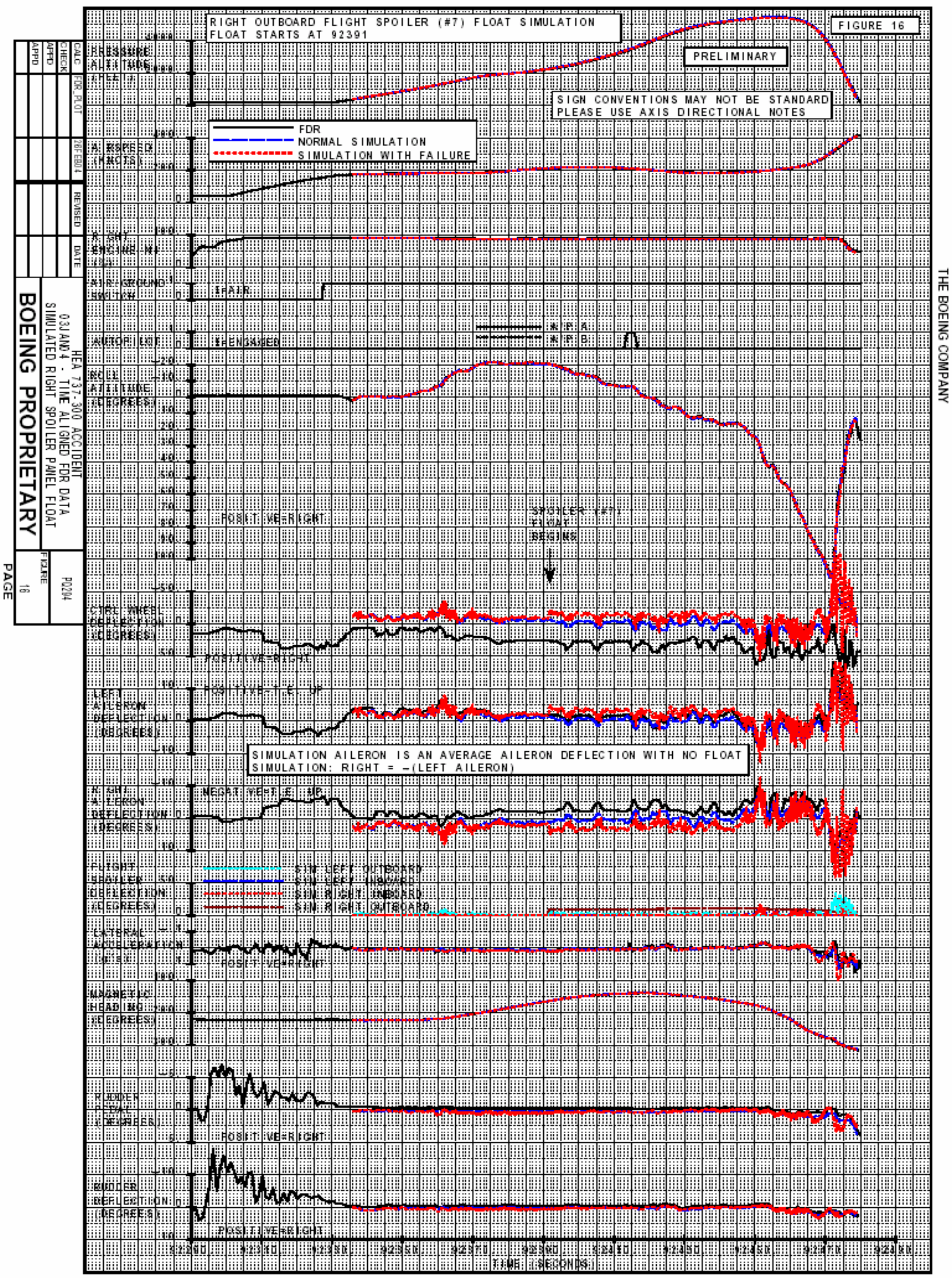


Figure 2.5.13.10b Right outboard flight spoilers (#7) Float simulation (floats starts at 92391) (Lateral)

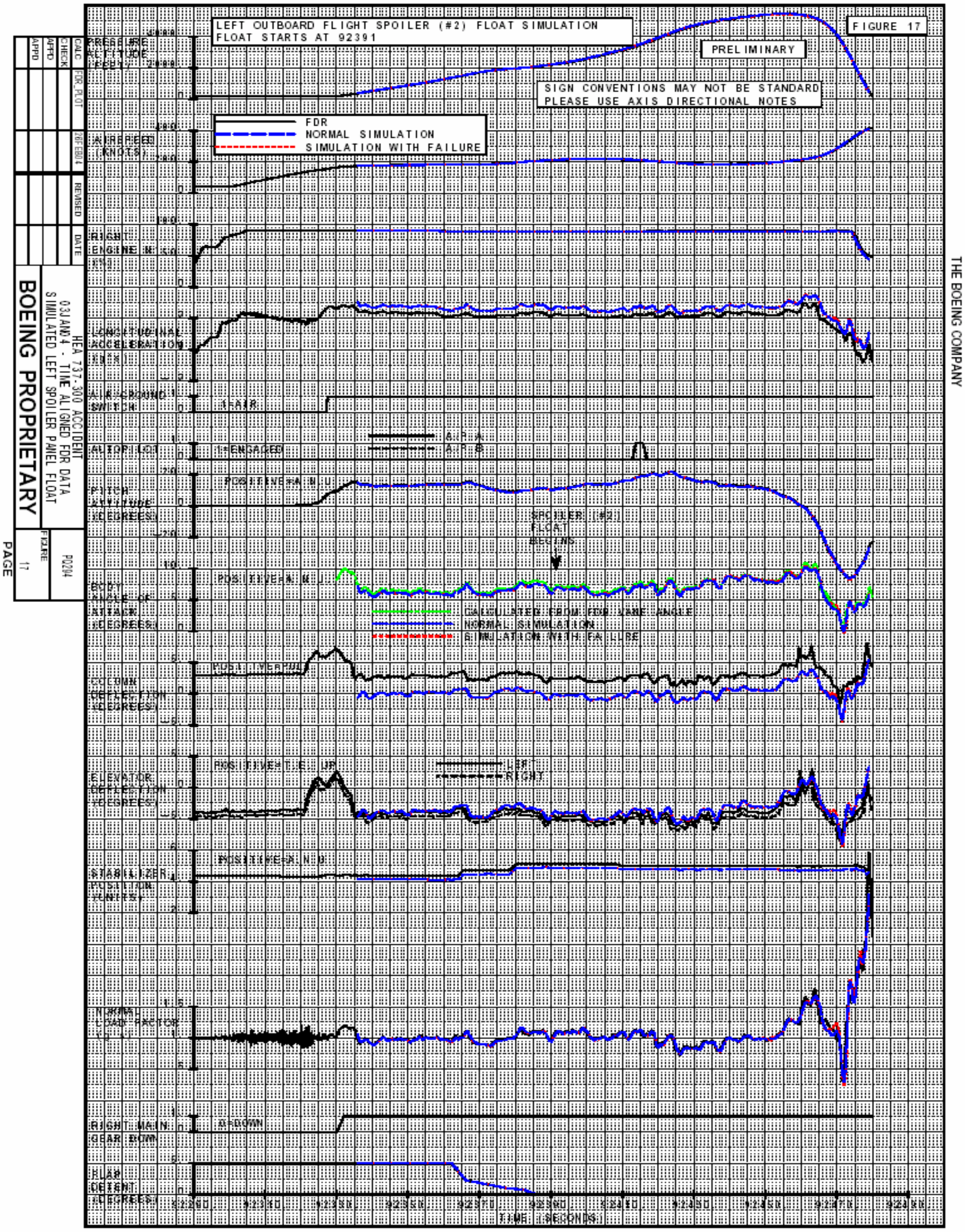


Figure 2.5.13.11a Left outboard flight spoilers (#2) Float simulation (floats starts at 92391) (Longitudinal)

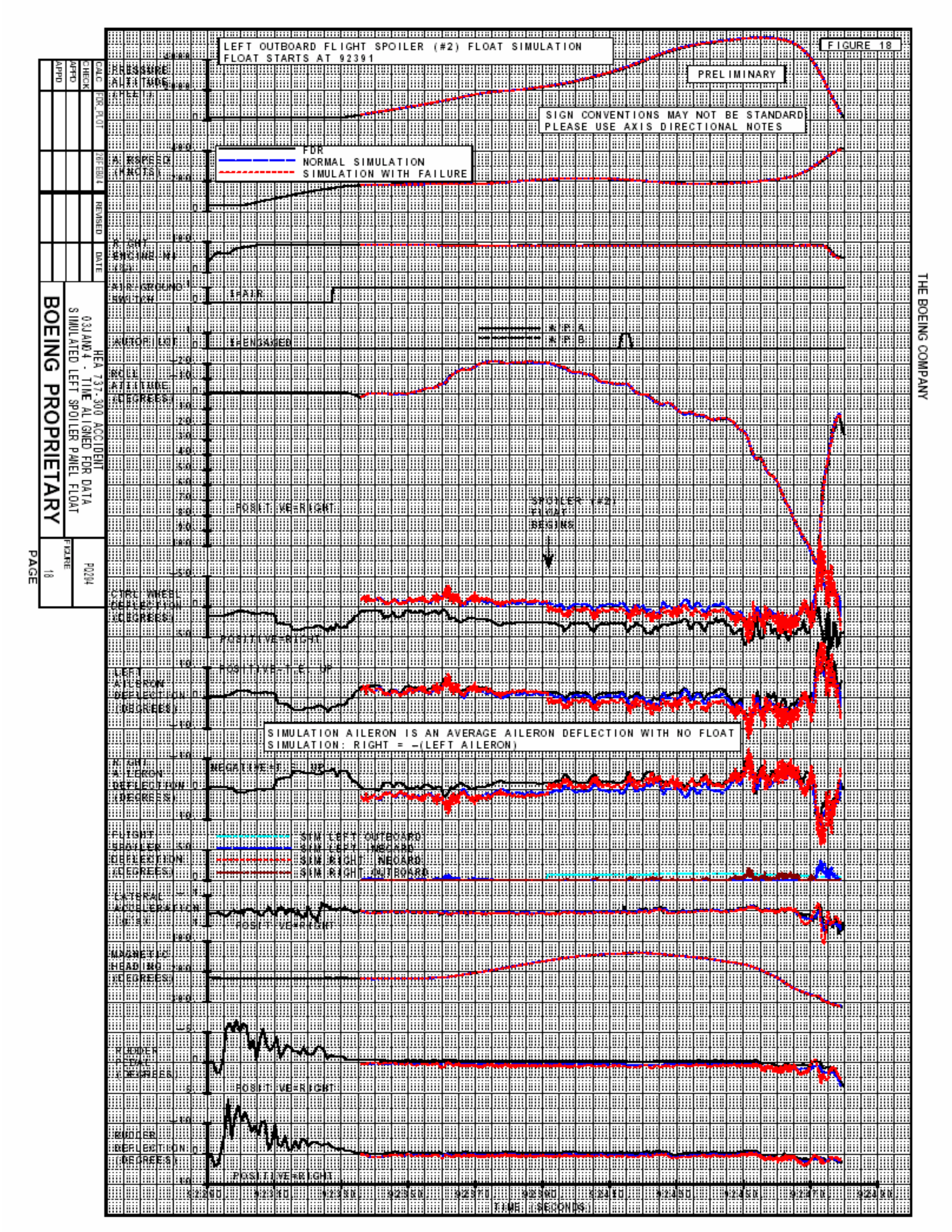


Figure 2.5.13.11b Left outboard flight spoilers (#2) Float simulation (floats starts at 92391) (Lateral)

6.3.5.3 Spoiler Mid-Position Jam

6.3.5.3.1 Scenario 10 - Spoiler wing cable jam
(Spoiler wing cable jam) offset of the neutral position at time 92450 (maximum wheel deflection).and clears at 92472

(Refer to appendix 2-1 lateral control analysis, Table 1 Hypothetical failures scenarios (Ailerons/ Spoilers Systems), Scenario 10)

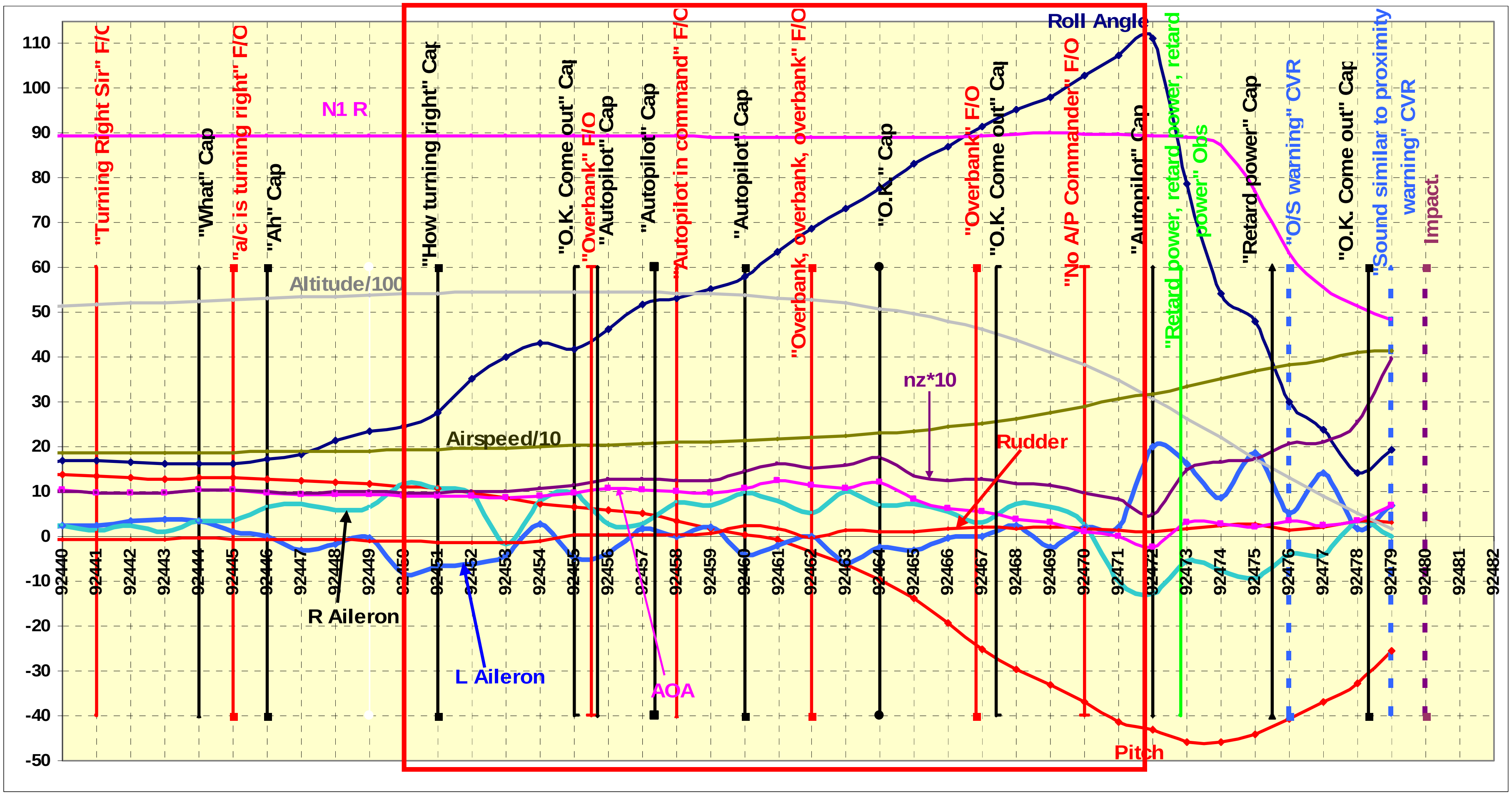


Figure 2.5.13.12 Right roll continues to overbank with ailerons activities (condition F3)

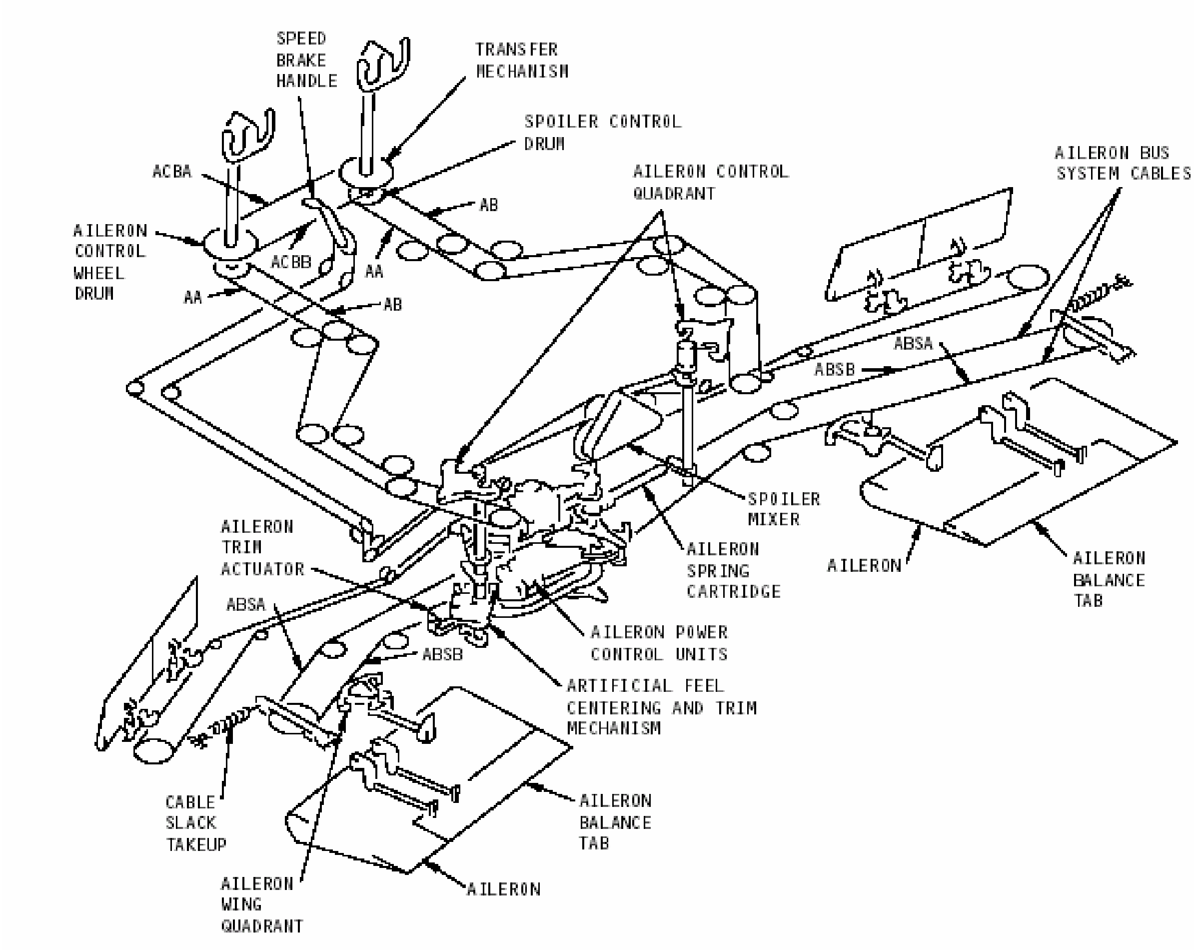


Figure 2.5.13.13 Lateral Control System

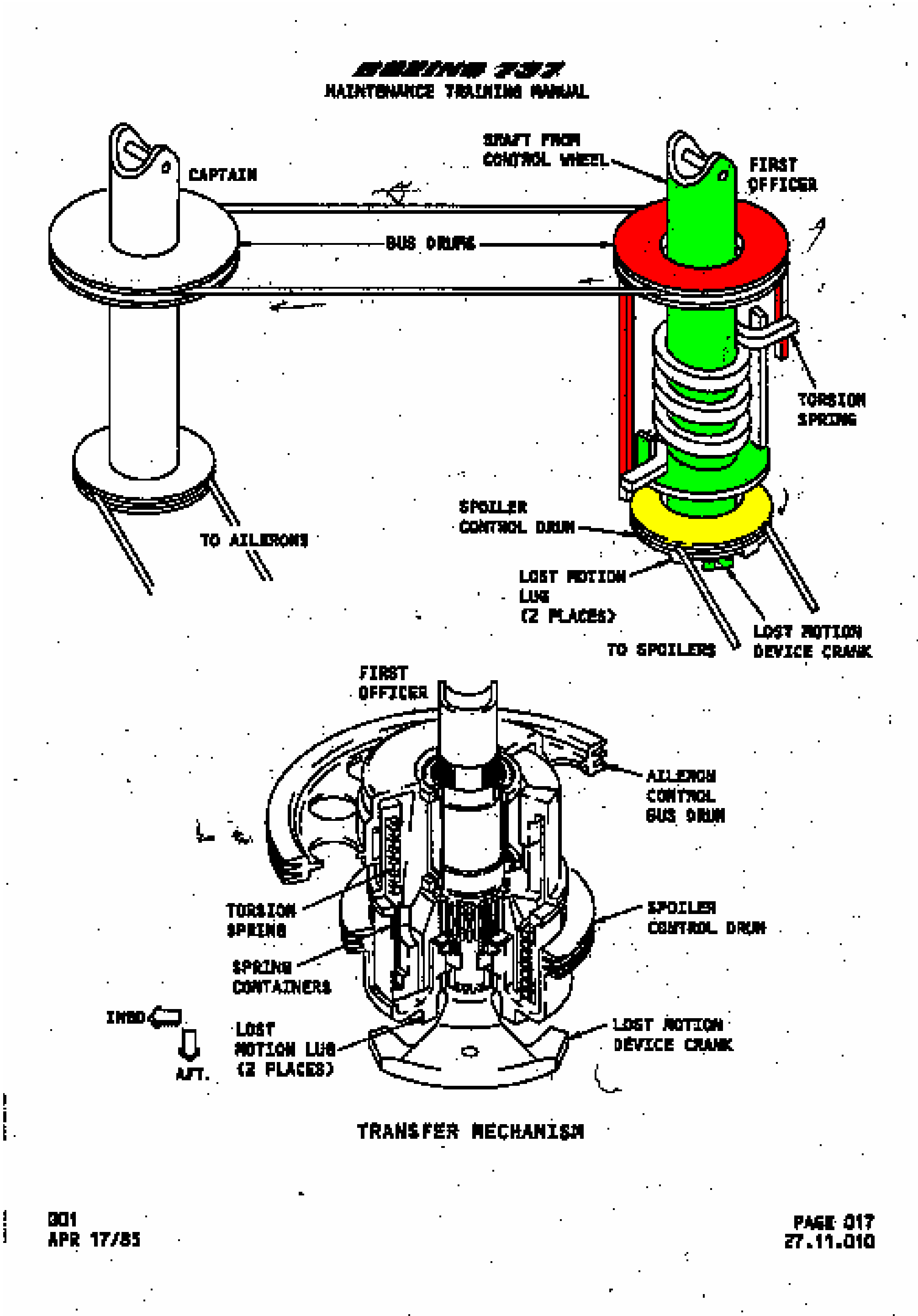


Figure 2.5.13.14 Transfer Mechanism

Assumptions:

- The spoiler wing cable is assumed to jam offset of the neutral position at time 2:44:36 (92450 time frames in seconds). At this time the ailerons and based on the FDR data, the aileron wheels were at their maximum deflections
- The left aileron was at 8.1 degrees TED[2], the right aileron was at 11.8 degrees. The airplane pitch angle was 11.25 degrees. The roll angle was 24.6 degrees (right roll)
- This fault is assumed to be cleared at 2:44:58 (92472 time frames in seconds) (beginning of the recovery effort.

Consequences of the hypothetical failure:

- The spoiler control drum will jam the lost motion device crank offset of the neutral position.
- The ailerons control wheels will, when released (no load condition) move and remain at a position equal to the position at the moment of the jam (about 40 degrees right roll-FDR data) minus 12 degrees (transfer mechanism lost motion), resulting in about 28 degree wheel deflection in the right roll direction.
- “The flight spoilers will remain in the position corresponding to the position of the jammed spoilers wing cables, irrespective of any mechanical inputs from either control wheel (about 12 degrees- FDR data). The ailerons can still be controlled via the captain's wheel. However, movement of aileron wheel towards airplane left turn (to correct for the right bank tendency) will be opposed by the override mechanism spring, consequently the forces required to move the ailerons in this direction will be significantly higher than the normal forces at no fault (about 50 lbs additional force)
- The F/O will not be able to control the ailerons in the direction of airplane left turn, with limited ability to control it in the direction of airplane right turn.
- This fault will not be associated with any visual or audio warning in the cockpit

•

[2] TED= Trailing Edge Down, TEU=Trailing Edge Up

Results of the M-Cab test[3]:

- During the meetings in Cairo on August 05, the MCA asked Boeing to redo simulations of scenarios 10 (spoiler cable jam) with the hypothetical fault inserted at the point of maximum wheel displacement and removed at the beginning of the recovery effort.

- Figure 2.5.13.15a (longitudinal parameters) and Figure 2.5.13.15b (lateral parameters) show the effect of the hypothetical spoiler cable jam fault.

[3] This test was done on Boeing M-Cab, Seattle, Washington

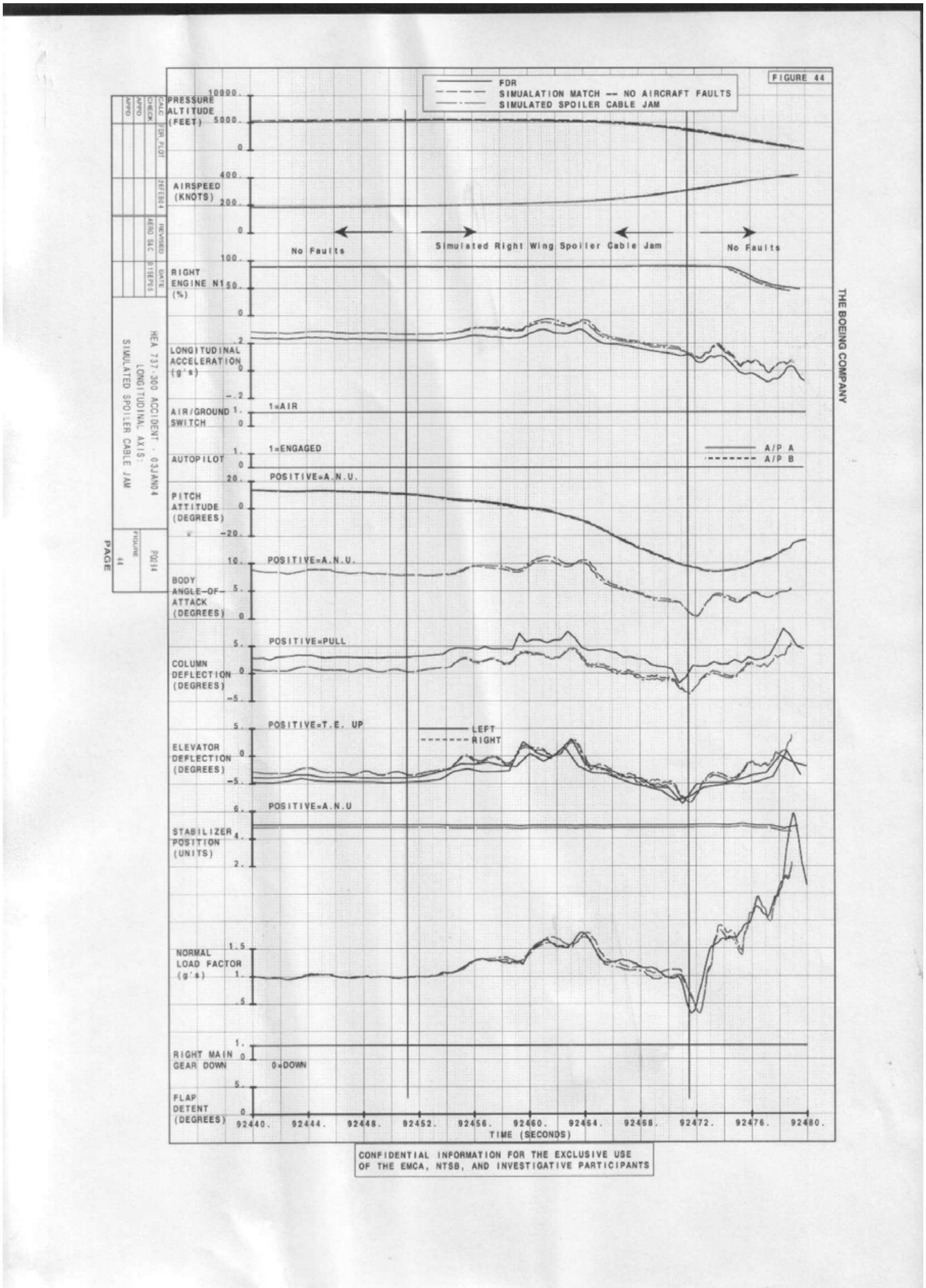


Figure 2.5.13.15a (longitudinal parameters)

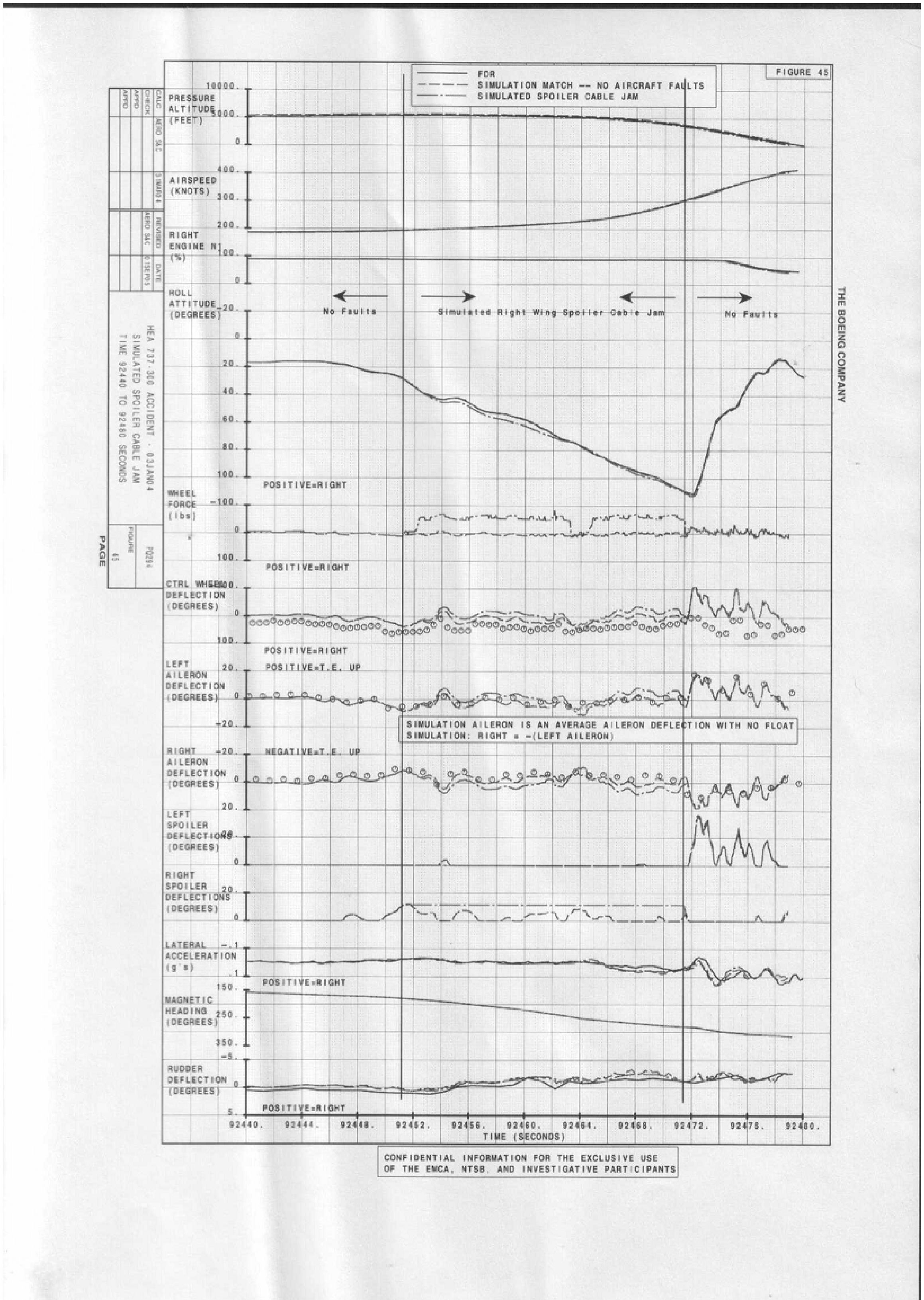


Figure 2.5.13.15b (lateral parameters)

- The simulations take into account the effects of blowdown on the ailerons. However, the blowdown effects on the spoilers are not included because of the way in which these hypothetical faults were simulated. The effects of spoiler blowdown are not expected to be large as spoiler deflections remain below 20 degrees and airspeed during the time of the fault remains below 310 knots.

- The longitudinal plot (Figures Figure 2.5.13.15a) included the following parameters:
    - Press Altitude (Feet)
    - Airspeed (Knots)
    - Right engine N1 (%)
    - Longitudinal acceleration (g's)
    - Air/ Ground switch
    - Autopilot status
    - Pitch attitude (Degrees)
    - Body angle of attack (Degrees)
    - Column deflection (Degrees)
    - Elevator deflection (Degrees)
    - Stabilizer position (Units)
    - Normal load factor (g's)
    - Right main gear down
    - Flap detent (Degrees)

- The lateral plot (Figures Figure 2.5.13.15b) included the following parameters:
    - Press Altitude
    - Airspeed (Knots)
    - Right engine N1 (%)
    - Roll attitude (Degrees)
    - Wheel force (lbs)
    - Control wheel deflection (Degrees)
    - Left aileron deflection (Degrees)
    - Right aileron deflection (Degrees)
    - Left spoiler deflection (Degrees)
    - Right spoiler deflection (Degrees)
    - Lateral acceleration (g's)
    - Magnetic heading (Degrees)
    - Rudder deflection (Degrees)
- All the parameters obtained from the M-Cab test with the fault inserted show very close consistency with the accident flight FDR data

.
- It is expected that wheel forces with higher magnitude can affect the speech pattern

It is noticed that there were no captain speeches when the ailerons were near to their neutral position. Most of the speeches were made at the timing where the ailerons were moving back to their position relevant to spoilers cables jammed condition

This condition could not be ruled out, based on the following:

- *A- The results obtained from the analytical studies and the M-Cab test show a close consistency with the available data.*
- *B- The airplane behavior is consistent with the consequences of the hypothetical fault:*
    - The ailerons movements towards airplane right roll are highly consistent with the expected position resulted from this hypothetical fault.
    - This fault always drive the airplane in the right roll direction
    - Movement of the aileron surfaces as shown in the FDR towards the neutral position are consistent with captain attempts to control the airplane attitude with the existence of the failure, the rate of airplane rolling to the right is always reduced with these attempts. The forces required to move the ailerons by the captain are considerably higher than the forces required in normal condition with no fault.
    - Whenever the captain control wheel is released, the ailerons move towards the offset position showing high consistency with the fault existence. The fault was continually driving the airplane towards more right roll
    - The movements of the ailerons throughout the last recovery phase highly support this scenario.
    - In the analysis in section 2.5.11 studying the chronological event where the airplane stopped the left turn and started a right turn at about 92420, the pilot input probability was not ruled out as one of the possible causes for this event. This input might be due to temporary loss of Situational Awareness. This explains how the airplane got to the point in the right roll at which the temporary jams supposedly occurred.
    - It is expected that wheel forces with higher magnitude can affect the speech pattern, however, it is noticed that there were no captain speeches when the ailerons were

near to their neutral position, most of the speeches were made at the timing where the ailerons were moving back to their position relevant to spoilers cables jammed condition. The timing and length of the Captain speeches through this event does not provide sufficient information to verify the effect of this force on the speech tone

- Crew behavior shows consistency

- 6.3.5.3.2 Scenario 10a - F/O wheel jam

(F/O wheel jam) offset of the neutral position at time 92450 (maximum wheel deflection).and clears at 92472

(Refer to appendix 2-1 lateral control analysis, Table 1 Hypothetical failures scenarios (Ailerons/ Spoilers Systems), Scenario 10a)

Assumptions:

- The F/O wheel is assumed to jam offset of the neutral position at time 2:44:36 (92450 time frames in seconds). At this time, and based on the FDR data, the aileron wheels were at their maximum deflections
- The left aileron was at 8.1 degrees TED, the right aileron was at 11.8 degrees. The airplane pitch angle was 11.25 degrees. The roll angle was 24.6 degrees (right roll)
- This fault is assumed to be cleared at 2:44:58 (92472 time frames in seconds) (beginning of the recovery effort.

Consequences of the the hypothetical failure:

- The F/O aileron control wheel will jam at a position offset of the neutral position relevant to the position of the jammed shaft.
- The ailerons control wheels will, <u>when released (no load condition)</u> remain at a position equal to the position at the moment of the jam (about 40 degrees right roll-FDR data). This corresponds to about 10 degrees of aileron deflections
- The flight spoilers will remain in the position corresponding to the position of the jammed spoilers wing cables (about 12 degrees- FDR data), however the captain will have a limited control on the spoilers within the transfer mechanism lost motion gap (± 12 degree) of aileron wheel deflection. (After 12 degrees of wheel rotation, the spoiler control drum lost motion lug will contact the lost motion device crank on the F/O control wheel shaft, preventing any further movement of the spoiler control drum. The spring cartridge will compensate for the continuing inputs from the ailerons bus drums).
- The ailerons can still be controlled via the captain's wheel. However, movement of aileron wheel in

either directions will be opposed by the override mechanism spring, consequently the forces required to move the ailerons in both directions will be significantly higher than the normal forces at no fault (about 50 lbs additional force)

- The F/O will not be able to control the ailerons nor the spoilers in either direction.
- This fault will not be associated with any visual or audio warning in the cockpit

Results of the M-Cab test[4]:

- Figure 2.5.13.15a (longitudinal parameters) and Figure 2.5.13.15b (lateral parameters) show the effect of the hypothetical spoiler cable jam fault.

[4] This test was done on Boeing M-Cab, Seattle, Washington

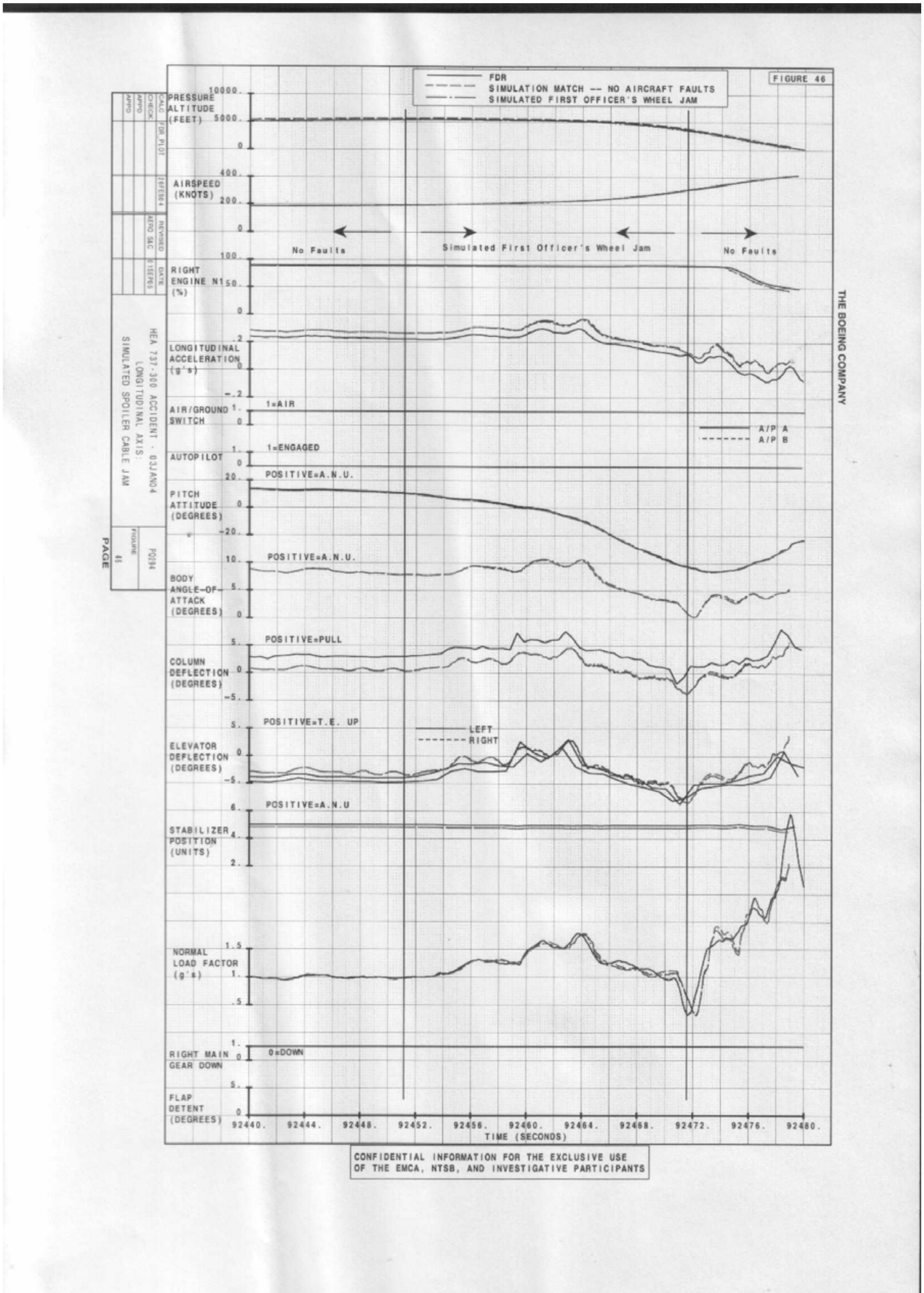


Figure 2.5.13.16a (longitudinal parameters)

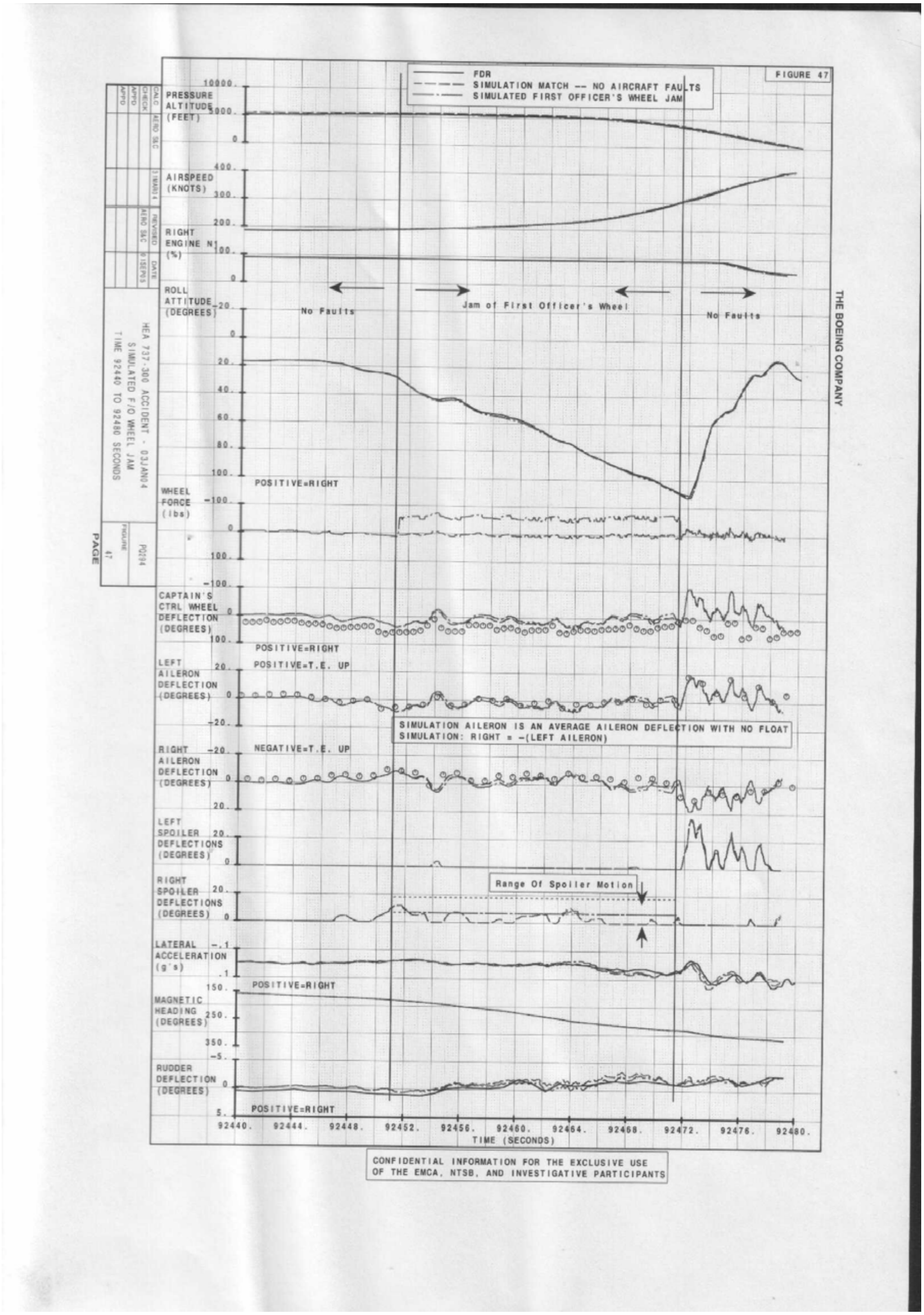


Figure 2.5.13.16b (lateral parameters

- In this scenario, the jam restricts further motion of the spoilers to the range of the lost motion device. Figure 2.5.13.15b shows that the right wing spoilers are limited to the range of 7 to about 17 degrees and the left wing spoilers are restricted to 0 degrees. The ailerons can still be controlled via the captain's wheel. There is an immediate significant increase in wheel force as the captain must overcome the spring force of the transfer mechanism.

- Both simulations take into account the effects of blowdown on the ailerons. However, the blowdown effects on the spoilers are not included because of the way in which these hypothetical faults were simulated. The effects of spoiler blowdown are not expected to be large as spoiler deflections remain below 20 degrees and airspeed during the time of the fault remains below 310 knots.

  Both figures include the wheel force required to overcome the transfer mechanism in the presence of the jam. It is significant to note that the force frequently exceeds 50 lbs.

- The longitudinal plot (Figure 2.5.13.16a) included the following parameters:
  - Press Altitude (Feet)
  - Airspeed (Knots)
  - Right engine N1 (%)
  - Longitudinal acceleration (g’s)
  - Air/ Ground switch
  - Autopilot status
  - Pitch attitude (Degrees)
  - Body angle of attack (Degrees)
  - Column deflection (Degrees)
  - Elevator deflection (Degrees)
  - Stabilizer position (Units)
  - Normal load factor (g’s)
  - Right main gear down
  - Flap detent (Degrees)

- The longitudinal plot (Figure 2.5.13.16b) included the following parameters:
  - Press Altitude
  - Airspeed (Knots)
  - Right engine N1 (%)
  - Roll attitude (Degrees)
  - Wheel force (lbs)
  - Control wheel deflection (Degrees)
  - Left aileron deflection (Degrees)

- Right aileron deflection (Degrees)
- Left spoiler deflection (Degrees)
- Right spoiler deflection (Degrees)
- Lateral acceleration (g's)
- Magnetic heading (Degrees)
- Rudder deflection (Degrees)

- All the parameters obtained from the M-Cab test with the fault inserted show very close consistency with the accident flight FDR data

- It is expected that wheel forces with higher magnitude can affect the speech pattern

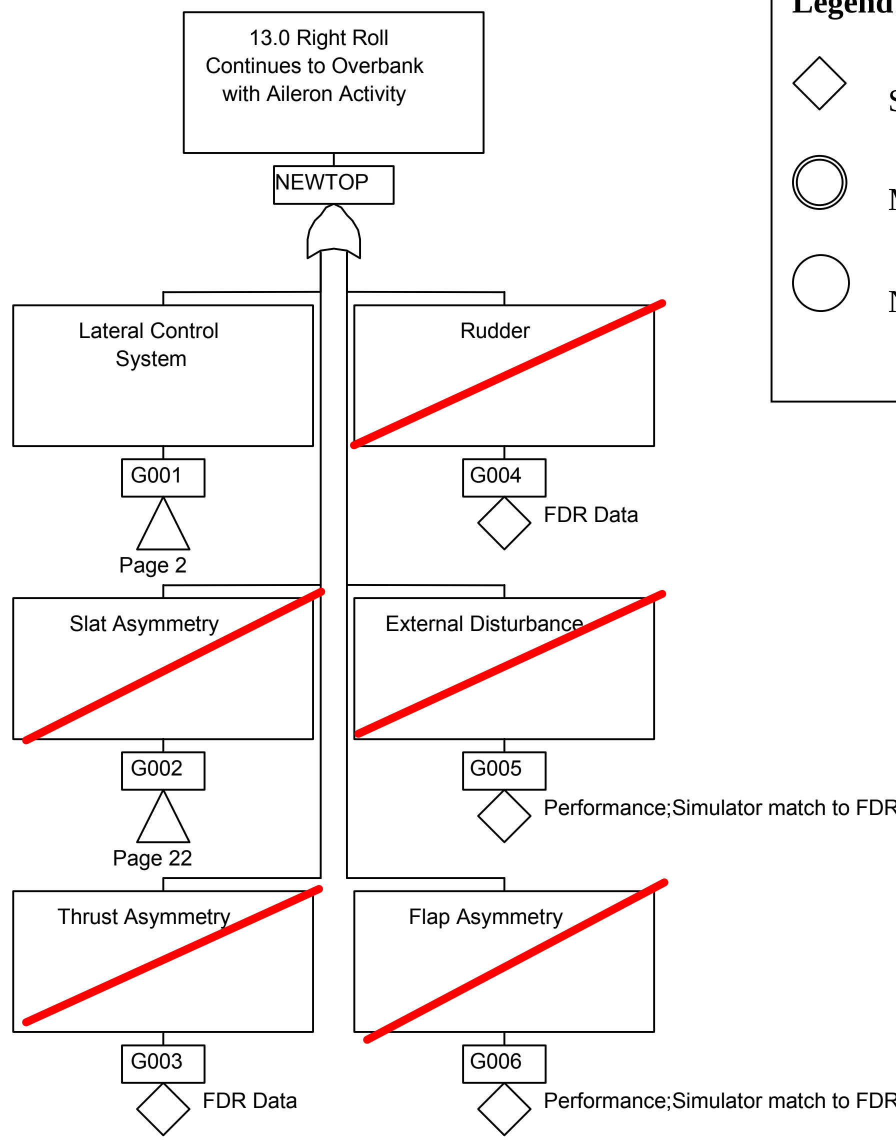
It is noticed that there were no captain speeches when the ailerons were near to their neutral position. Most of the speeches were made at the timing where the ailerons were moving back to their position relevant to spoilers cables jammed condition

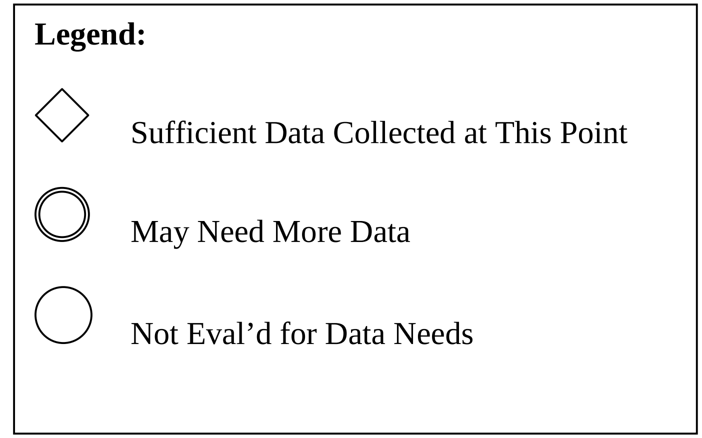
This condition could not be ruled out, based on the following:

A. The results obtained from the analytical studies and the M-Cab test show a close consistency with the available data.
B. The airplane behavior is consistent with the consequences of the hypothetical fault:

    - The ailerons movements towards airplane right roll are highly consistent with the expected position resulted from this hypothetical fault.
    - This fault always drive the airplane in the right roll direction
    - Movement of the aileron surfaces as shown in the FDR towards the neutral position are consistent with captain attempts to control the airplane attitude with the existence of the failure, the rate of airplane rolling to the right is always reduced with these attempts. The forces required to move the ailerons by the captain are considerably higher than the forces required in normal condition with no fault.
    - Whenever the captain control wheel is released, the ailerons move towards the offset position showing high consistency with the fault existence. The fault was continually driving the airplane towards more right roll
    - The movements of the ailerons throughout the last recovery phase highly support this scenario.

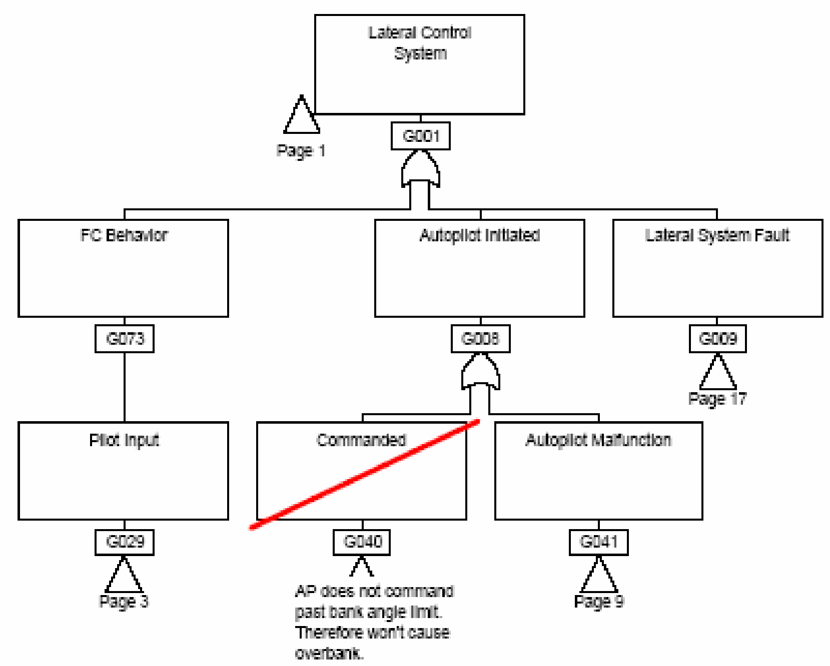
- In the analysis in section 2.5.11 studying the chronological event where the airplane stopped the left turn and started a right turn at about 92420, the pilot input probability was not ruled out as one of the possible causes for this event. This input might be due to momentarily loss of Situational Awareness. This explains how the airplane got to the point in the right roll at which the temporary jams supposedly occurred.
- It is expected that wheel forces with higher magnitude can affect the speech pattern, however, it is noticed that there were no captain speeches when the ailerons were near to their neutral position, most of the speeches were made at the timing where the ailerons were moving back to their position relevant to spoilers cables jammed condition. The timing and length of the Captain speeches through this event does not provide sufficient information to verify the effect of this force on the speech tone
- Crew behavior shows consistency





Cairo 4 Feb 05

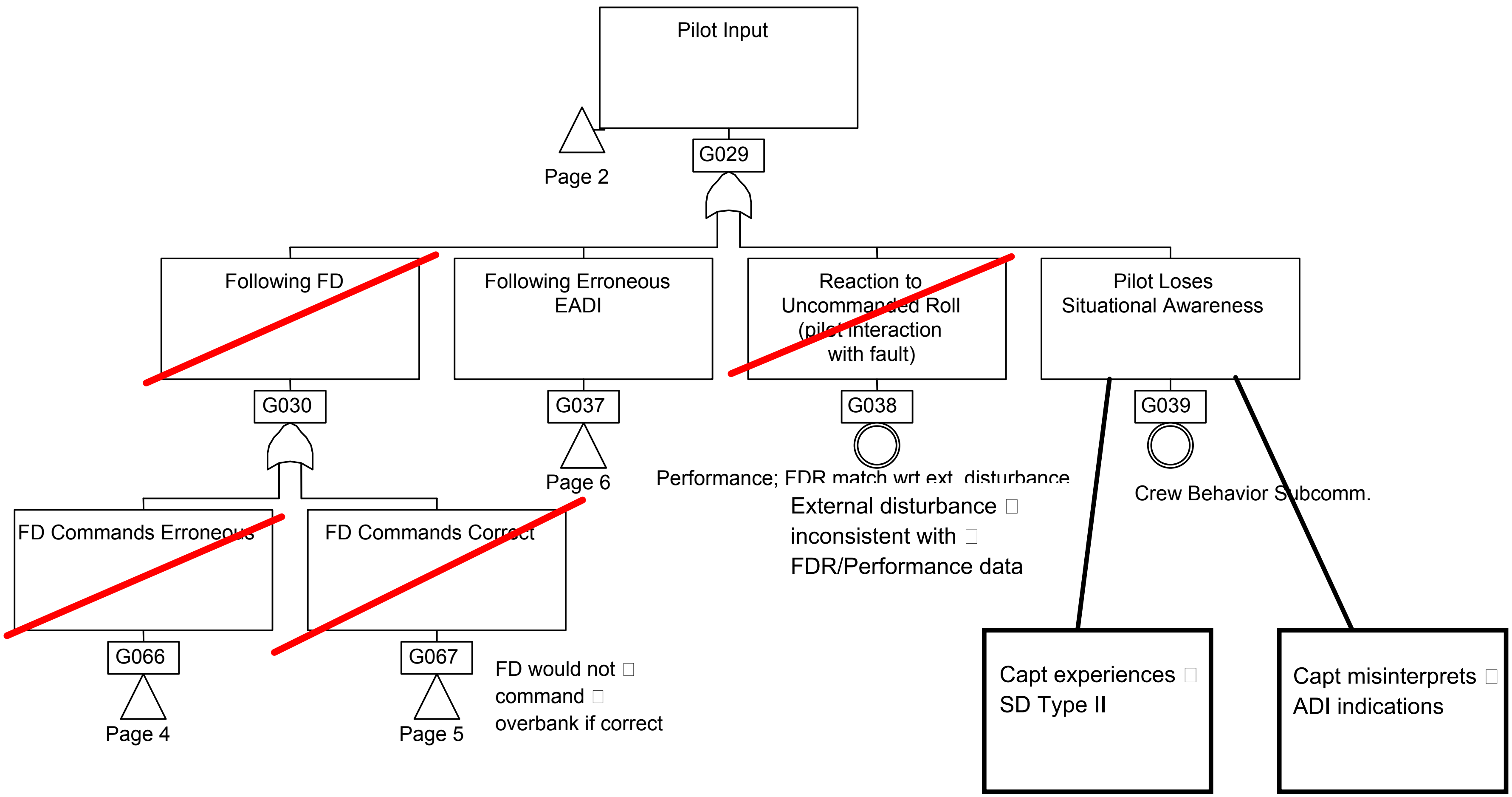
13.0 Right Roll Continues to Overbank with Aileron Activity



Cairo 4 Feb 05

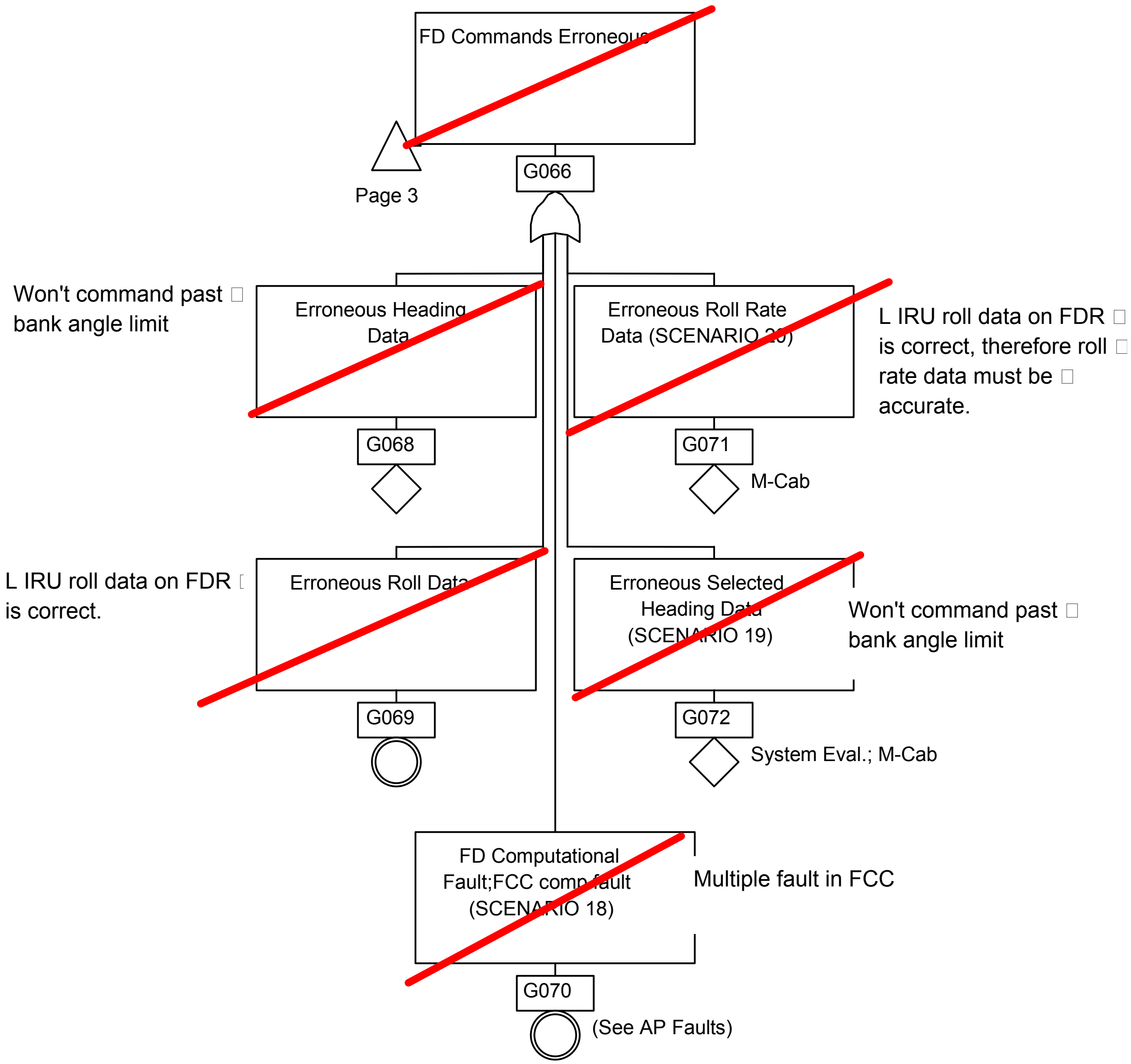
13.0 Right Roll Continues to Overbank with Aileron Activity

N.B.
For the "Lateral System Fault" block, See Appendix 2-1 lateral control analysis



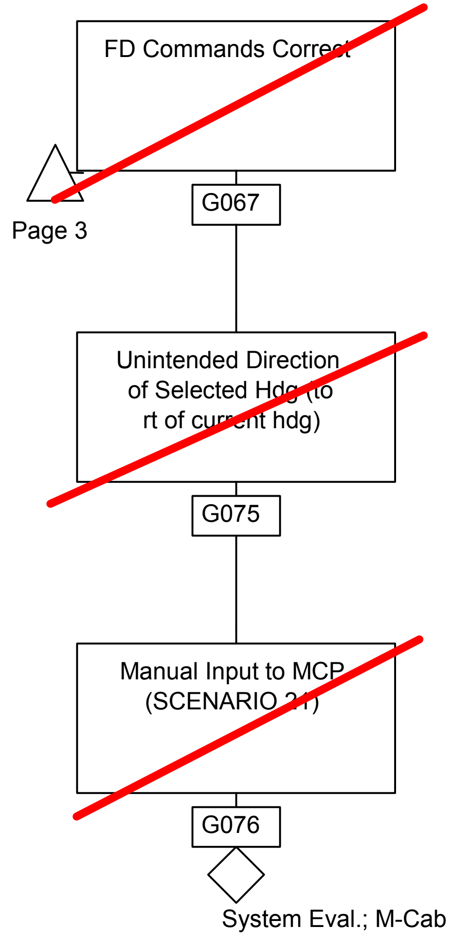
Cairo 26 Aug 05

13.0 Right Roll Continues to Overbank with Aileron Activity

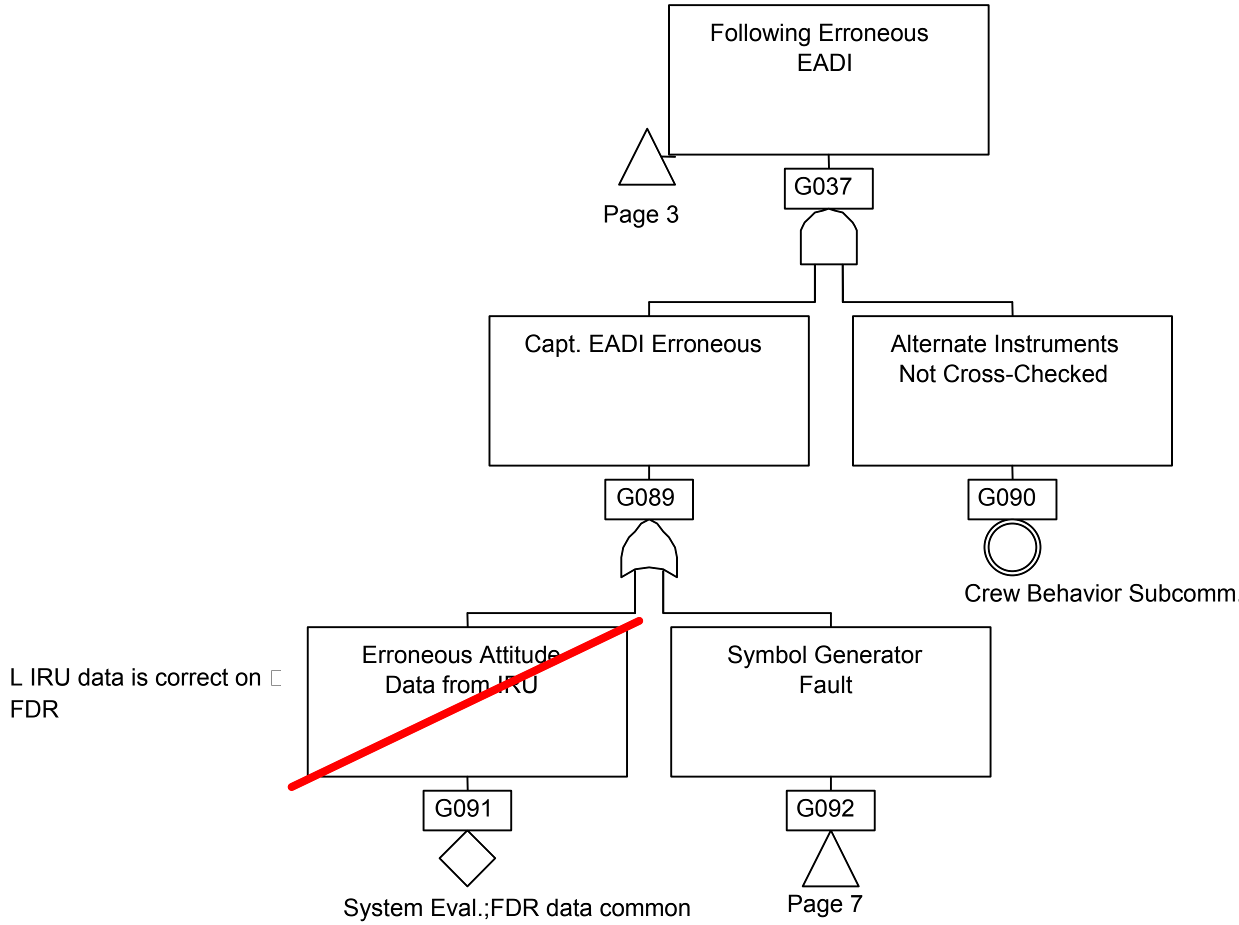


Cairo 4 Feb 05

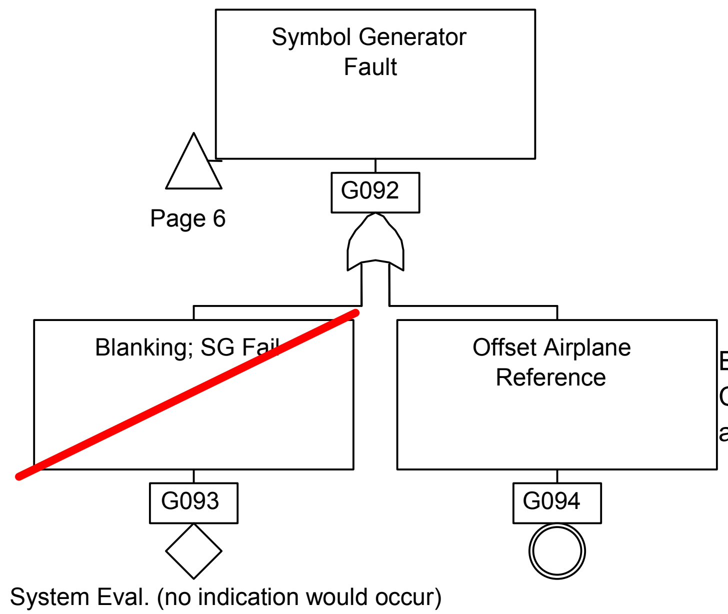
13.0 Right Roll Continues to Overbank with Aileron Activity



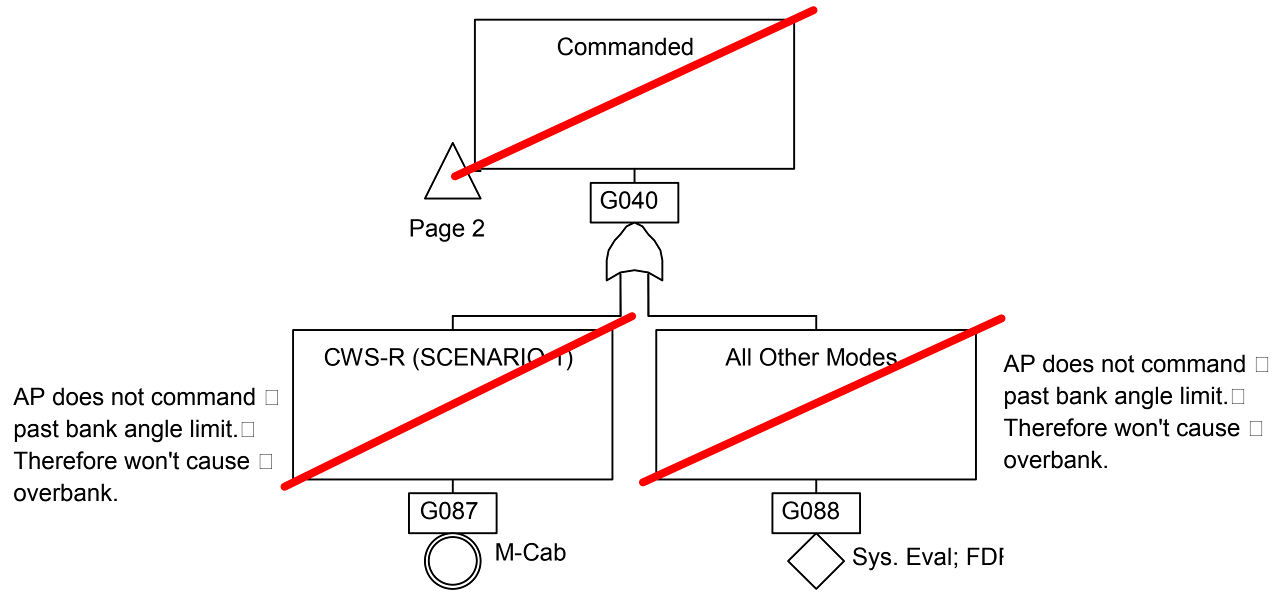
13.0 Right Roll Continues to Overbank with Aileron Activity



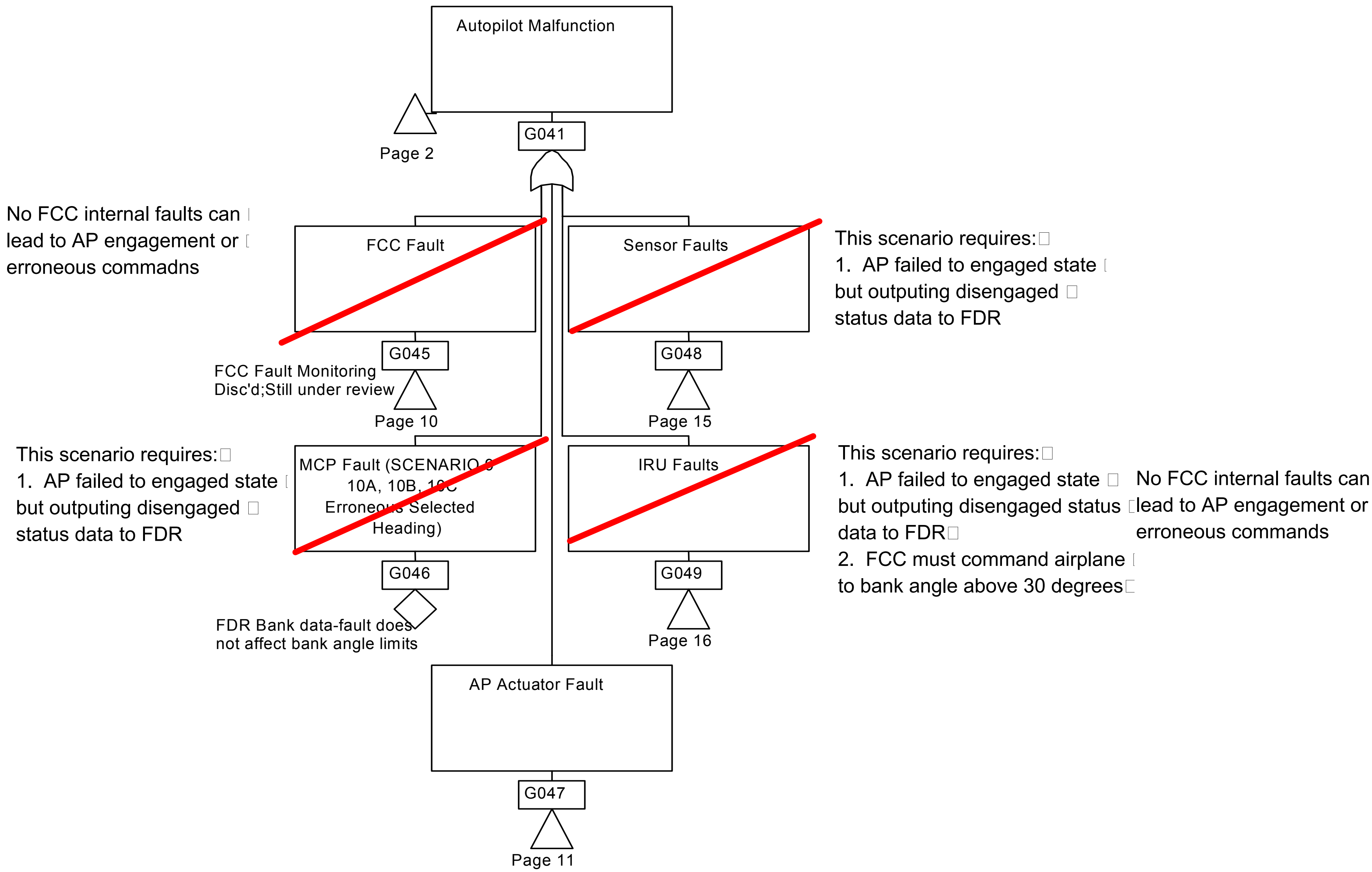
Cairo 4 Feb 05



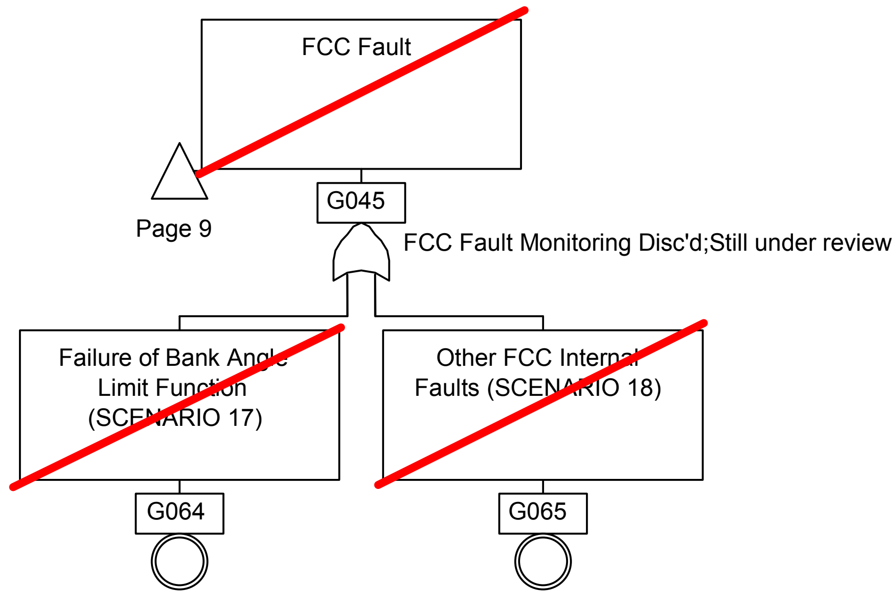
Boeing to ask Rockwell Collins if this fault can actually occur.



13.0 Right Roll Continues to Overbank with Aileron Activity

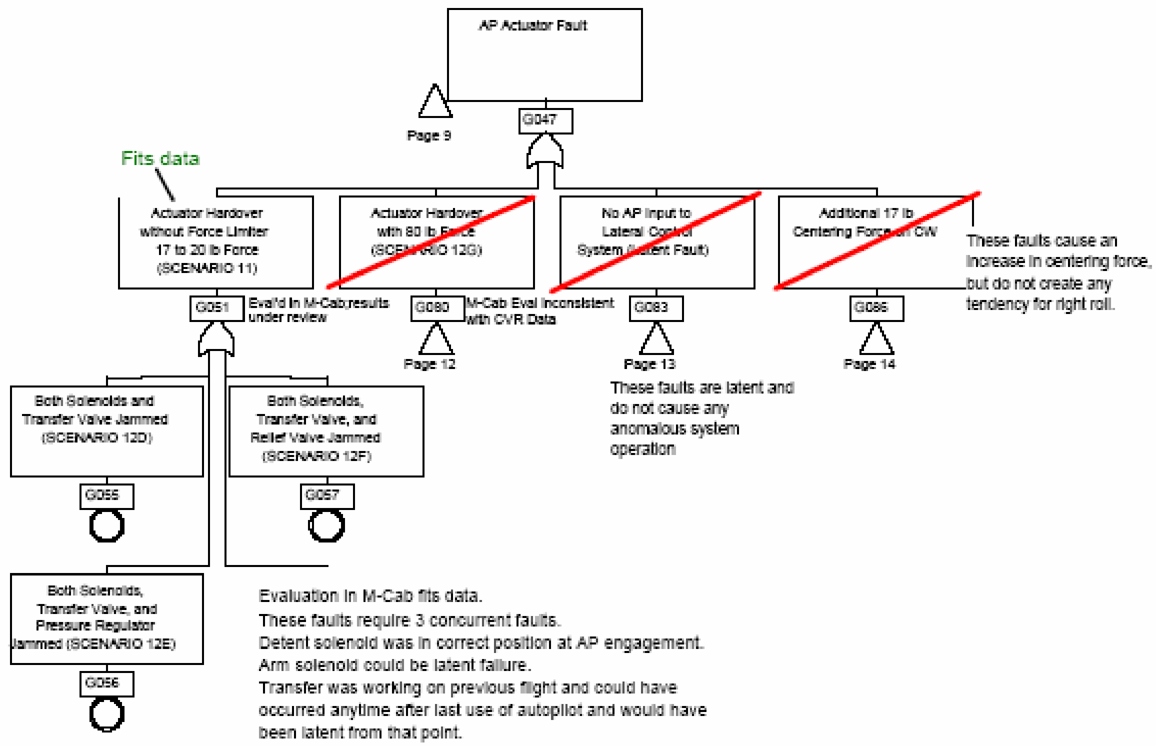


13.0 Right Roll Continues to Overbank with Aileron Activity



Cairo 4 Feb 05

13.0 Right Roll Continues to Overbank with Aileron Activity

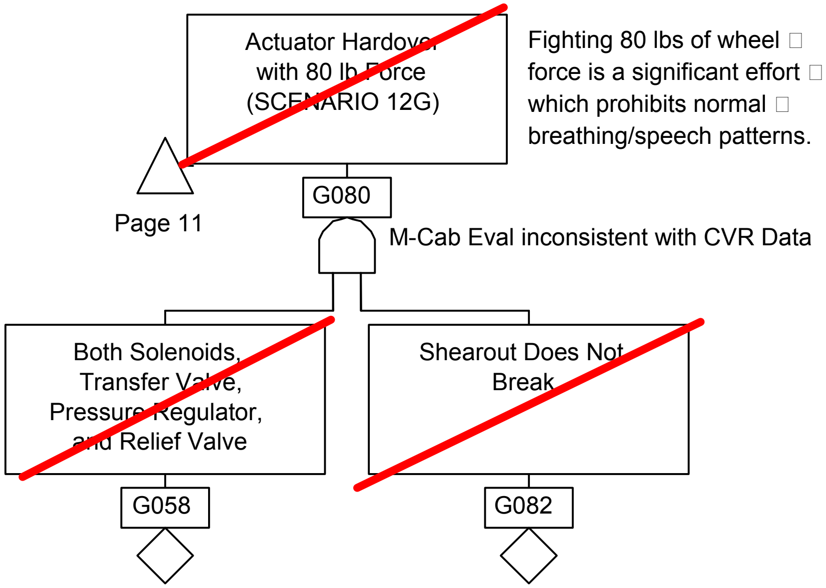


Cairo 4 Feb 05

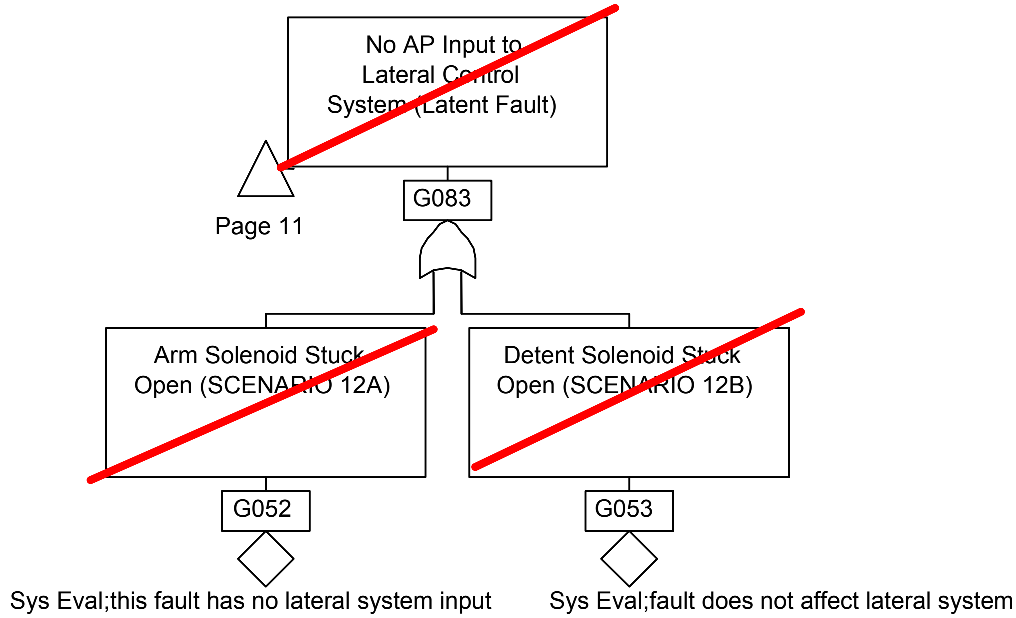
13.0 Right Roll Continues to Overbank with Aileron Activity

N.B.

For the "Actuator Hardover without Force Limiter 17 to 20 lb Force (SCENARIO 11)" block, See Appendix 2-1 lateral control analysis

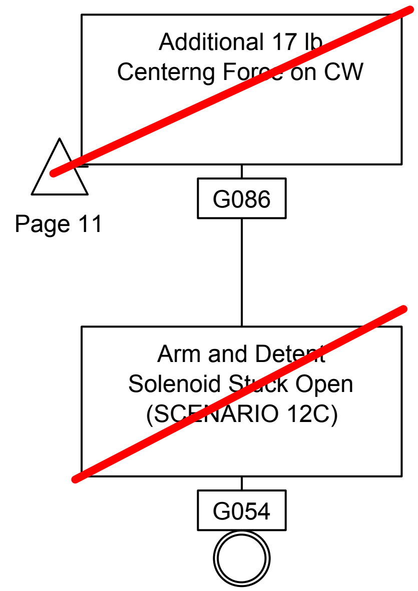


13.0 Right Roll Continues to Overbank with Aileron Activity



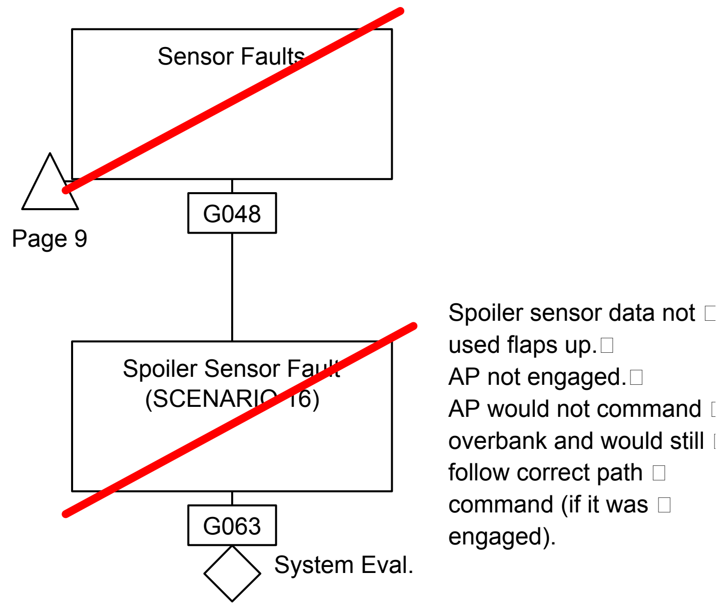
Cairo 4 Feb 05

13.0 Right Roll Continues to Overbank with Aileron Activity



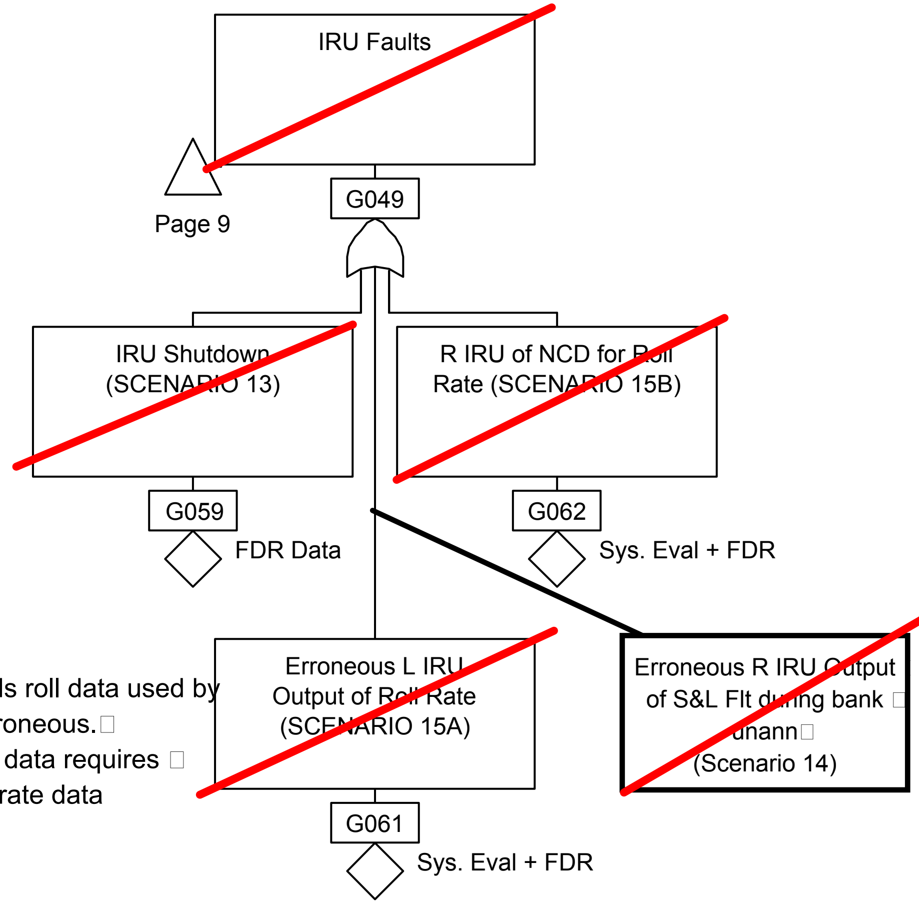
Cairo 4 Feb 05

13.0 Right Roll Continues to Overbank with Aileron Activity



Cairo 4 Feb 05

13.0 Right Roll Continues to Overbank with Aileron Activity



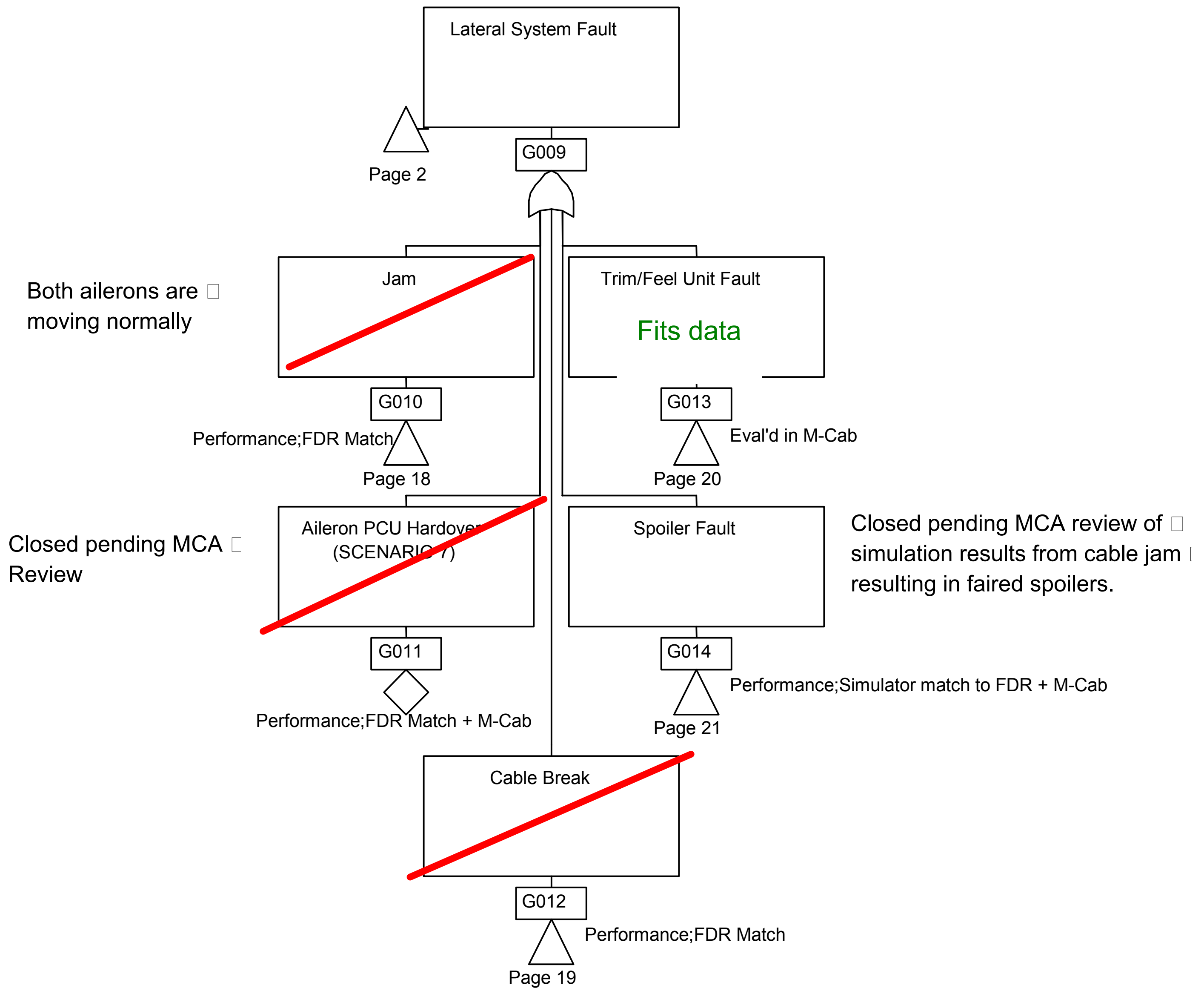
FDR records roll data used by FD - not erroneous.
Correct roll data requires correct roll rate data

This scenario requires-
1 AP failed to engaged state but outputing disengaged status data to FDR.
2 Internal faults within IRU that allow incorrect roll data to be transmitted to FCC, EADI

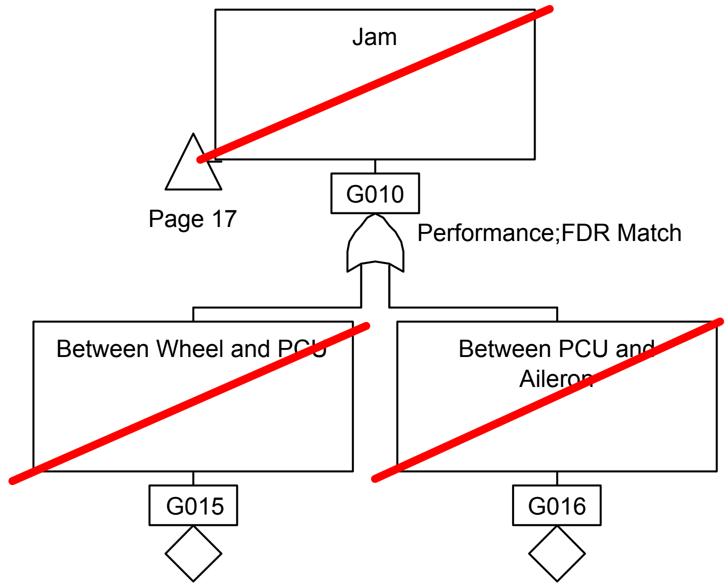
Would result in:
1 AP actuator hardover.
2 Capt FD would provice correct steering cues
3 FO EADI would display S&L flight
("Overbank annunciations must therefore be based on some other source")
4 FO FD would display erroneous steering cues
5 Roll comparator annunciated

Cairo 4 Feb 05

13.0 Right Roll Continues to Overbank with Aileron Activity

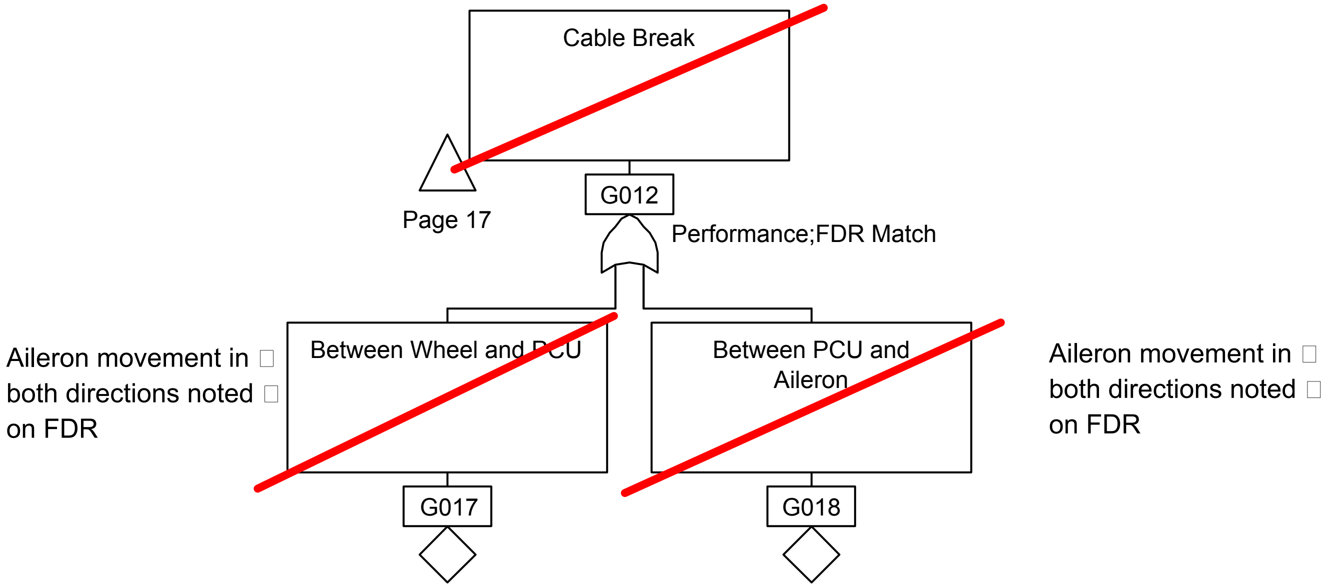


13.0 Right Roll Continues to Overbank with Aileron Activity



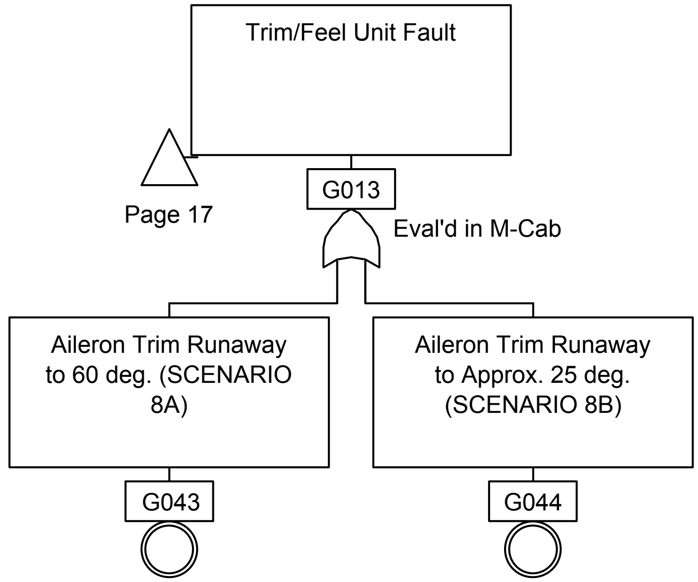
Cairo 4 Feb 05

13.0 Right Roll Continues to Overbank with Aileron Activity



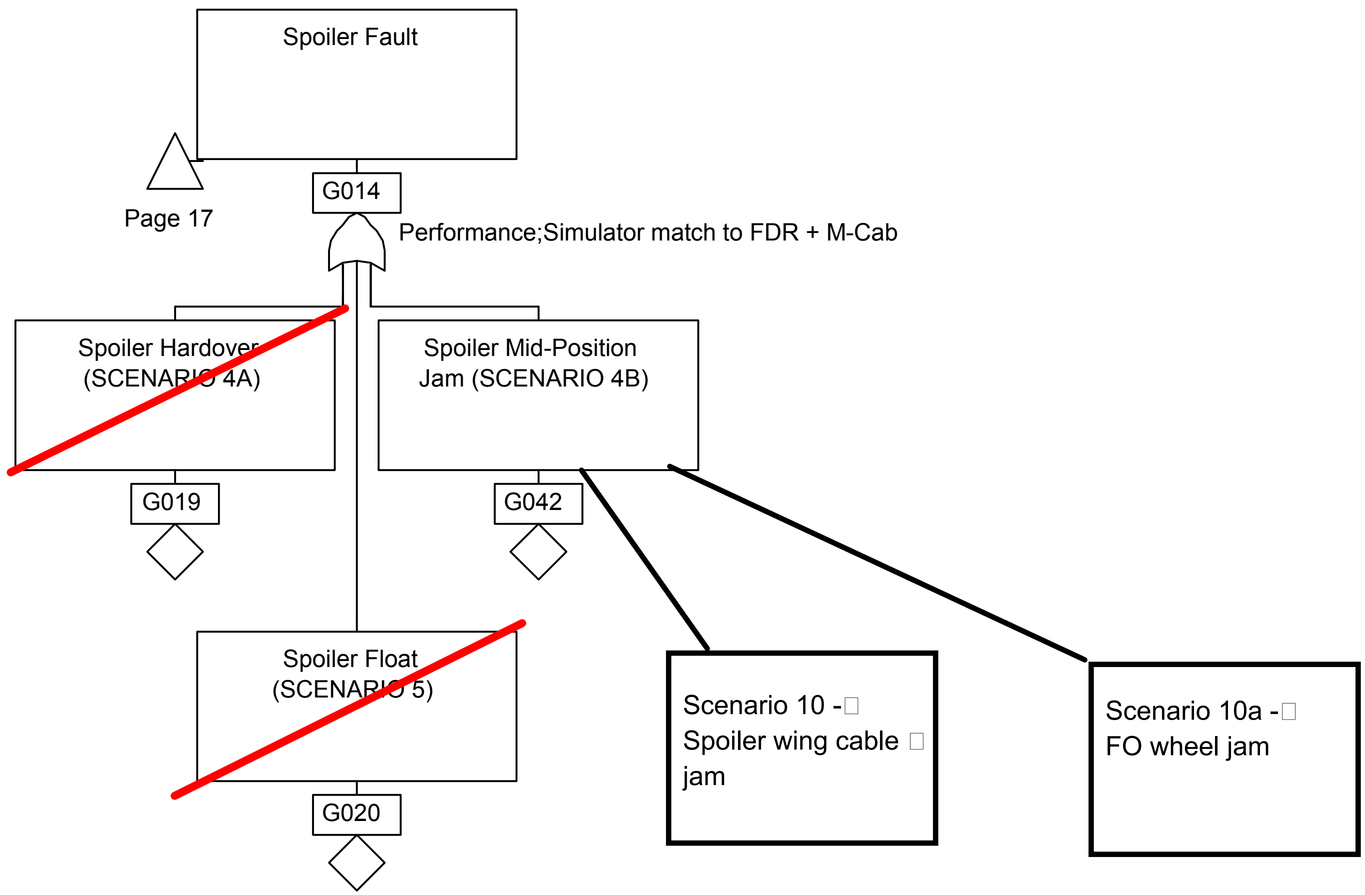
Cairo 4 Feb 05

13.0 Right Roll Continues to Overbank with Aileron Activity



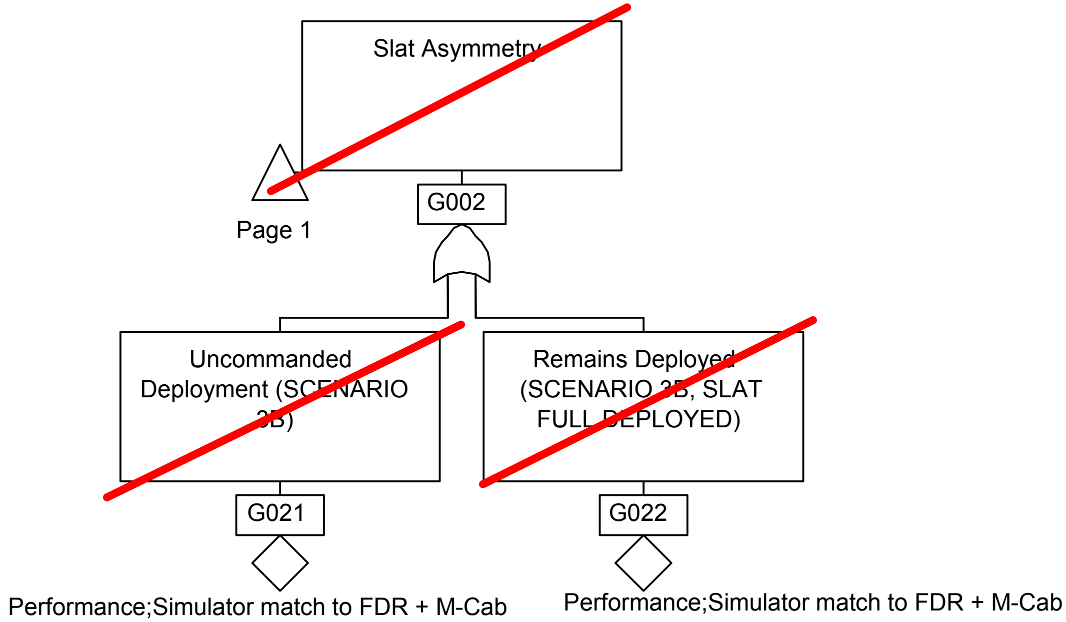
Evalutation in M-Cab fits data.
However, trim fault must have occurred after autopilot engagement (zero force, zero aileron engagement indicates zero trim at that point).

Review ROV videos for trim actuator.



Cairo 26 Aug 05

13.0 Right Roll Continues to Overbank with Aileron Activity



Cairo 4 Feb 05

13.0 Right Roll Continues to Overbank with Aileron Activity

2.5.14 Flight crew CVR autopilot announcements

The following Figure shows the related FDR and CVR events

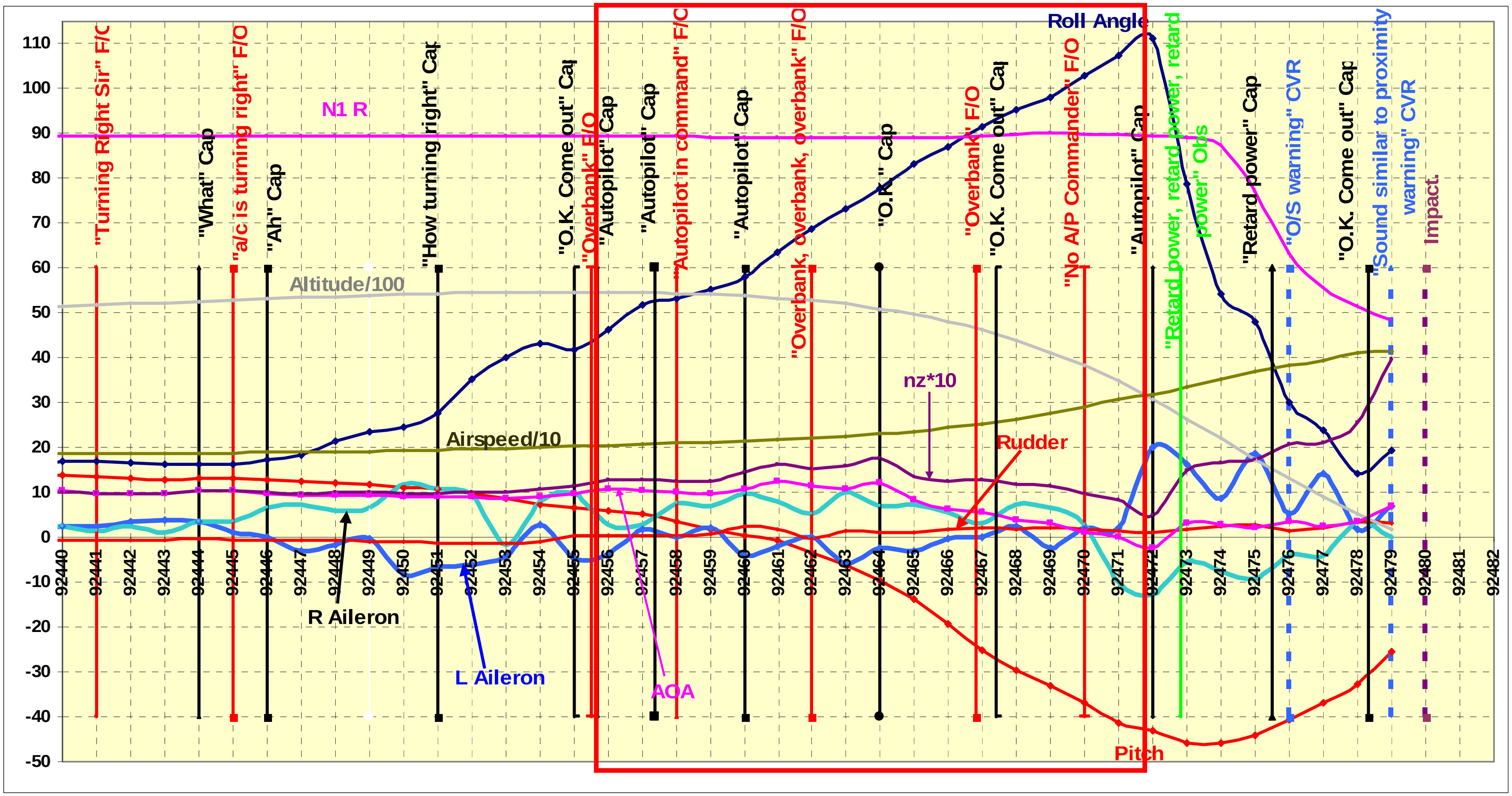


Figure 2.5.14.1 Flight crew CVR autopilot announcements

Flight crew CVR autopilot announcements might be explained by the following[1]:

1. Requests for Autopilot Engagement
   This scenario is consistent with expected normal airplane operation. If the Captain asked for autopilot and the F/O pressed the CMD button, the interlocks would not be satisfied because of forces on the control wheel. In this case, the button push is not recorded as an autopilot engagement on the FDR.
   (Done on M-Cab)

2. Announcement of Autopilot Status (Announcement of "Autopilot in Command" made by the F/O):
   This might be explained by one of the following possibilities:
   1. The statement was made automatic on button push without confirmation
   2. F/O thought autopilot was engaged
   3. F/O made mistake

3. Announcement of "No autopilot commander" made by the F/O:
   This announcement indicates that the F/O believed, to at least mean, that autopilot was not currently in operation.

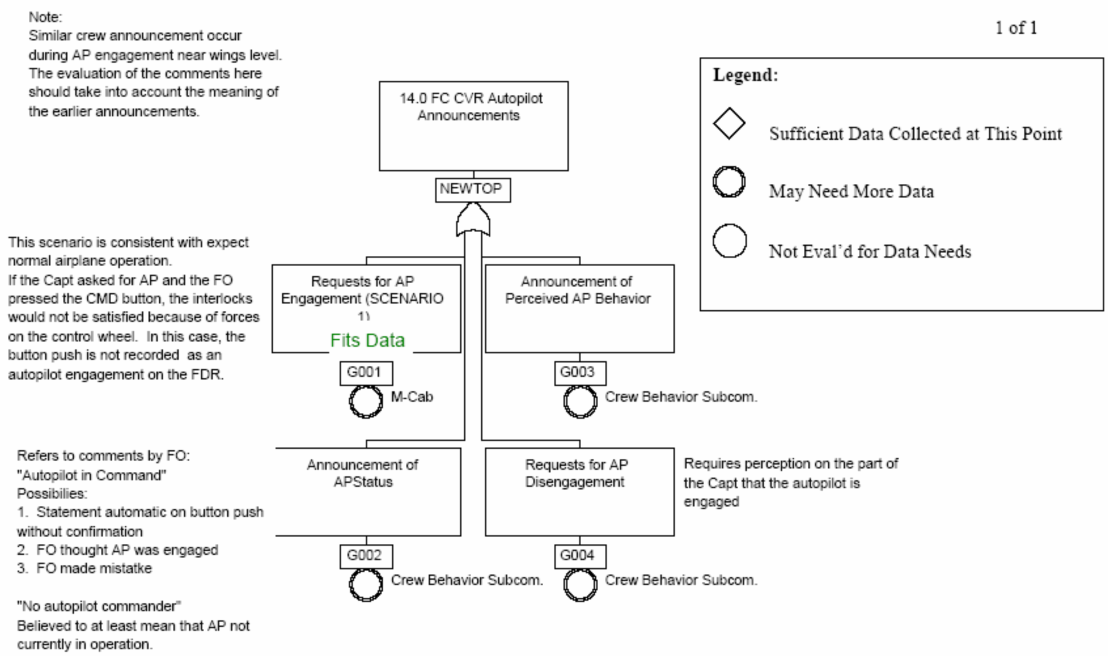
4. Announcement of Perceived Autopilot Behavior

5. Requests for Autopilot Disengagement
   This condition requires perception on the part of the Captain that the autopilot is engaged

It is to be noticed that similar crew announcement occur during autopilot engagement near wings level. The evaluation of the comments here should take into account the meaning of the earlier announcements.

The investigation could not determine a higher possibility to any of the above conditions based on the given data.

[1] See section 2.6 Human performance analysis


Note:
Similar crew announcement occur during AP engagement near wings level. The evaluation of the comments here should take into account the meaning of the earlier announcements.
14.0 FC CVR Autopilot Announcements
NEWTOP
Legend:
Sufficient Data Collected at This Point
May Need More Data
Not Eval'd for Data Needs
This scenario is consistent with expect normal airplane operation.
If the Capt asked for AP and the FO pressed the CMD button, the interlocks would not be satisfied because of forces on the control wheel. In this case, the button push is not recorded as an autopilot engagement on the FDR.
Requests for AP Engagement (SCENARIO 1)
Fits Data
G001
M-Cab
Announcement of Perceived AP Behavior
G003
Crew Behavior Subcom.
Refers to comments by FO:
"Autopilot in Command"
Possibilies:
1. Statement automatic on button push without confirmation
2. FO thought AP was engaged
3. FO made mistatke
"No autopilot commander"
Believed to at least mean that AP not currently in operation.
Announcement of APStatus
G002
Crew Behavior Subcom.
Requests for AP Disengagement
G004
Crew Behavior Subcom.
Requires perception on the part of the Capt that the autopilot is engaged

2.5.15 Rapid left roll towards wings level

The following figure shows the related FDR and CVR data

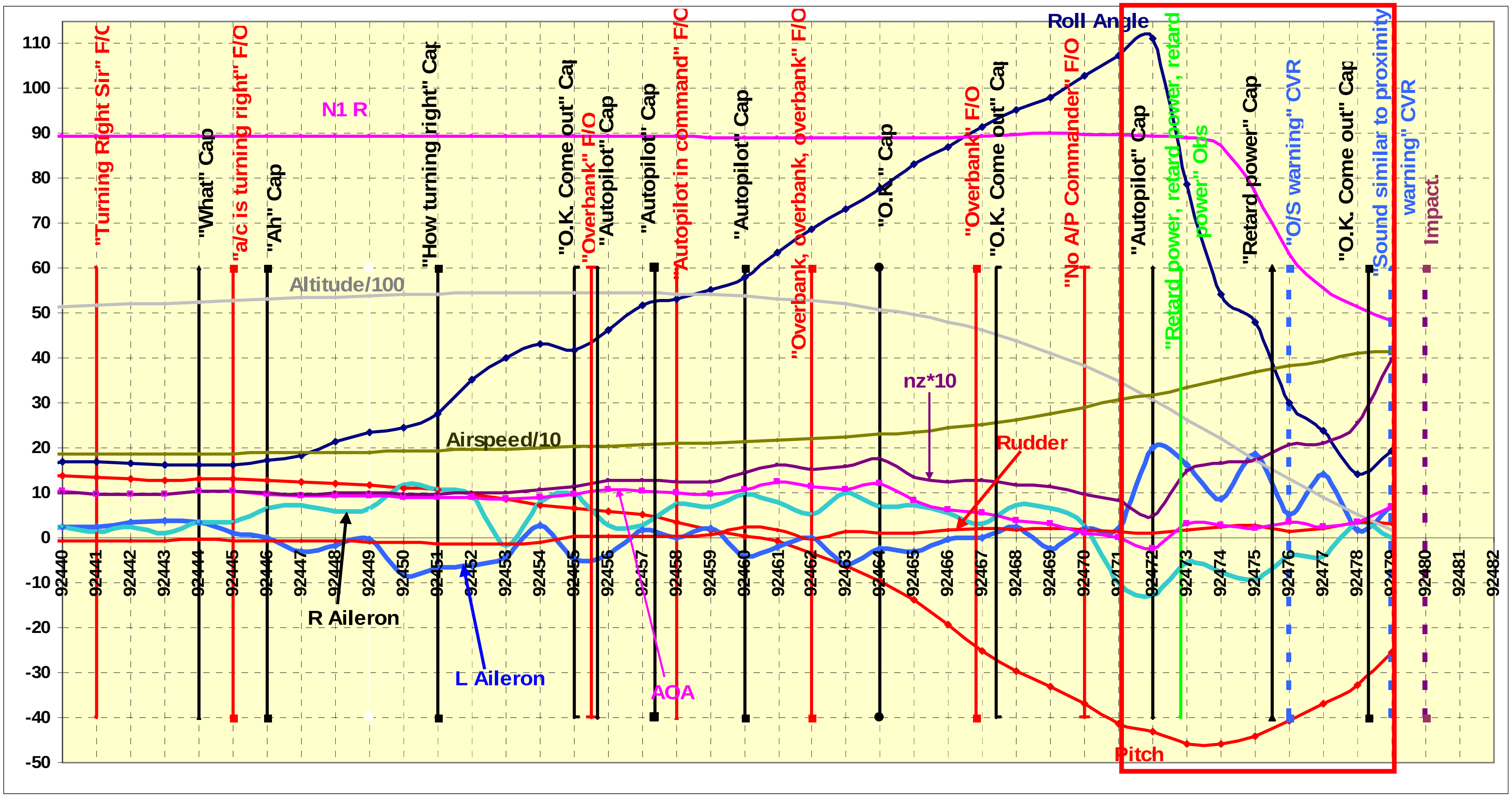


Figure 2.5.15 Rapid left roll towards wings level

The possibilties for this event are as follows:

1- Captain Upset Recovery Attempt
   Captain Input Only
   Captain in Presence of System Fault

This condition is supported by the information that the Captain was the pilot flying with nothing on CVR to suggest that control was transferred.
(Refer to section 2.6 Human Behavior, CBS report regarding CVR comments.)

2- First Officer Upset Recovery Attempt
   First Officer Input Only
   First Officer in Presence of System Fault

Based on CVR information, the FO did not announce that he is taking control.
(Refer to section 2.6 Human Behavior, CBS report regarding CVR comments.)

3- Joint Upset Recovery Attempt
   Crew Input Only (Captain, F/O, & Observer)
   Crew in Presence of System Fault (Captain, F/O, & Observer)

It is to be noted that previous upset events have resulted in multiple crew making control inputs; however the F/O does not announce he is taking control.

4- Lateral System Fault
   PCU Fault
      Based on the FDR data, the aileron motion recorded in both directions, even during recovery

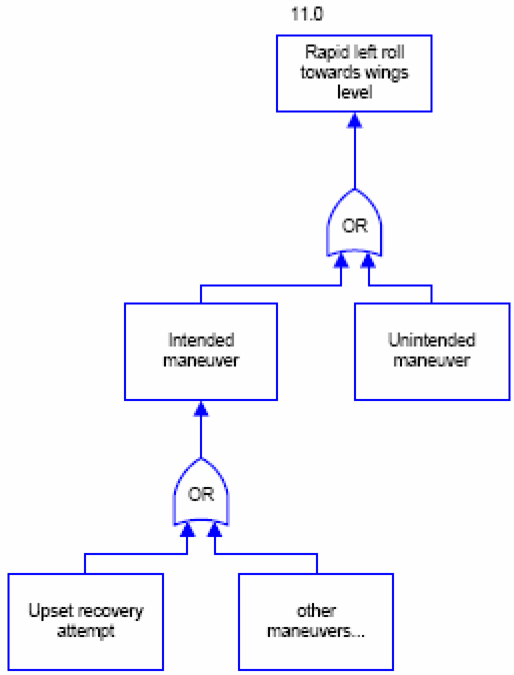
   AP Actuator Fault
      The aileron was commanded beyond A/P actuator limit (60 degrees of aileron wheel)

5- AP engaged and provided roll input
      The aileron was commanded beyond A/P authority limit (17 degrees of aileron wheel)

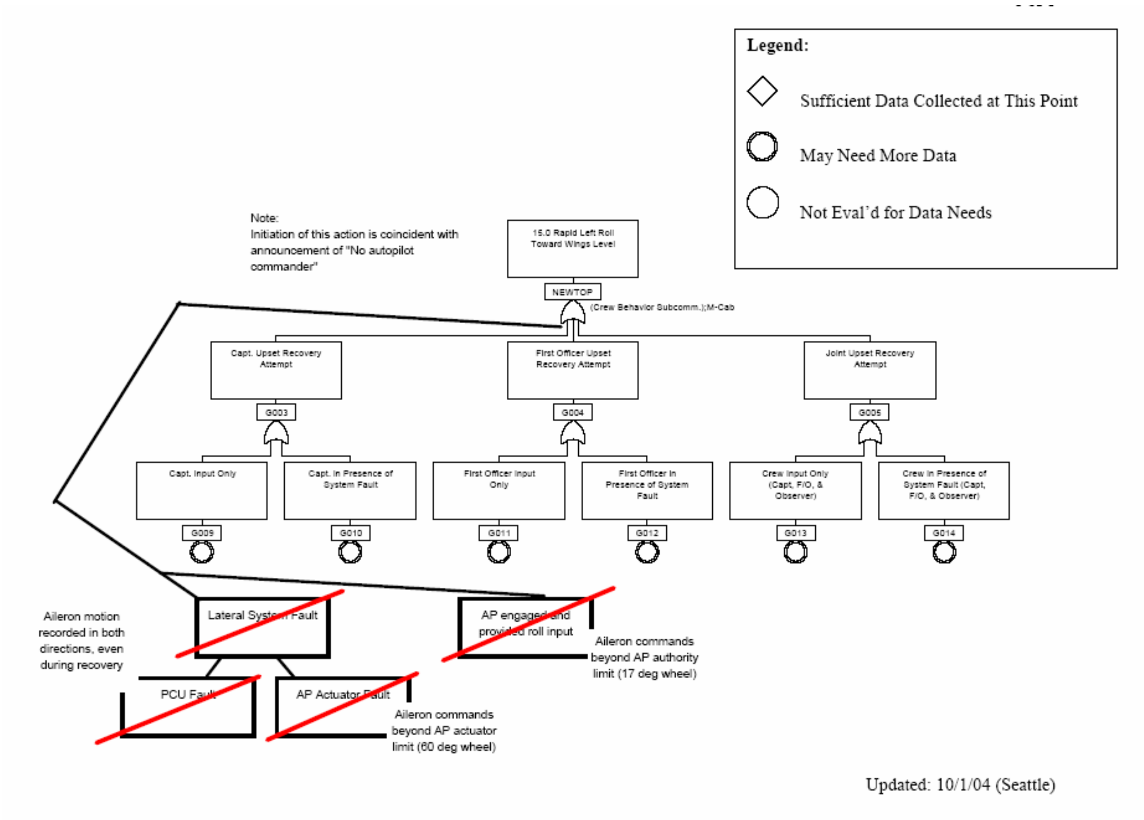
Note:
Initiation of this event is coincident with announcement of "No autopilot commander"

Conditions 4 and 5 might be ruled out.

From the above, Captain Upset Recovery Attempt seems a higher possibility



11.0
Rapid left roll towards wings level
OR
Intended maneuver
Unintended maneuver
OR
Upset recovery attempt
other maneuvers...


Legend:
Sufficient Data Collected at This Point
May Need More Data
Not Eval'd for Data Needs
Note:
Initiation of this action is coincident with announcement of "No autopilot commander"
15.0 Rapid Left Roll Toward Wings Level
NEWTOP
(Crew Behavior Subcomm.);M-Cab
Capt. Upset Recovery Attempt
First Officer Upset Recovery Attempt
Joint Upset Recovery Attempt
G003
G004
G005
Capt. Input Only
Capt. In Presence of System Fault
First Officer Input Only
First Officer In Presence of System Fault
Crew Input Only (Capt, F/O, & Observer)
Crew In Presence of System Fault (Capt, F/O, & Observer)
G009
G010
G011
G012
G013
G014
Lateral System Fault
AP engaged and provided roll input
Aileron motion recorded in both directions, even during recovery
Aileron commands beyond AP authority limit (17 deg wheel)
PCU Fault
AP Actuator Fault
Aileron commands beyond AP actuator limit (60 deg wheel)
Updated: 10/1/04 (Seattle)

2.5.16 Impact with water

The impact occurred at about 92480 (02:45:06 GMT) with the following conditions:

Bank Angle	24.6˚ to the right
Pitch Angle	24˚ Nose down
Vertical G. Load	3.9
Speed	416 Kts

Although an attempt to correct the recovery was initiated, the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery.

Appendix 2-1 lateral control system analysis

Lateral Control System analysis:

The following table contains several hypothetical failure scenarios within the ailerons and spoilers control systems. The table also shows the consequences of the failures and the ability to control the airplane from either pilot's side.
The objective of this analysis is to exclude all the hypothetical failure scenarios that will not lead to the event (aileron movement causing airplane Overbank, with recorded aileron movements in both directions) and consider the other remaining failure scenarios which could lead to the event.

Table 1: Hypothetical single failures scenarios (Ailerons/ Spoilers Systems)

Ser.	Failed Component	Type of Failure	Input from Captain	Input from F/O	
1	Hydraulic sys tem A	System Failure	Captain will be able to drive the ailerons in both directions. Because the aileron PCUs are significantly oversized, aileron travel rates are not a function of hydraulic system availability - i.e. aileron travel rates are not significantly different whether either or both hydraulic systems are pressurized. For reference, the no load rate is approximately 54 degrees per second of aileron.[1] Spoilers 3, 6 will be lost. Operation of other spoilers will not be affected. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Aileron trim will still be functional Indication: FLT Control A LOW PRESSURE light will illuminate, system low press reading will be visible on the Secondary Engine and Hydraulic Display, relevant pumps LOW	F/O will be able to drive the ailerons in both directions. Because the aileron PCUs are significantly oversized, aileron travel rates are not a function of hydraulic system availability - i.e. aileron travel rates are not significantly different whether either or both hydraulic systems are pressurized. For reference, the no load rate is approximately 54 degrees per second of aileron. Spoilers 3, 6 will be lost Operation of other spoilers will not be affected. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Aileron trim will still be functional Indication: FLT Control A LOW PRESSURE light will illuminate, system low press reading will be visible on the Secondary Engine and Hydraulic Display, relevant	Does not match with failure scenario ***(closed)***

[1] Boeing letter B-H200-17833-ASI Dated 12 February 2004, Responses to Airplane System Queries

			PRESSURE lights will illuminate, hydraulic fault light on right light shield will illuminate.	pumps LOW PRESSURE lights will illuminate, hydraulic fault light on right light shield will illuminate.	
2	Hydraulic system B	System Failure	Captain will be able to drive the ailerons in both directions. Because the aileron PCUs are significantly oversized, aileron travel rates are not a function of hydraulic system availability - i.e. aileron travel rates are not significantly different whether either or both hydraulic systems are pressurized. For reference, the no load rate is approximately 54 degrees per second of aileron. Outboard Flight Spoilers 2, 7 will be lost Operation of other spoilers will not be affected. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Aileron trim will still be functional Indication: FLT Control B LOW PRESSURE light will illuminate, system low press reading will be visible on the Secondary Engine and Hydraulic Display, relevant pumps LOW	F/O will be able to drive the ailerons in both directions. Because the aileron PCUs are significantly oversized, aileron travel rates are not a function of hydraulic system availability - i.e. aileron travel rates are not significantly different whether either or both hydraulic systems are pressurized. For reference, the no load rate is approximately 54 degrees per second of aileron. Outboard Flight Spoilers 2, 7 will be lost Operation of other spoilers will not be affected. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Aileron trim will still be functional Indication: FLT Control B LOW PRESSURE light will illuminate, system low press reading will be visible on the Secondary Engine and Hydraulic Display, relevant pumps LOW	Does not match with failure scenario ***(closed)***

			PRESSURE lights will illuminate, hydraulic fault light on right light shield will illuminate.	PRESSURE lights will illuminate, hydraulic fault light on right light shield will illuminate.	
3	Both hydraulic systems A and B	Total Hydraulic Failure	Refer to the dual failure scenario table, case no. 1	Refer to the dual failure scenario table, case no. 1	Refer to table #2
4	One aileron control bus cable (ACBA, ACBB)	Broken Cable	Captain can still control ailerons and spoilers normally. Ailerons operation will not be affected in both directions Spoilers operation will not be affected in both directions. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. F/O wheel will simultaneously follow Captain wheel in one direction. In the opposite direction, it will follow the Captain wheel but after 12 degree of captain wheel movement. Aileron trim will operate normally Indication: No cockpit light indication	F/O will be able to drive the ailerons in one direction only Spoilers operation will be normal in one direction. The spoilers will respond only after 12 degrees of aileron control wheel rotation in the opposite direction (affected side) The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Captain wheel will simultaneously follow the F/O wheel in only one direction. Captain wheel will not follow the F/O wheel in the opposite direction Aileron trim will operate normally Indication: No cockpit light indication	Does not match with failure scenario ***(closed)***
5	One aileron control bus cable (ACBA, ACBB)	Jammed Cable at certain position	Captain wheel will jam at a position relative to the cable jammed position. Captain will not be able to drive neither the ailerons nor the spoilers. The ailerons will jam at a position relative the cable jammed	F/O will not be able to control the ailerons. The ailerons will jam at a position relative the cable jammed position. .At no load condition, the F/O control wheel will stay at a position relative to the cable jammed position.	Does not match with failure scenario (***Closed)***

			position. Aileron trim will be lost. Indication: No cockpit light indication	After 12 degrees of control wheel rotation, the spoilers will respond to the position of the control wheel. The F/O will have to overcome both the torsion spring torque (at the transfer mechanism) and the aileron spring cartridge before further rotation of the control wheel. Captain wheel will stay jammed and will not follow the F/O wheel Aileron trim will be lost. Indication: No cockpit light indication	
6	Captain aileron control bus drum	Control bus drum jammed	Similar to item 5	Similar to item 5	Does not match with failure scenario ***(Closed)***
7	Captain aileron control drum	Control drum jammed	Similar to item 5	Similar to item 5	Does not match with failure scenario ***Closed***
8	F/O aileron control bus drum	Control bus drum jammed	Similar to item 5	Similar to item 5	Does not match with failure scenario ***(Closed)***
9	Spoiler control drum	Spoiler control drum jammed in the center	The captain will be able to control the ailerons as much as 12 degrees in either direction from the	The F/O aileron control wheel will be limited to 12 degrees either directions (motion will only be	Does not match with failure scenario ***(Closed)***

		(neutral) position	jammed position with normal feel forces. Beyond 12 degrees, an additional force is required to overcome the transfer mechanism and the aileron spring cartridge. The flight spoilers will remain in the position corresponding to the position of the jammed spoiler control drum, irrespective of any mechanical inputs from either control wheel (faired position). F/O aileron control wheel will follow the Captain aileron control wheel only in the range of 12 degrees either side of the position at which the spoiler control drum is jammed. After that movement of Captain aileron control wheel, the F/O aileron control wheel will not follow the Captain aileron control wheel. Aileron trim will be available in the range of 12 degrees either side of the position at which the spoiler control drum is jammed (the centering spring is not strong enough to overcome the transfer mechanism). Indication:	limited to the lost motion gap between the lost motion device crank and the lost motion lug).Therefore, the F/O will be able to control the ailerons only within 12 degrees of aileron control wheel rotation in either direction. The flight spoilers will remain in the position corresponding to the position of the jammed spoiler control drum, irrespective of any mechanical inputs from either control wheel (faired position). Captain aileron control wheel will follow the F/O aileron control wheel during its restricted movement (range of 12 degrees either side of the position at which the spoiler control drum is jammed). Aileron trim will be available in the range of 12 degrees either side of the position at which the spoiler control drum is jammed (the centering spring is not strong enough to overcome the transfer mechanism). Indication: No cockpit light	

			No cockpit light indication	indication	
10	Spoiler control drum	Spoiler control drum jammed offset from the center (neutral) position	The spoiler control drum will jam the lost motion device crank offset of the neutral position. The centering spring at the trim unit will pull both control wheels up to 12 degrees towards center through the lost motion device range. The centering spring is not strong enough to overcome the transfer mechanism. As a result, the ailerons and control wheel will remain 12 degrees from the jammed position (at no load condition on the control wheels), or at center if the jammed position is less than 12 degrees. The flight spoilers will remain in the position corresponding to the position of the jammed spoiler control drum, irrespective of any mechanical inputs from either control wheel. The captain will be able to control the ailerons as much as 12 degrees in either direction from the jammed position with normal feel forces. Beyond 12 degrees, an additional force is required to overcome the transfer	The spoiler control drum will jam the lost motion device crank offset of the neutral position. The centering spring at the trim unit will pull both control wheels up to 12 degrees towards center through the lost motion device range. The centering spring is not strong enough to overcome the transfer mechanism. As a result, the ailerons and control wheel will remain 12 degrees from the jammed position (at no load condition on the control wheels), or at center if the jammed position is less than 12 degrees. The flight spoilers will remain in the position corresponding to the position of the jammed spoiler control drum, irrespective of any mechanical inputs from either control wheel. The F/O will be able to control the ailerons as much as 12 degrees in either direction from the jammed position with normal feel forces. F/O wheel motion will be limited to 12 degrees either direction from the	Simulation has been done by Boeing. Refer to Chapter 2 Analysis

			mechanism and the aileron spring cartridge. Aileron trim will be available in the range of 12 degrees either side of the position at which the spoiler control drum is jammed. Indication: No cockpit light indication	jammed position. Aileron trim will be available in the range of 12 degrees either side of the position at which the spoiler control drum is jammed. Indication: No cockpit light indication	
10a	F/O control wheel shaft	F/O control wheel shaft jammed at a position offset of the neutral position	The F/O aileron control wheel will jam at a position offset of the neutral position relevant to the position of the jammed shaft. The centering spring at the trim unit will not be able to re-center the Captain aileron control wheel because of the resistance of the override mechanism strong torsion spring. Therefore, the Captain wheel will stay at the same position as the F/O aileron control wheel whenever the Captain aileron control wheel is released The captain will be capable of controlling the ailerons from his side, but with an additional force to overcome the override mechanism torsion spring. The ailerons will always follow the aileron control wheel. The spoilers will	The F/O aileron control wheel will jam at a position offset of the neutral position relevant to the position of the jammed shaft.	Simulation has been done by Boeing. Refer to Chapter 2 Analysis

			follow the captain aileron control wheel within only 12 degrees both sides from the offset wheel position. Input to the flight spoilers will be via the aileron spring cartridge. After 12 degrees of wheel rotation, the spoiler control drum lost motion lug will contact the lost motion device crank on the F/O control wheel shaft, preventing any further movement of the spoiler control drum. The spring cartridge will compensate for the continuing inputs from the ailerons bus drums. Indication: No cockpit light indication	Indication: No cockpit light indication	
11	Force Transducer	Broken force transducer	Captain will still be able to normally control the ailerons and spoilers from the Captain aileron control wheel. (Movement from the aileron control bus drum will be transmitted to the aileron drum through the mechanical stops on both drums). F/O aileron control wheel will simultaneously follow the Captain control wheel. The ailerons will not be biased in any direction by the aileron control system	F/O will still be able to normally control the ailerons and spoilers from the F/O aileron control wheel. (Movement from the aileron control bus drum will be transmitted to the aileron drum through the mechanical stops on both drums). Captain aileron control wheel will simultaneously follow the F/O control wheel. The ailerons will not be biased in any direction by the aileron control system with the control wheel	Does not match with failure scenario ***(Closed)***

			with the control wheel at no load condition. Aileron trim will still be functional (Refer to autopilot failure analysis)	at no load condition. Aileron trim will still be functional (Refer to autopilot failure analysis)	
12	One aileron control cable (left side) (ACBA, ACBB)	Broken Cable	Captain will be able to drive the ailerons in one direction only (unaffected direction). Spoilers will operate normally in the unaffected direction with Captain aileron control wheel rotation, however, when the aileron wheel is rotated in the opposite direction (affected direction), spoilers will follow aileron control wheel only after 12 degrees of wheel rotation, with an additional force to overcome the spring cartridge. Aileron trim will be available in both directions. F/O aileron control wheel will simultaneously follow the Captain control wheel. The aileron wheel may be slightly offset from neutral position due to cable stretch in one side Indication: No cockpit light indication	F/O will be able to drive the ailerons in one direction only (unaffected direction). Spoilers will operate normally in the unaffected direction with F/O aileron control wheel rotation, however, when the aileron wheel is rotated in the opposite direction (affected direction), spoilers will follow aileron control wheel only after 12 degrees of wheel rotation, with an additional force to overcome the spring cartridge. Aileron trim will be available in both directions. Captain aileron control wheel will simultaneously follow the F/O control wheel. The aileron wheel may be slightly offset from neutral position due to cable stretch in one side Indication: No cockpit light indication	Does not match with failure scenario ***(Closed)***
13	One aileron control cable (left side) (ACBA, ACBB)	Jammed Cable	Captain wheel will jam at a position relevant to the cable jammed position. Captain will not be able to drive neither the ailerons nor the spoilers.	The ailerons will jam and remain at a position relevant to the cable jammed position. The spoilers will remain at the jammed position until F/O intervention.	Does not match with failure scenario ***(Closed)***

			The ailerons will jam and remain at a position relevant to the cable jammed position. The spoilers will remain at the jammed position until F/O intervention. Aileron trim will not be available. Indication: No cockpit light indication	F/O will have to overcome the torsion spring resistance in the transfer mechanism, to start rotating the aileron control wheel. After 12 degrees of control wheel rotation, the F/O will be able to drive the spoilers with additional force to overcome the spring cartridge. Captain wheel will not follow the movement of the F/O control wheel and will stay jammed at a position relevant to the cable jammed position Aileron trim will not be available Indication: No cockpit light indication	
14	Aileron control Quadrant	Quadrant jammed	Similar to case 13	Similar to case 13	Does not match with failure scenario ***(Closed)***
15	PCA input rod (A or B)	Jammed	Similar to case 13	Similar to case 13	Does not match with failure scenario ***(Closed)***
16	PCA input rod (A or B)	Broken	There is no functional effect of a single failure in the PCA input rod. The entire input rod and fasteners are dual load path. The effect of a multiple failure depends on the position of the primary slide at the time of the failure. Worst case	There is no functional effect of a single failure in the PCA input rod. The entire input rod and fasteners are dual load path. The effect of a multiple failure depends on the position of the primary slide at the time of the failure.	Does not match with failure scenario ***(Closed)***

			effect is a rate jam of the affected PCU, causing a force fight with the other PCU and stalling of both PCUs. During such a force fight, the captain's control wheel motion is available one direction only. The F/O aileron control wheel will simultaneously follow the Captain aileron control wheel in this direction. (Aileron and spoiler position will correspond to the position of the captain's control wheel). Under no load condition, the captain's control wheel will remain in its current position or may drift slightly depending upon tolerances within the PCUs. Aileron trim will not be available. In case of failure of input rod with both the	Worst case effect is a rate jam of the affected PCU, causing a force fight with the other PCU and stalling of both PCUs. During such a force fight, the captain's control wheel motion is available one direction only; therefore, the F/O will be able to rotate the F/O control wheel in this direction with no additional forces. The Captain aileron control wheel will simultaneously follow the F/O aileron control wheel. (Aileron position will correspond to the position of the captain's control wheel.) In the opposite direction, the F/O aileron control wheel will be opposed by the Captain wheel, however, the first officer's wheel can be moved be used to control the spoilers after overcoming the transfer mechanism. Under no load condition, the first officer's control wheel will remain in its current position or may drift slightly depending upon tolerances within the PCUs. Aileron trim will not be available.	

			primary and secondary valves staying at the center position, the affected PCU will be hydraulically locked by blocking both the extend and retract sides of the PCU. The affected PCU will jam the unaffected PCU causing jamming to the Captain aileron control wheel in both directions (because of the mechanical stops on the PCU input arms). Therefore, the Captain will not be able to control neither the ailerons nor the spoilers from his side. Depressurizing the affected PCU will restore normal control Indication: No cockpit light indication	In case of failure of input rod with both the primary and secondary valves staying at the center position, the affected PCU will be hydraulically locked by blocking both the extend and retract sides of the PCU. The affected PCU will jam the unaffected PCU causing jamming to the Captain aileron control wheel in both directions (because of the mechanical stops on the PCU input arms). Therefore, the Captain will not be able to control neither the ailerons nor the spoilers from his side. The first officer's wheel can be moved be used to control the spoilers after overcoming the transfer mechanism in both directions. Depressurizing the affected PCU will restore normal control Indication: No cockpit light indication.	
17	Primary slide valve	Primary slide valve jammed offset of neutral position on one PCU	1. If the primary slide and secondary slide jam together near neutral, the effect is a minor reduction in rate capability. 2. If the jam occurs away from neutral, the feedback motion of the PCU will cause	1. If the primary slide and secondary slide jam together near neutral, the effect is a minor reduction in rate capability. 2. If the jam occurs away from neutral, the feedback motion of the PCU will cause	Does not match with failure scenario ***(Closed)***

			the primary and secondary slides to counter each other (crossflow condition). At a full crossflow condition, the PCU will lose rate capability and be backdriven by the unaffected PCU. Normal control of the ailerons and spoilers is available (latent failure). Aileron trim is not affected. Indication: No cockpit light indication	the primary and secondary slides to counter each other (crossflow condition). At a full crossflow condition, the PCU will lose rate capability and be backdriven by the unaffected PCU. Normal control of the ailerons and spoilers is available (latent failure). Aileron trim is not affected. Indication: No cockpit light indication	
18	Secondary slide valve	Secondary slide valve jammed	1. If the secondary slide jams near neutral, the effect is a minor reduction in rate capability. 2. If the jam occurs away from neutral, the feedback motion of the PCU will cause the primary and secondary slides to counter each other (crossflow condition). At a full crossflow condition, the PCU will lose rate capability and be backdriven by the unaffected PCU. Normal control of the ailerons and spoilers is available. Aileron trim is not affected. Indication: No cockpit light indication	1. If the secondary slide jams near neutral, the effect is a minor reduction in rate capability. 2. If the jam occurs away from neutral, the feedback motion of the PCU will cause the primary and secondary slides to counter each other (crossflow condition). At a full crossflow condition, the PCU will lose rate capability and be backdriven by the unaffected PCU. Normal control of the ailerons and spoilers is available). Aileron trim is not affected. Indication: No cockpit light indication	Does not match with failure scenario ***(Closed)***

19	PCU	PCU Internal leak (between both actuator chambers)	Normal control of the ailerons and spoilers systems will be maintained from both aileron control wheels. Indication: No cockpit light indication (latent failure)	Normal control of the ailerons and spoilers systems will be maintained from both aileron control wheels. Indication: No cockpit light indication (latent failure)	Does not match with failure scenario ***(Closed)***
20	PCU	PCU Jammed actuator piston at the neutral position.	Same effect as number 5.	Same effect as number 5.	
21	PCU	PCU Jammed actuator piston at a position offset from the neutral position.	Same effect as number 5.	Same effect as number 5.	
22	Aileron Spring Cartridge	Broken	Ailerons systems will not be affected. The spoilers will receive the mechanical input from the Captain aileron control wheel only after 12 degrees of wheel rotation through the transfer mechanism on the R.H. side. Forces required to drive the spoilers control mechanism will be added to the forces on the Captain control wheel The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Aileron trim will still be functional	Ailerons systems will not be affected. The spoilers will receive the mechanical input from the F/O aileron control wheel only after 12 degrees of wheel rotation through the transfer mechanism on the R.H. side. Forces required to drive the spoilers control mechanism will be added to the forces on the F/O control wheel The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Aileron trim will still be functional	Does not match with failure scenario ***(Closed)***

			Indication: No cockpit light indication (latent failure)	Indication: No cockpit light indication (latent failure)	
23	Aileron Spring Cartridge	Frozen (acting as a rigid rod)	Ailerons and spoilers systems will not be affected. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Aileron trim will still be functional Indication: No cockpit light indication (latent failure)	Ailerons and spoilers systems will not be affected. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Aileron trim will still be functional Indication: No cockpit light indication (latent failure)	Does not match with failure scenario ***(Closed)***
24	Spoiler input rod	Broken	Captain will be able to drive the ailerons in both directions at normal operating forces. All flight spoilers will be retracted The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Aileron trim will still be functional Indication: No cockpit light indication	F/O will be able to drive the ailerons in both directions at normal operating forces. All flight spoilers will be retracted The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Aileron trim will still be functional Indication: No cockpit light indication	Does not match with failure scenario (***Closed)***
25	Spoiler input rod	Spoiler input rod jammed	Refer to cases No. 9,10	Refer to cases No. 9,10	Does not match with failure scenario ***(Closed)***
26	Spoiler control quadrant	Spoiler control quadrant jammed	Refer to cases No. 9,10	Refer to cases No. 9,10	Does not match with failure scenario ***(Closed)***
27	One spoiler control	Broken	Captain will be able to drive the ailerons in	F/O will be able to drive the ailerons in	Does not match with

	cable (F/O cable AA, AB)		both directions Captain will be able to drive the spoilers in both directions (through the aileron spring cartridge) F/O aileron wheel will follow Captain aileron wheel F/O aileron wheel will simultaneously follow the Captain aileron wheel The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Aileron trim will still operate normally. This failure will only be evident in the case of jamming of the Captain aileron input side. In this case, the F/O will be able to control the spoilers in only one direction Indication: No cockpit light indication (latent failure)	both directions F/O will be able to drive the spoilers in both directions (through the captain aileron control wheel and the aileron spring cartridge) Captain aileron wheel will simultaneously follow the F/O aileron wheel The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Aileron trim will still operate normally. This failure will only be evident in the case of jamming of the Captain aileron input side. In this case, the F/O will be able to control the spoilers in only one direction Indication: No cockpit light indication (latent failure)	failure scenario ***(Closed)***
28	One spoiler control cable (F/O cable AA, AB)	Jammed	Refer to cases No. 9,10	Refer to cases No. 9,10	
29	Trim and centering mechanism	Aileron trim electric arming switch contact is stuck closed in	Ailerons and spoilers operation will not be affected. Aileron trim will still be functional normally in both directions. The ailerons will not be biased in any	Ailerons and spoilers operation will not be affected. Aileron trim will still be functional normally in both directions. The ailerons will not be biased in any	Does not match with failure scenario ***Closed***

		one direction	direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication (latent failure)	direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication (latent failure)	
30	Trim and centering mechanism	Aileron trim electric direction control switch contact is stuck closed in one direction	Ailerons and spoilers operation will not be affected. Aileron trim will only move in one direction regardless of the trim command direction. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication	Ailerons and spoilers operation from the F/O side will not be affected. Aileron trim will only move in one direction regardless of the trim command direction. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication	Does not match with failure scenario ***(Closed)***
31	Trim and centering mechanism	Motor Failure, jammed at the center (neutral) position	Aileron trim will be lost Captain will be able to normally drive both the ailerons and the spoilers in both directions. With the Captain control wheel released, the wheel will return to neutral position. Indication: No cockpit light indication	Aileron trim will be lost F/O will be able to normally drive both the ailerons and the spoilers in both directions. With the F/O control wheel released, the wheel will return to neutral position. Indication: No cockpit light indication	Does not match with failure scenario ***(Closed)***
32	Trim and centering mechanism	Motor Failure, jammed offset from the center (neutral) position	Aileron trim will be lost The aileron wheel will be biased to a new trim position (function of the length of the trim actuator). Accordingly, the ailerons and spoilers will be deflected following the wheel	Aileron trim will be lost The aileron wheel will be biased to a new trim position (function of the length of the trim actuator). Accordingly, the ailerons and spoilers will be deflected following the wheel	(To be considered) Simulation has been done by Boeing. Refer to Chapter 2 Analysis

			new trim condition (the maximum authority of the aileron trim is 15 degree of aileron travel up or down). The captain will be able to drive both the ailerons and the spoilers in both directions from this new trim position. The forces on the control wheel will be function of the trim and centering mechanism force characteristics (refer to figure xx). When the Captain releases the control wheel, the wheel will return to the new trim position (offset of the neutral position) Indication: No cockpit light indication	new trim condition (the maximum authority of the aileron trim is 15 degree of aileron travel up or down). The F/O will be able to drive both the ailerons and the spoilers in both directions from this new trim position. The forces on the control wheel will be function of the trim and centering mechanism force characteristics (refer to figure xx). When the F/O releases the control wheel, the wheel will return to the new trim position (offset of the neutral position) Indication: No cockpit light indication	
33	Trim and centering mechanism	Broken centering springs	Aileron trim will be lost. Centering and feel actions will be lost. Captain will be able to drive both the ailerons and the spoilers in both directions Indication: No cockpit light indication	Aileron trim will be lost. Centering and feel actions will be lost. F/O will be able to drive both the ailerons and the spoilers in both directions Indication: No cockpit light indication	Does not match with failure scenario ***(Closed)***
34	Trim and centering mechanism	Broken centering cam	Depending on the location of the break and shape of the remaining section of the cam, this fault may result in an unrestrained or jammed centering mechanism. If unrestrained, see 33 above. If jammed, see item 5.	Depending on the location of the break and shape of the remaining section of the cam, this fault may result in an unrestrained or jammed centering mechanism. If unrestrained, see 33 above. If jammed, see item	(Does not match with failure scenario ***(Closed)***

			Indication: No cockpit light indication	5. Indication: No cockpit light indication	
35	Ailerons bus cable ABSA, ABSB	Broken Cable	The aileron surface connected to the affected cable will be driven in one direction only Captain will be able to control the spoilers normally F/O aileron control wheel will follow the Captain aileron control wheel. The ailerons wheels will not be biased in any direction by the aileron control system with the control wheel at no load condition. During flight, the position of the affected aileron will depend on whether the failure in the up or down cable. Aerodynamic loads tend to move the ailerons upwards. Indication: No cockpit light indication	The aileron surface connected to the affected cable will be driven in one direction only F/O will be able to control the spoilers normally Captain aileron control wheel will follow the F/O aileron control wheel. The ailerons wheels will not be biased in any direction by the aileron control system with the control wheel at no load condition. During flight, the position of the affected aileron will depend on whether the failure in the up or down cable. Aerodynamic loads tend to move the ailerons upwards. Indication: No cockpit light indication	Does not match with failure scenario based on FDR data ***(Closed)***
36	Ailerons bus cable ABSA, ABSB	Jammed Cable at center (neutral) position.	The aileron surface connected to the affected cable will jam at the neutral position. When either control wheel is rotated, the PCU connected to the unaffected bus cable will apply force on the relevant output drum. This drum will be resisted by the other drum connected to the jammed bus cable. Consequently, the shear rivets on	The aileron surface connected to the affected cable will jam at the neutral position. When either control wheel is rotated, the PCU connected to the unaffected bus cable will apply force on the relevant output drum. This drum will be resisted by the other drum connected to the jammed bus cable. Consequently,	Does not match with failure scenario ***(Closed)***

			the aileron drums will break. After breaking the shear rivets, the Captain will be able to drive the unaffected aileron surface and spoilers normally. Both wheels will move normally. Aileron trim is not affected except that the jammed aileron will not respond. Indication: No cockpit light indication	the shear rivets on the aileron drums will break. After breaking the shear rivets, the F/O will be able to drive the unaffected aileron surface and spoilers normally. Both wheels will move normally. Aileron trim is not affected except that the jammed aileron will not respond. Indication: No cockpit light indication	
37	Aileron bus drum	Jammed Aileron bus drum at the center (neutral) position	Similar to case 36	Similar to case 36	Does not match with failure scenario ***(Closed)***
38	Ailerons bus cable ABSA, ABSB	Jammed Cable at a position offset from the center (neutral) position.	Similar to case 36 except that: The aileron surface connected to the affected cable will jam at a position offset from the neutral position.	Similar to case 36 except that: The aileron surface connected to the affected cable will jam at a position offset from the neutral position.	Does not match with failure scenario ***(Closed)***
39	Aileron bus drum	Jammed Aileron bus drum at a position offset from the neutral position	Similar to case 38	Similar to case 38	Does not match with failure scenario ***(Closed)***
40	Aileron bus drum	Broken lug or fork	Ailerons and spoilers operation will not be affected (as long as A and B hydraulic systems are available).	Ailerons and spoilers operation will not be affected (as long as A and B hydraulic systems are available).	Does not match with failure scenario ***(Closed)***

			Aileron trim will be functioning normally The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication (latent failure)	Aileron trim will be functioning normally The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication (latent failure)	
41	Aileron wing Quadrant	Aileron wing Quadrant jammed	Similar to cases 36 and 38	Similar to cases 36 and 38	Does not match with failure scenario ***(Closed)***
42	Cable tension spring	Cable tension spring broken (at one side)	Broken spring may cause slackening of the ailerons bus system cables (ABSA and ABSB). This may affect the connection between the ailerons bus drums and the ailerons wing quadrants which may cause some delays in the ailerons movement. No other systems will be affected. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication (may be a latent failure)	Broken spring may cause slackening of the ailerons bus system cables (ABSA and ABSB). This may affect the connection between the ailerons bus drums and the ailerons wing quadrants which may cause some delays in the ailerons movement. No other systems will be affected. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication (may be a latent failure)	Does not match with failure scenario ***(Closed)***
43	Aileron balance panel	Damaged Aileron balance panel	Captain will still be able to drive the ailerons and spoilers normally without additional forces (as long as at least one of the A or B hydraulic	F/O will still be able to drive the ailerons and spoilers normally without additional forces (as long as at least one of the A or B hydraulic systems	Does not match with failure scenario ***(Closed)***

			systems is available) Aileron trim will not be affected. Ailerons control will be less effective and heavier in the manual reversion mode The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication (may be a latent failure)	is available) Aileron trim will not be affected. Ailerons control will be less effective and heavier in the manual reversion mode The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication (may be a latent failure)	
44	Aileron balance tab	Damaged aileron control tab	Captain will still be able to drive the ailerons and spoilers normally without additional forces (as long as at least one of the A or B hydraulic systems is available) Aileron trim will not be affected. Ailerons control will be less effective and heavier in the manual reversion mode The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication (may be a latent failure)	F/O will still be able to drive the ailerons and spoilers normally without additional forces (as long as at least one of the A or B hydraulic systems is available) Aileron trim will not be affected. Ailerons control will be less effective and heavier in the manual reversion mode The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication (may be a latent failure)	Does not match with failure scenario ***(Closed)***
45	Shear rivets at the attach point between the spring cartridge and the control	Shear rivets at the attach point between the spring cartridge and the	The connection between the ailerons bus drums and the spoiler quadrant will be lost. Ailerons control will not be affected using either ailerons control	The connection between the ailerons bus drums and the spoiler quadrant will be lost. Ailerons control will not be affected using either ailerons control	Does not match with failure scenario ***(Closed)***

	quadrant shaft input crank	control quadrant shaft input crank are sheared	wheel. The spoilers will receive mechanical input from the Captain aileron wheel only after about 12 degrees of wheel rotation causing a delay in the flight spoilers operation The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication	wheel. The spoilers will receive mechanical input from the Captain aileron wheel only after about 12 degrees of wheel rotation causing a delay in the flight spoilers operation The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication	
46	Aileron cam (spoiler mixer)	Aileron cam (spoiler mixer) jammed	Similar to cases 9 and 10	Similar to cases 9 and 10	Does not match with failure scenario ***(Closed)***
47	Left or right spoiler output quadrant	Left or right spoiler output quadrant jammed	The flight spoilers on the both sides will jam at positions dependent on the jammed quadrant position. Normal aileron control will be available up to 12 degrees each side of the jam. Beyond 12 degrees, additional force is necessary to overcome the transfer mechanism.	The flight spoilers on the both sides will jam at positions dependent on the jammed quadrant position. Normal aileron control will be available up to 12 degrees each side of the jam. Beyond 12 degrees, additional force is necessary to overcome the transfer mechanism.	Does not match with failure scenario ***(Closed)***
48	Speed brake input quadrant	Speed brake input quadrant jammed (at the speed brake retracted position)	Only the speed brake will be lost. Ailerons and flight spoilers operation will not be affected	Only the speed brake will be lost. Ailerons and flight spoilers operation will not be affected	Does not match with failure scenario ***(Closed)***

Table 2- Hypothetical double failures scenarios (Ailerons/ Spoilers Systems)

Ser.	Failed Component	Type of Failure	Input from Captain	Input from F/O	
1	Both hydraulic systems A and B	Total Hydraulic Failure	Captain will maintain ailerons control manually through the aileron cables on the left side, PCU stops and the ailerons bus cables. Control forces are minimized by aileron balance tabs and balance panels. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Ailerons movements may be affected by external disturbances and aircraft maneuvers. The Captain has to overcome the aileron loads and the centering spring All the spoilers will be lost and will stay at the faired position. Aileron trim will be lost Indication: FLT Control A and B LOW PRESSURE lights will illuminate, systems A and B low press reading will be visible on the Secondary Engine and Hydraulic Display, relevant pumps LOW PRESSURE lights will illuminate, hydraulic fault light on right light shield will illuminate.	F/O will maintain ailerons control manually through the override mechanism on the right side, aileron cables on the left side, PCU stops and the ailerons bus cables. Control forces are minimized by aileron balance tabs and balance panels. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Ailerons movements may be affected by external disturbances and aircraft maneuvers. The F/O has to overcome the aileron loads and the centering spring All the spoilers will be lost and will stay at the faired position. . Aileron trim will be lost. Indication: FLT Control A and B LOW PRESSURE lights will illuminate, systems A and B low press reading will be visible on the Secondary Engine and Hydraulic Display, relevant pumps LOW PRESSURE lights will illuminate, hydraulic	Does not match with failure scenario ***(Closed)***

				fault light on right light shield will illuminate.	
2	Aileron trim switches	Both trim switches are stuck closed in the same direction	The aileron trim actuator will reach its hard over position driving the ailerons to 15 degrees (maximum trim authority). Both aileron wheels will be driven away from the neutral position. The ailerons and flight spoilers will always follow the aileron wheel. The new position for the wheel will be about 65 degrees. The force-wheels relation will change (refer to Force vs wheel chart) Whenever the aileron wheels are released, the wheels will move to the hardover position (65 degree). The ailerons wheels will always simultaneously follow each others. Indication: No cockpit light indication	The aileron trim actuator will reach its hard over position driving the ailerons to 15 degrees (maximum trim authority). Both aileron wheels will be driven away from the neutral position. The ailerons and flight spoilers will always follow the aileron wheel. The new position for the wheel will be about 65 degrees. The force-wheels relation will change (refer to Force vs wheel chart) Whenever the aileron wheels are released, the wheels will move to the hardover position (65 degree). The ailerons wheels will always simultaneously follow each others. Indication: No cockpit light indication	Refer to Chapter 2 Analysis
3	One spoiler control cable (F/O cable AA, AB), Captain aileron input side	Spoilers control cable broken + jamming of the Captain aileron input side.	Captain will not be able to control neither the ailerons nor the flight spoilers Indication: No cockpit light indication (latent failure)	The F/O will be able to control the spoilers in only one direction. No control on aileron system Indication: No cockpit light indication (latent failure)	Does not match with failure scenario ***(Closed)***
4	Trim and centering mechanism	Broken centering springs	Aileron trim will be lost. Centering and feel actions will be lost. Captain will be able to drive both the ailerons and the spoilers in both directions Indication:	Aileron trim will be lost. Centering and feel actions will be lost. F/O will be able to drive both the ailerons and the spoilers in both directions Indication:	Does not match with failure scenario ***(Closed)***

			No cockpit light indication	No cockpit light indication	
5	Aileron bus drum, Hydraulic system	Broken lug or fork + one hydraulic system is lost (A or B)	Ailerons and spoilers operation will not be affected as long as A and B hydraulic systems are available. Aileron trim will be functioning normally The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. In case of failure of A or B systems, one aileron surface will be controlled by manual reversion, resulting in increased forces at the wheel. Spoilers 3, 6 will be lost in case of A system failure. Outboard Flight Spoilers 2, 7 will be lost in case of B system failure. Indication: No cockpit light indication	Ailerons and spoilers operation will not be affected (as long as A and B hydraulic systems are available). Aileron trim will be functioning normally The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. In case of failure of A or B systems, one aileron surface will be controlled by manual reversion, resulting in increased forces at the wheel. Spoilers 3, 6 will be lost in case of A system failure. Outboard Flight Spoilers 2, 7 will be lost in case of B system failure Indication: No cockpit light indication	Does not match with failure scenario ***(Closed)***

Table 3- Hypothetical failures scenarios (Autopilot Actuator)

Ser.	Failed Component	Type of Failure	Input from Captain	Input from F/O	
1	Arm Solenoid	Arm Solenoid Stuck Open	With the arm solenoid open, the autopilot mod piston can move in response to FCC commands. When disengaged, the FCC commands the transfer valve as to center the A/P piston. However, as the detent solenoid is not open, the A/P piston is not coupled to the ailerons and the A/P actuator cannot command aileron motion. Captain will be able to control the ailerons and spoilers normally with autopilot disengaged. The autopilot can also be engaged normally. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication (latent failure)	With the arm solenoid open, the autopilot mod piston can move in response to FCC commands. When disengaged, the FCC commands the transfer valve as to center the A/P piston. However, as the detent solenoid is not open, the A/P piston is not coupled to the ailerons and the A/P actuator cannot command aileron motion. F/O will be able to control the ailerons and spoilers normally with autopilot disengaged. The autopilot can also be engaged normally. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication (latent failure)	Does not match with failure scenario ***(Closed)***
2	Detent Solenoid	Detent Solenoid Stuck Open	The arm and detent solenoids are in series. With the autopilot is not engaged, the arm solenoid will be closed, no hydraulic fluid will be available to allow the detent pistons to couple the	The arm and detent solenoids are in series. With the autopilot is not engaged, the arm solenoid will be closed, no hydraulic fluid will be available to allow the detent pistons to couple the	Does not match with failure scenario ***(Closed)***

			A/P piston to the ailerons. The A/P actuator cannot command aileron motion. If this fault exists when the autopilot is trying to engage, the FCC would detect hydraulic pressure before it is commanded and would disconnect the A/P within 182 ms.[2] Captain will be able to control the ailerons and spoilers normally with autopilot disengaged. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication	A/P piston to the ailerons. The A/P actuator cannot command aileron motion. If this fault exists when the autopilot is trying to engage, the FCC would detect hydraulic pressure before it is commanded and would disconnect the A/P within 182 ms. F/O will be able to control the ailerons and spoilers normally with autopilot disengaged. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication	
3	Arm and Detent Solenoids	Arm and Detent Solenoids Stuck Open	This is the normal condition when the autopilot is engaged. If the autopilot is not engaged, the FCC commands the transfer valve to hold the autopilot actuator in the neutral (ailerons faired) position. Because both the solenoids are stuck open, the transfer valve spool moves the A/P piston in response to commands from the FCC and the detent	This is the normal condition when the autopilot is engaged. If the autopilot is not engaged, the FCC commands the transfer valve to hold the autopilot actuator in the neutral (ailerons faired) position. Because both the solenoids are stuck open, the transfer valve spool moves the A/P piston in response to commands from the FCC and the detent	Does not match with failure scenario ***(Closed)***

[2] This information is based on the correction made in Boeing presentation (Scenario 12 ver 2.ppt). Boeing and Honeywell are requested to forward official document presenting this information.
[3] This figure was presented by Boeing during Cairo meeting February 1st, 2005

			pistons are pressurized to couple the actuator to the ailerons. Normal autopilot actuator breakout is still available to override the autopilot actuator malfunction. Without pilot intervention, the net result would be the same as letting go of the wheel and letting it center. Captain will be able to control the ailerons and spoilers with autopilot disengaged, but with an additional force of 17 lbs[3] to overcome detent piston pressure and override the autopilot. The autopilot can not be engaged. Detent pressure switch will sense hydraulic pressure; therefore, the pre- engagement logic will not be valid preventing engagement of autopilot. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication	pistons are pressurized to couple the actuator to the ailerons. Normal autopilot actuator breakout is still available to override the autopilot actuator malfunction. Without pilot intervention, the net result would be the same as letting go of the wheel and letting it center. Captain will be able to control the ailerons and spoilers with autopilot disengaged, but with an additional force of 17 lbs to overcome detent piston pressure and override the autopilot. The autopilot can not be engaged. Detent pressure switch will sense hydraulic pressure; therefore, the pre- engagement logic will not be valid preventing engagement of autopilot. The ailerons will not be biased in any direction by the aileron control system with the control wheel at no load condition. Indication: No cockpit light indication	
4	Both Solenoids and the Transfer Valve	Both Solenoids Stuck Open with Transfer Valve Jammed offset of	This triple fault will result in an A/P actuator hardover. The autopilot can not be engaged. Detent pressure switch will sense hydraulic pressure before	This triple fault will result in an A/P actuator hardover. The autopilot can not be engaged. Detent pressure switch will sense hydraulic pressure before	Simulation has been done by Boeing. Refer to Chapter 2 Analysis

		the neutral position	engagement; therefore, the pre-engagement logic will not be valid preventing engagement of autopilot. With autopilot disengaged, both aileron wheels will be driven away of the neutral position and will be positioned at about 60 degrees (wheel position) Refer to figure xxx, forces versus wheels position) The ailerons and flight spoilers will follow movement of the ailerons control wheels. The Captain will be able to control the ailerons and flight spoilers with an additional force of 17 lbs to overcome detent piston pressure and override the autopilot. Whenever the control wheels are released, the control wheel will return to the relevant autopilot actuator hardover position (60 degrees wheel position), resulting in an aileron deflection of about ± 13 degrees and spoilers deflection. Note: Depressurizing the relevant hydraulic system powering the faulty autopilot actuator will eliminate the fault.	engagement; therefore, the pre-engagement logic will not be valid preventing engagement of autopilot. With autopilot disengaged, both aileron wheels will be driven away of the neutral position and will be positioned at about 60 degrees (wheel position) Refer to figure xxx, forces versus wheels position) The ailerons and flight spoilers will follow movement of the ailerons control wheels. The Captain will be able to control the ailerons and flight spoilers with an additional force of 17 lbs to overcome detent piston pressure and override the autopilot. Whenever the control wheels are released, the control wheel will return to the relevant autopilot actuator hardover position (60 degrees wheel position), resulting in an aileron deflection of about ± 13 degrees and spoilers deflection. Note: Depressurizing the relevant hydraulic system powering the faulty autopilot actuator will eliminate	

			Indication: No cockpit light indication	the fault. Indication: No cockpit light indication	
5	Both Solenoids, Transfer Valve and Pressure Regulator	Both Solenoids Stuck Open, Transfer Valve and Pressure Regulator Jammed	This quadruple fault will result in an A/P actuator hardover. Because of the pressure regulator jam, the relief valve operates and wheel forces to overcome the autopilot hardover increase from 17 lbs (normal) to approximately 20 lbs. Other than that, this failure will be similar to failure case 4	This quadruple fault will result in an A/P actuator hardover. Because of the pressure regulator jam, the relief valve operates and wheel forces to overcome the autopilot hardover increase from 17 lbs (normal) to approximately 20 lbs. Other than that, this failure will be similar to failure case 4	Simulation has been done by Boeing. Refer to Chapter 2 Analysis
6	Both Solenoids, Transfer Valve and Relief Valve	Both Solenoids Stuck Open, Transfer Valve and Relief Valve Jammed	This condition is similar to condition 4 This quadruple fault will result in an A/P actuator hardover. Although the relief valve is jammed (stuck to pressure regulator slide), the primary pressure regulator still operates normally and wheel force to overcome the autopilot is approximately 17 lbs.	This condition is similar to condition 4 This quadruple fault will result in an A/P actuator hardover. Although the relief valve is jammed (stuck to pressure regulator slide), the primary pressure regulator still operates normally and wheel force to overcome the autopilot is approximately 17 lbs.	Simulation has been done by Boeing. Refer to Chapter 2 Analysis
7	Both Solenoids, Transfer Valve, Pressure Regulator, and Relief Valve	Both Solenoids Stuck Open, Transfer Valve Pressure Regulator,	This quintuple fault will result in an A/P actuator hardover. With both the pressure regulator and relief valve jammed, the	This quintuple fault will result in an A/P actuator hardover. With both the pressure regulator and relief valve jammed, the	Simulation has been done by Boeing. Refer to Chapter 2 Analysis

		and Relief Valve Jammed	wheel force required to overcome the autopilot is approximately 80 lbs. Other than that, this failure will be similar to failure case 4	wheel force required to overcome the autopilot is approximately 80 lbs. Other than that, this failure will be similar to failure case 4	

Appendix 2-2 Studies of other airplane incidents relevant to autoflight systems

Two cases of malfunctions related to Boeing 737-500 autopilot system were reported by one operator as follows:

I- CASE of “AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT”

1- BOEING REPLY, EXCESSIVE RATE OF DESCENT
11/8/2004 2:25:33 AM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
One Operator reports that during descent with A/P A engages, VS mode selected and 1500 FPM selected on MCP panel airplane started a descent with a rate of 3000 FPM. Crew reported that this occurred two times. Crew reported that A/P operated normal.

Maintenance reported the following AFDS Bite results:

Possible Causes
Stab Trim M255
Elevator Pos. Sensor
Stab. Pos. Sen-1

Attached for review is DFDR data for the flight which started at 2000 GMT and ended at 2110 GMT.

ACTION:

The operator requests that Boeing review the submitted DFDR data and advise findings.

Attachment: autopilot.pdf Date 11/8/2004 1:38:59 AM

Commercial Aviation Services
The Boeing Company

11/8/2004 2:25:33 AM PST

2. BOEING REPLY, EXCESSIVE RATE OF DESCENT
11/21/2004 2:55:20 AM PST

[MESSAGE NUMBER: 1-STLI4]
FROM: THE BOEING COMPANY

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
In response to the subject report, Ref /A/ advised that is possible that hysterisis in the actuator linkage can result in poor autopilot control. Boeing would be interested in knowing the altitude that was selected during the event and at what altitude the capture maneuver was initiated. Any available FDR data may be helpful in reviewing this event.

Regarding the A/P bite faults, Boeing would like to arrange for a convenient time when we could contact the operator and walk through some BITE tests with an operator mechanic while in the flight deck of the airplane.

Please advise if the operator can support further troubleshooting using a cell phone in the flight deck where the FCC BITE can be performed via telecon with Boeing. If affirmative, please provide a time and phone number that Boeing can contact.

As reported previously, the operator has performed adjustments of the Ref /D/ rods numerous times. After adjustment the aircraft would fly for a few days with no write-ups for the subject fault.

Datum airplane is currently operating under MEL for A/P system A. Based on previous experience with this airplane, the operator is investigating whether to change the Ref /D/ rods.

ACTION:

Please review and advise if Boeing concurs with the operator on replacement of the Ref /D/ rods.

Commercial Aviation Services
The Boeing Company

3- BOEING REPLY, EXCESSIVE RATE OF DESCENT
23-Nov-2004 11:42:51 AM PST

[SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
In response to the subject report, Ref /A/ advised that is possible that hysterisis in the actuator linkage can result in poor autopilot control. In addition, Boeing advised we would like to arrange for a convenient time when we could contact the operator and walk through some BITE tests with an the operator mechanic while in the flight deck of the airplane.

As reported previously, the operator has performed adjustments of the Ref /D/ rods numerous times. After adjustment the aircraft would fly for a few days with no write-ups for the subject fault.

Datum airplane is currently operating under MEL for A/P system A. Based on previous experience with this airplane, the operator is investigating whether to change the Ref /D/ rods.

ACTION:

Please review and advise if Boeing concurs with the operator on replacement of the Ref /D/ rods.

RESPONSE:

Last night, Boeing engineering was able to contact the operator personnel who were in the flight deck of the datum airplane. Based on the BITE tests performed and discussions with the operator personnel, it was decided that replacement of both of the A/P elevator actuator rod assemblies (shown in Figure 401 on page 402 of AMM 22-11-26) is the next maintenance action to be taken. Following replacement, the Autopilot Elevator Actuator Adjustment (DFCS BITE Test) (TASK 22-11-26-825-047) must be performed (AMM 22-11-26/501). Note, when installing the rod assembly between the two actuators, the operator needs to tighten the locknuts and lock wire in place on the end.

Commercial Aviation Services
The Boeing Company

4- BOEING REPLY, EXCESSIVE RATE OF DESCENT
11/30/2004 4:07:08 AM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
In response to the subject report, Ref /C/ advised that is possible that hysterisis in the actuator linkage can result in poor autopilot control. In addition, Boeing advised they would like to arrange for a convenient time when we could contact the operator and walk through some BITE tests with an operator mechanic while in the flight deck of the airplane. As reported previously, the operator has performed adjustments of the Ref /E/ rods numerous times. After adjustment the aircraft would fly for a few days with no write-ups for the subject fault.

Ref /B/ advised that datum airplane was currently operating under MEL for A/P system A. Based on previous experience with this airplane, the operator is investigating whether to change the Ref /F/ rods.

On 22-Nov-2004, Boeing engineering was able to contact the operator personnel who were in the flight deck of the datum airplane. Ref /A/ advised that based on the BITE tests performed and discussions with the operator personnel, it was decided that replacement of both of the A/P elevator actuator rod assemblies (shown in Figure 401 on page 402 of AMM 22-11-26) is the next maintenance action to be taken. Following replacement, the Autopilot Elevator Actuator Adjustment (DFCS BITE Test) (TASK 22-11-26-825-047) must be performed (AMM 22-11-26/501). Note, when installing the rod assembly between the two actuators, the operator needs to tighten the locknuts and lock wire in place on the end.

The operator replaced and adjusted the Ref /F/ rods and released the airplane for service. On 26-Nov-2004 the crew reported that, with A/P "A" engaged and V/S of 2000 FPM selected, aircraft descent was 4,000 FPM. See attached log sheet for details. On 28-Nov-2004, crew reported that with A/P "A" engaged MCP ALT 33,000, FMA- ALT ACQ the airplane started a descent of more than 2000 FPM. Please see attached log sheet for details. Aircraft is currently operating using A/P "B" only.

Attached for review is DFDR data for the 26-Nov event flight leg. As reported above, the reported excessive descent rate was during descent.

The operator is requesting that Boeing review the data and report findings. The operator management has also requested on-site technical assist.

ACTION:

1. Please review the attached DFDR data and report findings.

2. Please advise if Boeing can provide on-site technical assist.

A response by 01-Dec is requested.

Commercial Aviation Services

The Boeing Company

11/30/2004 4:07:08 AM PST

5- BOEING REPLY, EXCESSIVE RATE OF DESCENT
01-Dec-2004 01:52:43 PM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
In response to the subject report, Ref /C/ advised that is possible that hysterisis in the actuator linkage can result in poor autopilot control. In addition, Boeing advised they would like to arrange for a convenient time when we could contact the operator and walk through some BITE tests with an the operator mechanic while in the flight deck of the airplane. As reported previously, the operator has performed adjustments of the Ref /F/ rods numerous times. After adjustment the aircraft would fly for a few days with no write-ups for the subject fault.

Ref /B/ advised that datum airplane was currently operating under MEL for A/P system A. Based on previous experience with this airplane, the operator is investigating whether to change the Ref /F/ rods.

On 22-Nov-2004, Boeing engineering was able to contact the operator personnel who were in the flight deck of the datum airplane. Ref /A/ advised that based on the BITE tests performed and discussions with the operator personnel, it was decided that replacement of both of the A/P elevator actuator rod assemblies (shown in Figure 401 on page 402 of AMM 22-11-26) is the next maintenance action to be taken. Following replacement, the Autopilot Elevator Actuator Adjustment (DFCS BITE Test) (TASK 22-11-26-825-047) must be performed (AMM 22-11-26/501). Note, when installing the rod assembly between the two actuators, the operator needs to tighten the locknuts and lock wire in place on the end.

The operator replaced and adjusted the Ref /F/ rods and released the airplane for service. On 26-Nov-2004 the crew reported that, with A/P "A" engaged and V/S of 2000 FPM selected, aircraft descent was 4,000 FPM. See attached log sheet for details. On 28-Nov-2004, crew reported that with A/P "A" engaged MCP ALT 33,000, FMA- ALT ACQ the airplane started a descent of more than 2000 FPM. Please see attached log sheet for details. Aircraft is currently operating using A/P "B" only.

Attached for review is DFDR data. As reported above, the reported excessive descent rate was during descent into SSH.

The operator is requesting that Boeing review the data and report findings. The operator management has also requested on-site technical assist.

ACTION:

1. Please review the attached DFDR data and report findings.

2. Please advise if Boeing can provide on-site technical assist.

Reply:

Boeing has reviewed the provided FDR data and pilot reports. During the event, the elevator was out of nose up elevator authority while A was engaged, however no trim commands were output by A to pitch the airplane nose up. Four seconds after B was engaged (elevator remained where it was) the stab drove for about 6 seconds which relieved the elevator about 1 degree. There were other times in the data where A did command trim in both directions, so FCC A was capable of trim.

Boeing would recommend the following troubleshooting to verify the FCC stab trim interface as well as verification of the elevator position input to the channel A FCC:

Perform the DFCS Chapter 22 BITE Stab Trim rigging test, Elevator Rigging test (Both Single Authority and Dual Authority tests) and Mach Trim Rigging test. Verify that all the readings for these tests are within limits. As needed, Boeing will be available to support these checks by telecon. Please advise if the operator requests Boeing assistance by telephone during these checks and provide a contact time and number.

The noted condition could also be due to an incorrect FCC calculation of autopilot elevator authority upon which the trim thresholds are based. This calculation uses inputs from the ADCs. To help isolate this possible condition, we would recommend the operator swapping the left and right ADCs and IRUs.

Commercial Aviation Services
The Boeing Company

01-Dec-2004 01:52:43 PM PST

6- BOEING REPLY, EXCESSIVE RATE OF DESCENT
03-Dec-2004 03:38:20 PM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:

This is to advise that Boeing has reviewed the FCC BITE data provided in fax dated 3 December and the data indicates all test results passed and FCC operation appears normal. Therefore Boeing has no further recommendations at this time and recommends using both A and B channel autopilots. In the event the condition occurs again, please provide a listing of any DFCS in flight faults, FCC Bite test results for elevator and stab rigging checks and FDR data for review.

Commercial Aviation Services
The Boeing Company

03-Dec-2004 03:38:20 PM PST

7- BOEING REPLY, EXCESSIVE RATE OF DESCENT:
12/6/2004 5:56:58 AM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
In response to Ref /D/, Ref /C/ advised that Boeing had reviewed the provided FDR data and pilot reports. During the event, the elevator was out of nose up elevator authority while A was engaged, however no trim commands were output by A to pitch the airplane nose up. Four seconds after B was engaged (elevator remained where it was) the stab drove for about 6 seconds which relieved the elevator about 1 degree. There were other times in the data where A did command trim in both directions, so FCC A was capable of trim.

Boeing recommended the following troubleshooting to verify the FCC stab trim interface as well as verification of the elevator position input to the channel A FCC:

Perform the DFCS Chapter 22 BITE Stab Trim rigging test, Elevator Rigging test (Both Single Authority and Dual Authority tests) and Mach Trim Rigging test. Verify that all the readings for these tests are within limits. As needed, Boeing will be available to support these checks by telecon. Please advise if the operator requests Boeing assistance by telephone during these checks and provide a contact time and number.

The noted condition could also be due to an incorrect FCC calculation of autopilot elevator authority upon which the trim thresholds are based. This calculation uses inputs from the ADCs. To help isolate this possible condition, we would recommend the operator swapping the left and right ADCs and IRUs.

Ref /B/ provided results of the above recommended tests.

Ref /A/ advised that Boeing had reviewed the FCC BITE data provided in fax dated 3 December and the data indicates all test results passed and FCC operation appears normal. Therefore Boeing has no further recommendations at this time and recommends using both A and B channel autopilots. In the event the condition occurs again, please provide a listing of any DFCS in flight faults, FCC Bite test results for elevator and stab rigging checks and FDR data for review. The operator has reviewed the Ref /A/ and /C/ responses and is requesting clarification regarding the intermittent trim command output from FCC A. As reported above, the elevator was out of nose up elevator authority while A was engaged, however no trim commands were output by A to pitch the airplane nose up. It was also verified that there were other times in the data where A did command trim in both directions, so FCC A was (is) capable of trim.

The operator is requesting further Boeing recommendations and on-site tech assist.

ACTION:

1. Based on the above data is replacement of the FCC A horizontal position sensor and sensor wiring check recommended?

2. Based on the above data, is an intermittent circuit between FCC A D1671B, pin 42, wire 102-20 to splice SP3677 a possible cause of the intermittent trim UP command?

3. Please advise any additional wiring checks to be performed.

Commercial Aviation Services
The Boeing Company

12/6/2004 5:56:58 AM PST

8- BOEING REPLY, EXCESSIVE RATE OF DESCENT:
09-Nov-2004 03:42:22 PM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
The operator reports that, during descent with A/P A engages, VS mode selected and 1500 FPM selected on MCP panel airplane started a descent with a rate of 3000 FPM. Crew reported that this occurred two times. Crew reported that A/P operated normal.

Maintenance reported the following AFDS Bite results:

Possible Causes
Stab Trim M255
Elevator Pos. Sensor
Stab. Pos. Sen-1

Attached for review is DFDR data for the flight.

ACTION:

The operator requests that Boeing review the submitted DFDR data and advise findings.

Reply,

Boeing has reviewed the FDR data and we do not identify any unusual autopilot operation noted in the reviewed data. The selected V/S is not recorded and therefore it is difficult to determine how well the autopilot is tracking vertical speed. We produced a derivative of the airplane altitude to determine where in the flight the vertical speed was 3000 feet per minute or greater. The resulting vertical speed data plot did not confirm any flight segment that exhibited a vertical speed of 3000 feet per minute or greater. As an added note, if the winds change with altitude, the airplane vertical speed will be upset in the short term from that selected.

Commercial Aviation Services
The Boeing Company

09-Nov-2004 03:42:22 PM PST

9- BOEING REPLY, EXCESSIVE RATE OF DESCENT:
07-Dec-2004 04:19:07 PM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
In response to Ref /D/, Ref /C/ advised that Boeing had reviewed the provided FDR data and pilot reports. During the event, the elevator was out of nose up elevator authority while A was engaged, however no trim commands were output by A to pitch the airplane nose up. Four seconds after B was engaged (elevator remained where it was) the stab drove for about 6 seconds which relieved the elevator about 1 degree. There were other times in the data where A did command trim in both directions, so FCC A was capable of trim.

Boeing recommended the following troubleshooting to verify the FCC stab trim interface as well as verification of the elevator position input to the channel A FCC:

Perform the DFCS Chapter 22 BITE Stab Trim rigging test, Elevator Rigging test (Both Single Authority and Dual Authority tests) and Mach Trim Rigging test. Verify that all the readings for these tests are within limits. As needed, Boeing will be available to support these checks by telecon. Please advise if the operator requests Boeing assistance by telephone during these checks and provide a contact time and number.

The noted condition could also be due to an incorrect FCC calculation of autopilot elevator authority upon which the trim thresholds are based. This calculation uses inputs from the ADCs. To help isolate this possible condition, we would recommend the operator swapping the left and right ADCs and IRUs.

Ref /B/ provided results of the above recommended tests.

Ref /A/ advised that Boeing had reviewed the FCC BITE data provided in fax dated 3 December and the data indicates all test results passed and FCC operation appears normal. Therefore Boeing has no further recommendations at this time and recommends using both A and B channel autopilots. In the event the condition occurs again, please provide a listing of any DFCS in flight faults, FCC Bite test results for elevator and stab rigging checks and FDR data for review. the operator has reviewed the Ref /A/ and /C/ responses and is requesting clarification regarding the intermittent trim command output from FCC A. As reported above, the elevator was out of nose up elevator authority while A was engaged, however no trim commands were output by A to pitch the airplane nose up. It was also verified that there were other times in the data where A did command trim in both directions, so FCC A was (is) capable of trim.

The operator is requesting further Boeing recommendations and on-site tech assist.

ACTION:

1. Based on the above data is replacement of the FCC A horizontal position sensor and sensor wiring check recommended?

2. Based on the above data, is an intermittent circuit between FCC A D1671B, pin 42, wire 102-20 to splice SP3677 a possible cause of the intermittent trim UP command?

3. Please advise any additional wiring checks to be performed.

Reply:

The stab position data is used in determining trim thresholds. We also agree that an open between FCC A D1671B pin 42 would result in the A channel FCC being unable to command a trim up. Therefore, replacement of the stab position sensor and sensor wire verification is recommended.

We understand that the airplane has returned to service and we have no further recommendations at this time.

Commercial Aviation Services
The Boeing Company

07-Dec-2004 04:19:07 PM PST

10- BOEING REPLY, EXCESSIVE RATE OF DESCENT:
12/13/2004 6:06:11 AM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
Refs /A/ thru /E/ discuss subject events and troubleshooting accomplished by the operator and Boeing recommendations.

Pilot reported the following: "During descent to FL160, A/P "A" engaged, FMA displayed ALT ACQUIRE but airplane continued descent." Airplane returned with A/P "B" engaged and no faults were noted. Airplane has been operating using A/P "B".

The operator has provided the attached DFDR data for the event. Please note the altitude reported above may be 1,600 feet vs FL160.

The airplane is currently out of service for troubleshooting.

ACTION:

The operator requests that Boeing review the attached DFDR data and advise findings.

Commercial Aviation Services
The Boeing Company

12/13/2004 6:06:11 AM PST

11- BOEING REPLY, EXCESSIVE RATE OF DESCENT:
13-Dec-2004 11:06:19 AM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
Refs /A/ thru /E/ discuss subject events and troubleshooting accomplished by the operator and Boeing recommendations.

Pilot reported the following: "During descent to FL160, A/P "A" engaged, FMA displayed ALT ACQUIRE but airplane continued descent." Airplane returned with A/P "B" engaged and no faults were noted. Airplane has been operating using A/P "B".

The operator has provided the attached DFDR data for the event. Please note the altitude reported above may be 1,600 feet vs FL160.

The airplane is currently out of service for troubleshooting.

ACTION:

the operator requests that Boeing review the attached DFDR data and advise findings.

RESPONSE:

For this event, it appears that when ALT ACQUIRE was engaged the elevator moved about 1 degree to slow the rate of descent and then remained flat at that value for the 10 seconds it was in the mode. It appears there was not enough elevator authority on the A side to finish pitching the airplane up, and it continued to slowly pitch down until the autopilot was disconnected.

Also during the acquire, the autopilot was not trimming the stabilizer. Since the flaps were at 1, the autopilot trims based on elevator position. Therefore, the autopilot probably could not move the quadrant far enough. Based on this and the previous event, it would appear that the A actuator does not have the required authority, for whatever reason.

Commercial Aviation Services
The Boeing Company

II- CASE of AUTOPILOT OVERBANK

1- Case of Overbank Follow up:

Model: 737 - 500

Pilot Report:

During Departure with LNAV engaged, when selecting A/P "B", A/P "B" engaged then disengaged. After satisfying F/D again A/P selected then autopilot gives more than 35 deg. bank angle and increasing. A/P disconnected again followed by F/D Pitch bar out of view. F/D switches recycled off-on.

After Flap retraction and with aircraft was leveled A/P selected again operates normally (A & B)

Maintenance Action:

- Autoflight system checked on ground from MCDU according to M.M. found operating normal.
- Last flight faults checked, found no faults recorded.
- Both IRS checked found OK
- Flight data recorder removed for read out and aircraft released for flight.
- Snag not repeated on the next flights but FDR read out for the subject flight shows that autopilot exceeds bank angle limitation.
- A/P "B" was deactivated and considered A/P "B" D. Defect according to MEL.

N.B

The airplane has a history in flight control problems, Boeing have the full details.

(Subject Flight FDR raw data available if needed)

2- BOEING COMPANY REPLY
3/27/2005 4:30:18 AM PST

Please do not reply. This message is the acknowledgement of your request.

Your Service Request has been received by The Boeing Company. Your request will be reviewed and a response provided in accordance with your request. Thank you for your inquiry.

SUBJECT: Autopilot Overbank /
DESCRIPTION:
T he flight crew reported the following:

During departure with LNAV engaged, AP "B" selected, the AP "B" engaged then disengaged. After satisfying F/D, again AP selected. At UTC 20:14 the autopilot gave more than 35 degree bank angle and increased. A/P disconnected followed by F/D pitch bar out of view, F/D switches recycled. Flap retraction and leveled, AP selected and operation normal.

Maintenance Action:
the operator maintenance checked on ground Autopilot system from MCDU and per MM no findings. Both IRS checked no finding. FDR removed for analysis and plane released back on flight line. Snag didn't reappear on the next flight. According to FDR the subject airplane had an autopilot exceeds bank angle limitations.
The operator deactivated the AP "B" and considered the AP "B" defected according to MEL.
The FDR raw data is available for Boeing review if required.

Action:
The airplane has a history of heavy flight control per Ref /A/ SR.
The subject Airplane is currently AOG for troubleshooting.
Please review the above information and advise the operator with any recommended troubleshooting.

Commercial Aviation Services
The Boeing Company

3/27/2005 4:30:18 AM PST

3- BOEING COMPANY REPLY
28-Mar-2005 04:47:03 PM PST

REFERENCES:
Ref /A/ SR 1-57258797

SUBJECT: Autopilot Overbank /
DESCRIPTION:
The flight crew reported the following:

During departure with LNAV engaged, AP "B" selected, the AP "B" engaged then disengaged. After satisfying F/D, again AP selected. At UTC 20:14 the autopilot gave more than 35 degree bank angle and increased. A/P disconnected followed by F/D pitch bar out of view, F/D switches recycled. Flap retraction and leveled, AP selected and operation normal.

Maintenance Action:
the operator maintenance checked on ground Autopilot system from MCDU and per MM no findings. Both IRS checked no finding. FDR removed for analysis and plane released back on flight line. Snag didn't reappear on the next flight. According to FDR the subject airplane had an autopilot exceeds bank angle limitations.

The operator deactivated the AP "B" and considered the AP "B" defected according to MEL.
The FDR raw data is available for Boeing review if required.

ACTION:

The airplane has a history of heavy flight control per Ref /A/ SR.

The subject Airplane is currently AOG for troubleshooting.
Please review the above information and advise the operator with any recommended troubleshooting.

As a follow-up, the operator attached the FDR data to Message Number: 1-1A4J4N.

RESPONSE:

We have analyzed the flight data recorder data provided by the operator, and are providing that analysis, followed by troubleshooting suggestions. The figures referred to in the analysis are provided as attachments to this response.

FDR Analysis

Analysis of the FDR data indicate that the overbank resulted when the pilot released the wheel, possibly to engage the autopilot, while the airplane had been trimmed with approximately 1.5 degrees of nose-left rudder pedal. Figure 1 presents the lateral and directional data for the event; for reference, the longitudinal parameters during the event are provided in Figure 2, although they did not play a significant role in the overbank.

The airplane performed a flaps 5 takeoff, becoming airborne at time 546 according to the air/ground logic. The airplane climbed out at 160 KCAS and shortly after lift off initiated a left turn from heading 295 towards heading 170. The wind was out of heading 050, increasing to about 25 knots in the air - this would constitute a quartering right tailwind transitioning to a quartering left tailwind. Note that FDR wind data are not valid on the ground.

At liftoff, the control wheel was deflected to about 25 degree right, and held at that deflection to maintain wings level. As the left turn was initiated, wheel was relaxed back to neutral and then deflected slightly left. At time 570 the wheel was relaxed to neutral and the A/P "B" was engaged - at this time the airplane had zero control wheel displacement but was rolling left at about 2.5 deg/sec. After about 1 sec, the A/P "B" disengaged. The control wheel was then deflected to the right, again to about 25 degrees, and arrested the roll at 30 degrees of left bank. At time 592 the control wheel returned to neutral and the A/P "B" channel was engaged again. As the wheel returned to neutral, the airplane again began to roll left at about 2 deg/sec. At time 597 the A/P "B" disengaged a second time and the CWS ROLL discrete (not shown) briefly engaged for 1 frame. Control wheel was deflected to 40 degrees right, the bank angle returned to zero and then continued right to about 4 degrees, then wheel was relaxed back to about 20 degrees right to hold bank angle between 5-8 degrees right.

During the entire event, from liftoff to the CWS engage and the roll back to 5-8 degrees right, the airplane appears to have been in a small nose-left sideslip. Rudder pedal indicates about 1.5 degrees nose left, and rudder position indicates about 2.7 degrees nose left. Furthermore, lateral acceleration persisted throughout the event at about -.03 g's, another indication of small sideslip angle. <u>A simulation of the event confirms that, for the airspeed, altitude, and airplane configuration, a rudder pedal input of 1.5 degrees would give about 2.7 degrees of rudder and would require about 26 degrees of right wheel to balance. As the airspeed increased (FDR time 605 and on) the rudder blew down, and the amount of wheel required to balance reduced to about 20 degrees.</u>

Figure 3 shows the takeoff roll. At time 505, the engines began to spool up - prior to this, the rudder pedal and rudder position parameters are both very close to zero (neutral). Shortly afterwards, several large pedal and rudder deflections occurred, accompanied by changes in heading. This is not unusual at the beginning of a takeoff roll and generally indicates that the pilot was aligning the aircraft on the runway centerline. By time 530 the rudder pedal deflections had subsided, but the rudder pedal position remained approximately at 1-2 degrees nose-left. The reason for this is unknown, but the deflection of pedal is confirmed by the accompanying rudder deflection of approximately 2-3 degrees nose left.

Figure 4 shows the FDR data after the event. At time 690, the flaps had been retracted to UP, and the airplane was just completing a left turn to heading 170, with bank angle returning to neutral. At this time, the pedal remained deflected at 1.3 degrees nose left, the rudder position was 2.2 degrees nose left, and 20 degrees of right wheel were required to hold the wings level. At this airspeed (now 205 KCAS) the simulation again indicates that this is consistent. As airspeed began increasing toward 250 KCAS, the rudder pedal and rudder position slowly neutralized; this was likely the result of manual trim adjustments by the crew, as the rudder appears to return in steps similar to the trim rate (note the expanded scale on rudder pedal on Figure 4). During the descent, as airspeed increased, the data indicate that the rudder pedal and rudder position remained near neutral, further suggesting that the situation was corrected during the cruise.

Conclusion

The FDR data indicate that PT561 experienced an overbank during an attempted autopilot engage because the airplane was in a small nose-left sideslip as the result of rudder pedal being deflected to approximately 1.5 degrees nose left. The reasons for this are unknown and cannot be determined from the FDR data, but the trim likely arose either from crew trim inputs during the takeoff roll (possibly inadvertent) or from something sticking in the rudder feel and centering unit. The simulation confirms that the sideslip resulting from the pedal input would have required approximately 25 degrees of right control wheel deflection to maintain wings level flight, as indicated by the FDR data. During each attempt to engage the "B" autopilot, the wheel was released to neutral and the airplane rolled at between 2 and 2.5 deg/sec as a result of the sideslip-induced roll.

Past experience with lateral trim issues on 737's would indicate that flap rigging was not a factor, as the roll that can be produced by flap mis-rigging is not nearly large enough to require 25 degrees of control wheel. Small sideslip angles, on the other hand, can produce significant roll asymmetries.

From the data provided, the autopilot was working normally.

We suggest that the operator accomplish the following troubleshooting:

- Do a test of the rudder centering
  AMM 27-21-00 Task S 735-012-001

- Do a test of the rudder pedal forces
  AMM 27-21-00 Task S 735-014-001

- Do the rudder trim control system test
  AMM Task 27-21-00-735-22-001

If any of the above tests are unsatisfactory, visually inspect the rudder feel and centering unit cam roller bearing to verify whether it is rolling on the cam when the rudder pedals are moved. If it is sliding on the cam instead of rolling, the bearing must be replaced.

Commercial Aviation Services
The Boeing Company

If attachments are referred to, and are not present, then the recipient should contact their Field Service Representative to obtain a copy.

named recipients. If you are not an intended recipient, you are hereby notified that any further review, copying, use or dissemination of this message is strictly prohibited. If you have received this message in error, delete it from your computer and/or other storage medium and notify the sender immediately.

28-Mar-2005 04:47:03 PM PST

4- Case of Overbank Follow up:
(Autopilot Overbank
29-03-05.

Dear Sir,
With refer to Boeing "MESSAGE NUMBER:1-1A7XEW", Required rudder tests in process. The operator notices that at 20:15:47, FDR data shows the follow:

Aircraft Roll	34.81
A/P "B"	In Command
A/P Roll Mode	LNAV

And with all previous condition autopilot still engaged till autopilot disconnected by the captain one second later.

Request:

Boeing Recommendation for the above situation.

5- BOEING COMPANY REPLY, 30-Mar-2005 02:01:38 PM PST

The operator has reviewed the FDR readout summary. The operator notes that FDR data point at time 20:15:47 reads:

> Aircraft Roll 34.81
> A/P "B" In Command
> A/P Roll Mode LNAV
> and with previous condition autopilot still engaged until disconnected by the captain one second later.

The operator also notes that the autopilot usually limits roll to approximately 30 degrees while engaged. The operator requests additional explanation regarding the recorded roll angle of 34.81 with the A/P engaged and LNAV selected.

Action:
1) Please review the aforementioned query and provide an explanation.
2) Please advise if any additional troubleshooting is required other than that provided in Activity 1-1A7XEW.

Reply:

Attached is an expanded plot of this event. The autopilot doesn't couple to the surface at the instant it is engaged. It first synchronizes the LVDT in the actuator to the surface position sensor in the quadrant. Also, FDR data is not sampled often enough to be sure of the exact timing; however it is probably the case that the detent solenoid that couples the autopilot to the surface was not actuated until the roll had already reached the maximum bank angle recorded. (The autopilot was engaged after the airplane had already established a roll rate to increase the bank angle to greater than 30 deg). In addition, for this engagement, the initial data point for CMD occurred just prior to the control wheel reaching zero. Since the surface was moving at the time of engagement, synchronization to that surface would take somewhat longer than normal.

We do not have any additional troubleshooting recommendations regarding this event.

Commercial Aviation Services
The Boeing Company

If attachments are referred to, and are not present, then the recipient should contact their Field Service Representative to obtain a copy.

medium and notify the sender immediately.

30-Mar-2005 02:01:38 PM PST

6- Case of Overbank Follow up:
(Autopilot Overbank)
31-03-05

According to Boeing MESSAGE NUMBER:1-1A7XEW:
AMM 27-21-00 Task S 735-012-001carried out found normal, no finding.
AMM 27-21-00 Task S735- 014-001carried out found within limit.
AMM 27-21-00 Task S 735-22-001carried out found normal, no finding.
Also According to MESSAGE NUMBER:1-1AGX8Y
Autopilot "B" D. Defect cleared with no action taken.

7- Case of Overbank Follow up:
(Autopilot Overbank)
Sent: Thursday, April 07, 2005 11:04 AM

As the aircraft return, the Captain on command
recorded his report in the T. Log Book, autoflight was checked from FMC CDU using codes 100 and 300. No recorded faults found. Again after Boeing email was received autoflight checked using codes 100 and 300 on 7th of April,05 found one fault was recorded on flight -1 as follow
* ERROR FCC-B* P2 P SPM TRIP B-8776 A/P DISC.
Nothing else was recorded.

8- BOEING COMPANY REPLY, 13-Apr-2005 01:20:30 PM PST

REFERENCES:
Ref /A/ SR 1-57258797
1-1A4CR1

SUBJECT: Autopilot Overbank /
DESCRIPTION:
The following information has been received from the operator in response to Boeing request for flight fault information:

//QUOTE//As the aircraft return, the Captain on command recorded his report in the T. Log Book, Autoflight was checked from FMC CDU using codes 100 and 300. No recorded faults found. Again after ur. email was received autoflight checked using codes 100 and 300 on 7th of April,05 found one fault was recorded on flt -1 as follow
* ERROR FCC-B* P2 P SPM   TRIP   B-8776   A/P DISC.

Nothing else was recorded.//UNQUOTE//

ACTION:

Please review and advise if Boeing has any additional comments on the subject event or any additional troubleshooting/maintenance recommendations.

Reply:

The Bite fault note on 7 April is most likely not related to the event dated 19 March because the FCC will retain faults for only 9 flight legs.

The BITE message indicates the FCC recorded an internal fault. Also, the ERROR FCC-B indicates the fault was logged while the FCC was in the B channel and this computer was subsequently swapped to the A side when the BITE was interrogated.

Commercial Aviation Services
The Boeing Company

If attachments are referred to, and are not present, then the recipient should contact their Field Service Representative to obtain a copy.

13-Apr-2005 01:20:30 PM PST

Appendix 2-2 Studies of other airplane incidents relevant to autoflight systems

Two cases of malfunctions related to Boeing 737-500 autopilot system were reported by one operator as follows:

I- CASE of “AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT”

1- BOEING REPLY, EXCESSIVE RATE OF DESCENT
11/8/2004 2:25:33 AM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
One Operator reports that during descent with A/P A engages, VS mode selected and 1500 FPM selected on MCP panel airplane started a descent with a rate of 3000 FPM. Crew reported that this occurred two times. Crew reported that A/P operated normal.

Maintenance reported the following AFDS Bite results:

Possible Causes
Stab Trim M255
Elevator Pos. Sensor
Stab. Pos. Sen-1

Attached for review is DFDR data for the flight which started at 2000 GMT and ended at 2110 GMT.

ACTION:

The operator requests that Boeing review the submitted DFDR data and advise findings.

Attachment: autopilot.pdf   Date 11/8/2004 1:38:59 AM

Commercial Aviation Services
The Boeing Company

11/8/2004 2:25:33 AM PST

2. BOEING REPLY, EXCESSIVE RATE OF DESCENT
11/21/2004 2:55:20 AM PST

[MESSAGE NUMBER: 1-STLI4]
FROM: THE BOEING COMPANY

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
In response to the subject report, Ref /A/ advised that is possible that hysterisis in the actuator linkage can result in poor autopilot control. Boeing would be interested in knowing the altitude that was selected during the event and at what altitude the capture maneuver was initiated. Any available FDR data may be helpful in reviewing this event.

Regarding the A/P bite faults, Boeing would like to arrange for a convenient time when we could contact the operator and walk through some BITE tests with an operator mechanic while in the flight deck of the airplane.

Please advise if the operator can support further troubleshooting using a cell phone in the flight deck where the FCC BITE can be performed via telecon with Boeing. If affirmative, please provide a time and phone number that Boeing can contact.

As reported previously, the operator has performed adjustments of the Ref /D/ rods numerous times. After adjustment the aircraft would fly for a few days with no write-ups for the subject fault.

Datum airplane is currently operating under MEL for A/P system A. Based on previous experience with this airplane, the operator is investigating whether to change the Ref /D/ rods.

ACTION:

Please review and advise if Boeing concurs with the operator on replacement of the Ref /D/ rods.

Commercial Aviation Services
The Boeing Company

3- BOEING REPLY, EXCESSIVE RATE OF DESCENT
23-Nov-2004 11:42:51 AM PST

[SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
In response to the subject report, Ref /A/ advised that is possible that hysterisis in the actuator linkage can result in poor autopilot control. In addition, Boeing advised we would like to arrange for a convenient time when we could contact the operator and walk through some BITE tests with an the operator mechanic while in the flight deck of the airplane.

As reported previously, the operator has performed adjustments of the Ref /D/ rods numerous times. After adjustment the aircraft would fly for a few days with no write-ups for the subject fault.

Datum airplane is currently operating under MEL for A/P system A. Based on previous experience with this airplane, the operator is investigating whether to change the Ref /D/ rods.

ACTION:

Please review and advise if Boeing concurs with the operator on replacement of the Ref /D/ rods.

RESPONSE:

Last night, Boeing engineering was able to contact the operator personnel who were in the flight deck of the datum airplane. Based on the BITE tests performed and discussions with the operator personnel, it was decided that replacement of both of the A/P elevator actuator rod assemblies (shown in Figure 401 on page 402 of AMM 22-11-26) is the next maintenance action to be taken. Following replacement, the Autopilot Elevator Actuator Adjustment (DFCS BITE Test) (TASK 22-11-26-825-047) must be performed (AMM 22-11-26/501). Note, when installing the rod assembly between the two actuators, the operator needs to tighten the locknuts and lock wire in place on the end.

Commercial Aviation Services
The Boeing Company

4- BOEING REPLY, EXCESSIVE RATE OF DESCENT
11/30/2004 4:07:08 AM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
In response to the subject report, Ref /C/ advised that is possible that hysterisis in the actuator linkage can result in poor autopilot control. In addition, Boeing advised they would like to arrange for a convenient time when we could contact the operator and walk through some BITE tests with an operator mechanic while in the flight deck of the airplane. As reported previously, the operator has performed adjustments of the Ref /E/ rods numerous times. After adjustment the aircraft would fly for a few days with no write-ups for the subject fault.

Ref /B/ advised that datum airplane was currently operating under MEL for A/P system A. Based on previous experience with this airplane, the operator is investigating whether to change the Ref /F/ rods.

On 22-Nov-2004, Boeing engineering was able to contact the operator personnel who were in the flight deck of the datum airplane. Ref /A/ advised that based on the BITE tests performed and discussions with the operator personnel, it was decided that replacement of both of the A/P elevator actuator rod assemblies (shown in Figure 401 on page 402 of AMM 22-11-26) is the next maintenance action to be taken. Following replacement, the Autopilot Elevator Actuator Adjustment (DFCS BITE Test) (TASK 22-11-26-825-047) must be performed (AMM 22-11-26/501). Note, when installing the rod assembly between the two actuators, the operator needs to tighten the locknuts and lock wire in place on the end.

The operator replaced and adjusted the Ref /F/ rods and released the airplane for service. On 26-Nov-2004 the crew reported that, with A/P "A" engaged and V/S of 2000 FPM selected, aircraft descent was 4,000 FPM. See attached log sheet for details. On 28-Nov-2004, crew reported that with A/P "A" engaged MCP ALT 33,000, FMA- ALT ACQ the airplane started a descent of more than 2000 FPM. Please see attached log sheet for details. Aircraft is currently operating using A/P "B" only.

Attached for review is DFDR data for the 26-Nov event flight leg. As reported above, the reported excessive descent rate was during descent.

The operator is requesting that Boeing review the data and report findings. The operator management has also requested on-site technical assist.

ACTION:

1. Please review the attached DFDR data and report findings.

2. Please advise if Boeing can provide on-site technical assist.

A response by 01-Dec is requested.

Commercial Aviation Services

The Boeing Company

11/30/2004 4:07:08 AM PST

5- BOEING REPLY, EXCESSIVE RATE OF DESCENT
01-Dec-2004 01:52:43 PM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
In response to the subject report, Ref /C/ advised that is possible that hysterisis in the actuator linkage can result in poor autopilot control. In addition, Boeing advised they would like to arrange for a convenient time when we could contact the operator and walk through some BITE tests with an the operator mechanic while in the flight deck of the airplane. As reported previously, the operator has performed adjustments of the Ref /F/ rods numerous times. After adjustment the aircraft would fly for a few days with no write-ups for the subject fault.

Ref /B/ advised that datum airplane was currently operating under MEL for A/P system A. Based on previous experience with this airplane, the operator is investigating whether to change the Ref /F/ rods.

On 22-Nov-2004, Boeing engineering was able to contact the operator personnel who were in the flight deck of the datum airplane. Ref /A/ advised that based on the BITE tests performed and discussions with the operator personnel, it was decided that replacement of both of the A/P elevator actuator rod assemblies (shown in Figure 401 on page 402 of AMM 22-11-26) is the next maintenance action to be taken. Following replacement, the Autopilot Elevator Actuator Adjustment (DFCS BITE Test) (TASK 22-11-26-825-047) must be performed (AMM 22-11-26/501). Note, when installing the rod assembly between the two actuators, the operator needs to tighten the locknuts and lock wire in place on the end.

The operator replaced and adjusted the Ref /F/ rods and released the airplane for service. On 26-Nov-2004 the crew reported that, with A/P "A" engaged and V/S of 2000 FPM selected, aircraft descent was 4,000 FPM. See attached log sheet for details. On 28-Nov-2004, crew reported that with A/P "A" engaged MCP ALT 33,000, FMA- ALT ACQ the airplane started a descent of more than 2000 FPM. Please see attached log sheet for details. Aircraft is currently operating using A/P "B" only.

Attached for review is DFDR data. As reported above, the reported excessive descent rate was during descent into SSH.

The operator is requesting that Boeing review the data and report findings. The operator management has also requested on-site technical assist.

ACTION:

1. Please review the attached DFDR data and report findings.

2. Please advise if Boeing can provide on-site technical assist.

Reply:

Boeing has reviewed the provided FDR data and pilot reports. During the event, the elevator was out of nose up elevator authority while A was engaged, however no trim commands were output by A to pitch the airplane nose up. Four seconds after B was engaged (elevator remained where it was) the stab drove for about 6 seconds which relieved the elevator about 1 degree. There were other times in the data where A did command trim in both directions, so FCC A was capable of trim.

Boeing would recommend the following troubleshooting to verify the FCC stab trim interface as well as verification of the elevator position input to the channel A FCC:

Perform the DFCS Chapter 22 BITE Stab Trim rigging test, Elevator Rigging test (Both Single Authority and Dual Authority tests) and Mach Trim Rigging test. Verify that all the readings for these tests are within limits. As needed, Boeing will be available to support these checks by telecon. Please advise if the operator requests Boeing assistance by telephone during these checks and provide a contact time and number.

The noted condition could also be due to an incorrect FCC calculation of autopilot elevator authority upon which the trim thresholds are based. This calculation uses inputs from the ADCs. To help isolate this possible condition, we would recommend the operator swapping the left and right ADCs and IRUs.

Commercial Aviation Services
The Boeing Company

01-Dec-2004 01:52:43 PM PST

6- BOEING REPLY, EXCESSIVE RATE OF DESCENT
03-Dec-2004 03:38:20 PM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:

This is to advise that Boeing has reviewed the FCC BITE data provided in fax dated 3 December and the data indicates all test results passed and FCC operation appears normal. Therefore Boeing has no further recommendations at this time and recommends using both A and B channel autopilots. In the event the condition occurs again, please provide a listing of any DFCS in flight faults, FCC Bite test results for elevator and stab rigging checks and FDR data for review.

Commercial Aviation Services
The Boeing Company

03-Dec-2004 03:38:20 PM PST

7- BOEING REPLY, EXCESSIVE RATE OF DESCENT:
12/6/2004 5:56:58 AM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
In response to Ref /D/, Ref /C/ advised that Boeing had reviewed the provided FDR data and pilot reports. During the event, the elevator was out of nose up elevator authority while A was engaged, however no trim commands were output by A to pitch the airplane nose up. Four seconds after B was engaged (elevator remained where it was) the stab drove for about 6 seconds which relieved the elevator about 1 degree. There were other times in the data where A did command trim in both directions, so FCC A was capable of trim.

Boeing recommended the following troubleshooting to verify the FCC stab trim interface as well as verification of the elevator position input to the channel A FCC:

Perform the DFCS Chapter 22 BITE Stab Trim rigging test, Elevator Rigging test (Both Single Authority and Dual Authority tests) and Mach Trim Rigging test. Verify that all the readings for these tests are within limits. As needed, Boeing will be available to support these checks by telecon. Please advise if the operator requests Boeing assistance by telephone during these checks and provide a contact time and number.

The noted condition could also be due to an incorrect FCC calculation of autopilot elevator authority upon which the trim thresholds are based. This calculation uses inputs from the ADCs. To help isolate this possible condition, we would recommend the operator swapping the left and right ADCs and IRUs.

Ref /B/ provided results of the above recommended tests.

Ref /A/ advised that Boeing had reviewed the FCC BITE data provided in fax dated 3 December and the data indicates all test results passed and FCC operation appears normal. Therefore Boeing has no further recommendations at this time and recommends using both A and B channel autopilots. In the event the condition occurs again, please provide a listing of any DFCS in flight faults, FCC Bite test results for elevator and stab rigging checks and FDR data for review. The operator has reviewed the Ref /A/ and /C/ responses and is requesting clarification regarding the intermittent trim command output from FCC A. As reported above, the elevator was out of nose up elevator authority while A was engaged, however no trim commands were output by A to pitch the airplane nose up. It was also verified that there were other times in the data where A did command trim in both directions, so FCC A was (is) capable of trim.

The operator is requesting further Boeing recommendations and on-site tech assist.

ACTION:

1. Based on the above data is replacement of the FCC A horizontal position sensor and sensor wiring check recommended?

2. Based on the above data, is an intermittent circuit between FCC A D1671B, pin 42, wire 102-20 to splice SP3677 a possible cause of the intermittent trim UP command?

3. Please advise any additional wiring checks to be performed.

Commercial Aviation Services
The Boeing Company

12/6/2004 5:56:58 AM PST

8- BOEING REPLY, EXCESSIVE RATE OF DESCENT:
09-Nov-2004 03:42:22 PM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
The operator reports that, during descent with A/P A engages, VS mode selected and 1500 FPM selected on MCP panel airplane started a descent with a rate of 3000 FPM. Crew reported that this occurred two times. Crew reported that A/P operated normal.

Maintenance reported the following AFDS Bite results:

Possible Causes
Stab Trim M255
Elevator Pos. Sensor
Stab. Pos. Sen-1

Attached for review is DFDR data for the flight.

ACTION:

The operator requests that Boeing review the submitted DFDR data and advise findings.

Reply,

Boeing has reviewed the FDR data and we do not identify any unusual autopilot operation noted in the reviewed data. The selected V/S is not recorded and therefore it is difficult to determine how well the autopilot is tracking vertical speed. We produced a derivative of the airplane altitude to determine where in the flight the vertical speed was 3000 feet per minute or greater. The resulting vertical speed data plot did not confirm any flight segment that exhibited a vertical speed of 3000 feet per minute or greater. As an added note, if the winds change with altitude, the airplane vertical speed will be upset in the short term from that selected.

Commercial Aviation Services
The Boeing Company

09-Nov-2004 03:42:22 PM PST

9- BOEING REPLY, EXCESSIVE RATE OF DESCENT:
07-Dec-2004 04:19:07 PM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
In response to Ref /D/, Ref /C/ advised that Boeing had reviewed the provided FDR data and pilot reports. During the event, the elevator was out of nose up elevator authority while A was engaged, however no trim commands were output by A to pitch the airplane nose up. Four seconds after B was engaged (elevator remained where it was) the stab drove for about 6 seconds which relieved the elevator about 1 degree. There were other times in the data where A did command trim in both directions, so FCC A was capable of trim.

Boeing recommended the following troubleshooting to verify the FCC stab trim interface as well as verification of the elevator position input to the channel A FCC:

Perform the DFCS Chapter 22 BITE Stab Trim rigging test, Elevator Rigging test (Both Single Authority and Dual Authority tests) and Mach Trim Rigging test. Verify that all the readings for these tests are within limits. As needed, Boeing will be available to support these checks by telecon. Please advise if the operator requests Boeing assistance by telephone during these checks and provide a contact time and number.

The noted condition could also be due to an incorrect FCC calculation of autopilot elevator authority upon which the trim thresholds are based. This calculation uses inputs from the ADCs. To help isolate this possible condition, we would recommend the operator swapping the left and right ADCs and IRUs.

Ref /B/ provided results of the above recommended tests.

Ref /A/ advised that Boeing had reviewed the FCC BITE data provided in fax dated 3 December and the data indicates all test results passed and FCC operation appears normal. Therefore Boeing has no further recommendations at this time and recommends using both A and B channel autopilots. In the event the condition occurs again, please provide a listing of any DFCS in flight faults, FCC Bite test results for elevator and stab rigging checks and FDR data for review. the operator has reviewed the Ref /A/ and /C/ responses and is requesting clarification regarding the intermittent trim command output from FCC A. As reported above, the elevator was out of nose up elevator authority while A was engaged, however no trim commands were output by A to pitch the airplane nose up. It was also verified that there were other times in the data where A did command trim in both directions, so FCC A was (is) capable of trim.

The operator is requesting further Boeing recommendations and on-site tech assist.

ACTION:

1. Based on the above data is replacement of the FCC A horizontal position sensor and sensor wiring check recommended?

2. Based on the above data, is an intermittent circuit between FCC A D1671B, pin 42, wire 102-20 to splice SP3677 a possible cause of the intermittent trim UP command?

3. Please advise any additional wiring checks to be performed.

Reply:

The stab position data is used in determining trim thresholds. We also agree that an open between FCC A D1671B pin 42 would result in the A channel FCC being unable to command a trim up. Therefore, replacement of the stab position sensor and sensor wire verification is recommended.

We understand that the airplane has returned to service and we have no further recommendations at this time.

Commercial Aviation Services
The Boeing Company

07-Dec-2004 04:19:07 PM PST

10- BOEING REPLY, EXCESSIVE RATE OF DESCENT:
12/13/2004 6:06:11 AM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
Refs /A/ thru /E/ discuss subject events and troubleshooting accomplished by the operator and Boeing recommendations.

Pilot reported the following: "During descent to FL160, A/P "A" engaged, FMA displayed ALT ACQUIRE but airplane continued descent." Airplane returned with A/P "B" engaged and no faults were noted. Airplane has been operating using A/P "B".

The operator has provided the attached DFDR data for the event. Please note the altitude reported above may be 1,600 feet vs FL160.

The airplane is currently out of service for troubleshooting.

ACTION:

The operator requests that Boeing review the attached DFDR data and advise findings.

Commercial Aviation Services
The Boeing Company

12/13/2004 6:06:11 AM PST

11- BOEING REPLY, EXCESSIVE RATE OF DESCENT:
13-Dec-2004 11:06:19 AM PST

SUBJECT: AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT

DESCRIPTION:
Refs /A/ thru /E/ discuss subject events and troubleshooting accomplished by the operator and Boeing recommendations.

Pilot reported the following: "During descent to FL160, A/P "A" engaged, FMA displayed ALT ACQUIRE but airplane continued descent." Airplane returned with A/P "B" engaged and no faults were noted. Airplane has been operating using A/P "B".

The operator has provided the attached DFDR data for the event. Please note the altitude reported above may be 1,600 feet vs FL160.

The airplane is currently out of service for troubleshooting.

ACTION:

the operator requests that Boeing review the attached DFDR data and advise findings.

RESPONSE:

For this event, it appears that when ALT ACQUIRE was engaged the elevator moved about 1 degree to slow the rate of descent and then remained flat at that value for the 10 seconds it was in the mode. It appears there was not enough elevator authority on the A side to finish pitching the airplane up, and it continued to slowly pitch down until the autopilot was disconnected.

Also during the acquire, the autopilot was not trimming the stabilizer. Since the flaps were at 1, the autopilot trims based on elevator position. Therefore, the autopilot probably could not move the quadrant far enough. Based on this and the previous event, it would appear that the A actuator does not have the required authority, for whatever reason.

Commercial Aviation Services
The Boeing Company

II- CASE of AUTOPILOT OVERBANK

1- Case of Overbank Follow up:

Model: 737 - 500

Pilot Report:

During Departure with LNAV engaged, when selecting A/P "B", A/P "B" engaged then disengaged. After satisfying F/D again A/P selected then autopilot gives more than 35 deg. bank angle and increasing. A/P disconnected again followed by F/D Pitch bar out of view. F/D switches recycled off-on.

After Flap retraction and with aircraft was leveled A/P selected again operates normally (A & B)

Maintenance Action:

- Autoflight system checked on ground from MCDU according to M.M. found operating normal.
- Last flight faults checked, found no faults recorded.
- Both IRS checked found OK
- Flight data recorder removed for read out and aircraft released for flight.
- Snag not repeated on the next flights but FDR read out for the subject flight shows that autopilot exceeds bank angle limitation.
- A/P "B" was deactivated and considered A/P "B" D. Defect according to MEL.

N.B

The airplane has a history in flight control problems, Boeing have the full details.

(Subject Flight FDR raw data available if needed)

2- BOEING COMPANY REPLY
3/27/2005 4:30:18 AM PST

Please do not reply. This message is the acknowledgement of your request.

Your Service Request has been received by The Boeing Company. Your request will be reviewed and a response provided in accordance with your request. Thank you for your inquiry.

SUBJECT: Autopilot Overbank /
DESCRIPTION:
T he flight crew reported the following:

During departure with LNAV engaged, AP "B" selected, the AP "B" engaged then disengaged. After satisfying F/D, again AP selected. At UTC 20:14 the autopilot gave more than 35 degree bank angle and increased. A/P disconnected followed by F/D pitch bar out of view, F/D switches recycled. Flap retraction and leveled, AP selected and operation normal.

Maintenance Action:
the operator maintenance checked on ground Autopilot system from MCDU and per MM no findings. Both IRS checked no finding. FDR removed for analysis and plane released back on flight line. Snag didn't reappear on the next flight. According to FDR the subject airplane had an autopilot exceeds bank angle limitations.
The operator deactivated the AP "B" and considered the AP "B" defected according to MEL.
The FDR raw data is available for Boeing review if required.

Action:
The airplane has a history of heavy flight control per Ref /A/ SR.
The subject Airplane is currently AOG for troubleshooting.
Please review the above information and advise the operator with any recommended troubleshooting.

Commercial Aviation Services
The Boeing Company

3/27/2005 4:30:18 AM PST

3- BOEING COMPANY REPLY
28-Mar-2005 04:47:03 PM PST

REFERENCES:
Ref /A/ SR 1-57258797

SUBJECT: Autopilot Overbank /
DESCRIPTION:
The flight crew reported the following:

During departure with LNAV engaged, AP "B" selected, the AP "B" engaged then disengaged. After satisfying F/D, again AP selected. At UTC 20:14 the autopilot gave more than 35 degree bank angle and increased. A/P disconnected followed by F/D pitch bar out of view, F/D switches recycled. Flap retraction and leveled, AP selected and operation normal.

Maintenance Action:
the operator maintenance checked on ground Autopilot system from MCDU and per MM no findings. Both IRS checked no finding. FDR removed for analysis and plane released back on flight line. Snag didn't reappear on the next flight. According to FDR the subject airplane had an autopilot exceeds bank angle limitations.

The operator deactivated the AP "B" and considered the AP "B" defected according to MEL.
The FDR raw data is available for Boeing review if required.

ACTION:

The airplane has a history of heavy flight control per Ref /A/ SR.

The subject Airplane is currently AOG for troubleshooting.
Please review the above information and advise the operator with any recommended troubleshooting.

As a follow-up, the operator attached the FDR data to Message Number: 1-1A4J4N.

RESPONSE:

We have analyzed the flight data recorder data provided by the operator, and are providing that analysis, followed by troubleshooting suggestions. The figures referred to in the analysis are provided as attachments to this response.

FDR Analysis

Analysis of the FDR data indicate that the overbank resulted when the pilot released the wheel, possibly to engage the autopilot, while the airplane had been trimmed with approximately 1.5 degrees of nose-left rudder pedal. Figure 1 presents the lateral and directional data for the event; for reference, the longitudinal parameters during the event are provided in Figure 2, although they did not play a significant role in the overbank.

The airplane performed a flaps 5 takeoff, becoming airborne at time 546 according to the air/ground logic. The airplane climbed out at 160 KCAS and shortly after lift off initiated a left turn from heading 295 towards heading 170. The wind was out of heading 050, increasing to about 25 knots in the air - this would constitute a quartering right tailwind transitioning to a quartering left tailwind. Note that FDR wind data are not valid on the ground.

At liftoff, the control wheel was deflected to about 25 degree right, and held at that deflection to maintain wings level. As the left turn was initiated, wheel was relaxed back to neutral and then deflected slightly left. At time 570 the wheel was relaxed to neutral and the A/P "B" was engaged - at this time the airplane had zero control wheel displacement but was rolling left at about 2.5 deg/sec. After about 1 sec, the A/P "B" disengaged. The control wheel was then deflected to the right, again to about 25 degrees, and arrested the roll at 30 degrees of left bank. At time 592 the control wheel returned to neutral and the A/P "B" channel was engaged again. As the wheel returned to neutral, the airplane again began to roll left at about 2 deg/sec. At time 597 the A/P "B" disengaged a second time and the CWS ROLL discrete (not shown) briefly engaged for 1 frame. Control wheel was deflected to 40 degrees right, the bank angle returned to zero and then continued right to about 4 degrees, then wheel was relaxed back to about 20 degrees right to hold bank angle between 5-8 degrees right.

During the entire event, from liftoff to the CWS engage and the roll back to 5-8 degrees right, the airplane appears to have been in a small nose-left sideslip. Rudder pedal indicates about 1.5 degrees nose left, and rudder position indicates about 2.7 degrees nose left. Furthermore, lateral acceleration persisted throughout the event at about -.03 g's, another indication of small sideslip angle. A simulation of the event confirms that, for the airspeed, altitude, and airplane configuration, a rudder pedal input of 1.5 degrees would give about 2.7 degrees of rudder and would require about 26 degrees of right wheel to balance. As the airspeed increased (FDR time 605 and on) the rudder blew down, and the amount of wheel required to balance reduced to about 20 degrees.

Figure 3 shows the takeoff roll. At time 505, the engines began to spool up - prior to this, the rudder pedal and rudder position parameters are both very close to zero (neutral). Shortly afterwards, several large pedal and rudder deflections occurred, accompanied by changes in heading. This is not unusual at the beginning of a takeoff roll and generally indicates that the pilot was aligning the aircraft on the runway centerline. By time 530 the rudder pedal deflections had subsided, but the rudder pedal position remained approximately at 1-2 degrees nose-left. The reason for this is unknown, but the deflection of pedal is confirmed by the accompanying rudder deflection of approximately 2-3 degrees nose left.

Figure 4 shows the FDR data after the event. At time 690, the flaps had been retracted to UP, and the airplane was just completing a left turn to heading 170, with bank angle returning to neutral. At this time, the pedal remained deflected at 1.3 degrees nose left, the rudder position was 2.2 degrees nose left, and 20 degrees of right wheel were required to hold the wings level. At this airspeed (now 205 KCAS) the simulation again indicates that this is consistent. As airspeed began increasing toward 250 KCAS, the rudder pedal and rudder position slowly neutralized; this was likely the result of manual trim adjustments by the crew, as the rudder appears to return in steps similar to the trim rate (note the expanded scale on rudder pedal on Figure 4). During the descent, as airspeed increased, the data indicate that the rudder pedal and rudder position remained near neutral, further suggesting that the situation was corrected during the cruise.

Conclusion

The FDR data indicate that PT561 experienced an overbank during an attempted autopilot engage because the airplane was in a small nose-left sideslip as the result of rudder pedal being deflected to approximately 1.5 degrees nose left. The reasons for this are unknown and cannot be determined from the FDR data, but the trim likely arose either from crew trim inputs during the takeoff roll (possibly inadvertent) or from something sticking in the rudder feel and centering unit. The simulation confirms that the sideslip resulting from the pedal input would have required approximately 25 degrees of right control wheel deflection to maintain wings level flight, as indicated by the FDR data. During each attempt to engage the "B" autopilot, the wheel was released to neutral and the airplane rolled at between 2 and 2.5 deg/sec as a result of the sideslip-induced roll.

Past experience with lateral trim issues on 737's would indicate that flap rigging was not a factor, as the roll that can be produced by flap mis-rigging is not nearly large enough to require 25 degrees of control wheel. Small sideslip angles, on the other hand, can produce significant roll asymmetries.

From the data provided, the autopilot was working normally.

We suggest that the operator accomplish the following troubleshooting:

- Do a test of the rudder centering
  AMM 27-21-00 Task S 735-012-001

- Do a test of the rudder pedal forces
  AMM 27-21-00 Task S 735-014-001

- Do the rudder trim control system test
  AMM Task 27-21-00-735-22-001

If any of the above tests are unsatisfactory, visually inspect the rudder feel and centering unit cam roller bearing to verify whether it is rolling on the cam when the rudder pedals are moved. If it is sliding on the cam instead of rolling, the bearing must be replaced.

Commercial Aviation Services
The Boeing Company

If attachments are referred to, and are not present, then the recipient should contact their Field Service Representative to obtain a copy.

named recipients. If you are not an intended recipient, you are hereby notified that any further review, copying, use or dissemination of this message is strictly prohibited. If you have received this message in error, delete it from your computer and/or other storage medium and notify the sender immediately.

28-Mar-2005 04:47:03 PM PST

4- Case of Overbank Follow up:
(Autopilot Overbank
29-03-05.

Dear Sir,
With refer to Boeing "MESSAGE NUMBER:1-1A7XEW", Required rudder tests in process. The operator notices that at 20:15:47, FDR data shows the follow:

Aircraft Roll	34.81
A/P "B"	In Command
A/P Roll Mode	LNAV

And with all previous condition autopilot still engaged till autopilot disconnected by the captain one second later.

Request:

Boeing Recommendation for the above situation.

5- BOEING COMPANY REPLY, 30-Mar-2005 02:01:38 PM PST

The operator has reviewed the FDR readout summary. The operator notes that FDR data point at time 20:15:47 reads:

> Aircraft Roll 34.81
> A/P "B" In Command
> A/P Roll Mode LNAV
> and with previous condition autopilot still engaged until disconnected by the captain one second later.

The operator also notes that the autopilot usually limits roll to approximately 30 degrees while engaged. The operator requests additional explanation regarding the recorded roll angle of 34.81 with the A/P engaged and LNAV selected.

Action:
1) Please review the aforementioned query and provide an explanation.
2) Please advise if any additional troubleshooting is required other than that provided in Activity 1-1A7XEW.

Reply:

Attached is an expanded plot of this event. The autopilot doesn't couple to the surface at the instant it is engaged. It first synchronizes the LVDT in the actuator to the surface position sensor in the quadrant. Also, FDR data is not sampled often enough to be sure of the exact timing; however it is probably the case that the detent solenoid that couples the autopilot to the surface was not actuated until the roll had already reached the maximum bank angle recorded. (The autopilot was engaged after the airplane had already established a roll rate to increase the bank angle to greater than 30 deg). In addition, for this engagement, the initial data point for CMD occurred just prior to the control wheel reaching zero. Since the surface was moving at the time of engagement, synchronization to that surface would take somewhat longer than normal.

We do not have any additional troubleshooting recommendations regarding this event.

Commercial Aviation Services
The Boeing Company

If attachments are referred to, and are not present, then the recipient should contact their Field Service Representative to obtain a copy.

medium and notify the sender immediately.

30-Mar-2005 02:01:38 PM PST

6- Case of Overbank Follow up:
(Autopilot Overbank)
31-03-05

According to Boeing MESSAGE NUMBER:1-1A7XEW:
AMM 27-21-00 Task S 735-012-001carried out found normal, no finding.
AMM 27-21-00 Task S735- 014-001carried out found within limit.
AMM 27-21-00 Task S 735-22-001carried out found normal, no finding.
Also According to MESSAGE NUMBER:1-1AGX8Y
Autopilot "B" D. Defect cleared with no action taken.

7- Case of Overbank Follow up:
(Autopilot Overbank)
Sent: Thursday, April 07, 2005 11:04 AM

As the aircraft return, the Captain on command
recorded his report in the T. Log Book, autoflight was checked from FMC CDU using codes 100 and 300. No recorded faults found. Again after Boeing email was received autoflight checked using codes 100 and 300 on 7th of April,05 found one fault was recorded on flight -1 as follow
* ERROR FCC-B* P2 P SPM TRIP B-8776 A/P DISC.
Nothing else was recorded.

8- BOEING COMPANY REPLY, 13-Apr-2005 01:20:30 PM PST

REFERENCES:
Ref /A/ SR 1-57258797
1-1A4CR1

SUBJECT: Autopilot Overbank /
DESCRIPTION:
The following information has been received from the operator in response to Boeing request for flight fault information:

//QUOTE//As the aircraft return, the Captain on command recorded his report in the T. Log Book, Autoflight was checked from FMC CDU using codes 100 and 300. No recorded faults found. Again after ur. email was received autoflight checked using codes 100 and 300 on 7th of April,05 found one fault was recorded on flt -1 as follow
* ERROR FCC-B* P2 P SPM TRIP B-8776 A/P DISC.

Nothing else was recorded.//UNQUOTE//

ACTION:

Please review and advise if Boeing has any additional comments on the subject event or any additional troubleshooting/maintenance recommendations.

Reply:

The Bite fault note on 7 April is most likely not related to the event dated 19 March because the FCC will retain faults for only 9 flight legs.

The BITE message indicates the FCC recorded an internal fault. Also, the ERROR FCC-B indicates the fault was logged while the FCC was in the B channel and this computer was subsequently swapped to the A side when the BITE was interrogated.

Commercial Aviation Services
The Boeing Company

If attachments are referred to, and are not present, then the recipient should contact their Field Service Representative to obtain a copy.

13-Apr-2005 01:20:30 PM PST

2.6. Crew Behavior

Note:

All crew behavior subcommittee work has been included in the report with no differentiation between preliminary and otherwise.

The report reflexes the interpretation of the Egyptian Investigation Team and specialized advisors.

2.6.1 Flash Airlines Flight 604 Investigation
Crew Behavior Subcommittee

Definition of spatial disorientation
Spatial disorientation is an incorrect perception of attitude, altitude or motion of one's own aircraft relative to the position of the Earth.

Type I spatial disorientation:
Unrecognized spatial disorientation. No conscious perception of SD.
Distractions are often antecedents to the accident. Crash with no distress or concern expressed. No mayday or other than routine communications. Unusual or inappropriate aircraft attitude, but pilot does not make any appropriate corrective action. Pilot is apparently oblivious to the situation.

Type II recognized:
Conscious manifestation of a problem. Pilots often incorrectly refer to this experience as vertigo. Pilot recognizes conflict between perceived and intended or expected attitude. Can assume that the instruments are operating incorrectly. Might not properly react because of difficulty accepting indicated correct control input or might just be puzzled about the situation. Confusion might persist after recovery and lead to compounding of SD problem.
{Veronneau, S.J.H. & Evans, R.. (2004). Spatial disorientation mishap classification, data and investigation. Previc, F.H. & Ercoline, W.R. (Eds) Spatial disorientation in aviation. American institute of Aeronautics and Astronautics.}

Conditions for establishing spatial disorientation
1. Presence of inaccurate or misleading vestibular cues.
2. Absence of visual cues or presence of misleading visual cues.
3. Presence of a distraction capable of drawing attention away from attitude displays.

Examination of evidence pertaining to specific phases of the accident
1. From the roll input that initiated a right roll from wings level (from around time 104) through the statement by the Capt, "how turning right", (around time 02:44:37), the committee agrees that the above three conditions are met, and it is therefore possible that the Capt was experiencing type I Spatial Disorientation.
2. From the statement by the Capt, "How turning right", to the beginning of sustained left roll (around time 158), evidence for orientation or disorientation is inconclusive given currently available data.
3. After the first officer says "no autopilot commander" and sustained left control inputs begin the committee agrees that there is evidence that someone was properly oriented and manual recovery of the aircraft was initiated.
4. The committee agrees that there is no evidence suggesting spatial disorientation on the part of the first officer.
5. The committee agrees that the flight crew exhibited some positive CRM- related behaviors during the flight; however, further analysis in this area is required.

Closing Comments
This is a preliminary report. More work is needed to comprehensively address all human factors issues relevant to this accident, as needed.

2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004:

According to the meeting held on Aug. 23 – 26, 2004 and attended by representatives from NTSB, BEA and Boeing. The committee agreed that the Captain was possibly experiencing “Type I Spatial Disorientation” in the 1st stage of the accident.

In the 2nd stage the evidence of “Spatial Disorientation Type I” is inconclusive.

In the 3rd stage there is no evidence of this disorder.

On 15 February, 2005 a message was received from NTSB including analysis of the Captain Behavior.

The scenarios included the word “Confusion “and not “Spatial disorientation type I “.

Here is a comparative analysis of different labels of the Captains behavior.

Confusion:

By definition confusion means: a state of mild disturbance of consciousness where the person is perplexed and fails to distinguish properly different stimuli around him. It is caused by internal factor as illness; sever fatigue, drugs … etc.

Differentiation from similar conditions can be shown in the following table:-

	Duration	Onset & Termination	Other crew members	Appropriate corrective action	Response to calls	Tone of speech	Reaction time	Insight	Anxiety	Astonishment	Rate of conversation	Orders
Confusion	Long	Gradual	Not affected	Slow	Slow	Slurred	Prolonged	Partial	Probable	None	Few	Few
Spatial disorientation type I	Short	Sudden	May be affected	None	N.	N.	N.	None	None	None	N.	N.
Distraction	Short	Sudden	Usually affected	Yes	Can be normal	May be anxious	N.	N.	Yes	High	Few	Few
Mistake	Short	Sudden	Not affected	Yes	N.	N.	N.	None	None	None	N.	N.

Captain:

We apply the above table to the circumstances of the accident. The highest probability is that the captain suffered from distraction accuracy during the 1st stage only.

In favor of distracting:

The 1st part of C.V.R. shows the talk and behavior of captain is completely normal.

The captain was the 1st to attract attention of the rest of the crew that something wrong is happening in the airplane "*see what the airplane did* ".

This distraction could not be detected in the 2nd or 3rd stage.

This was shared by other crewmembers, as they assisted the captain in the same direction. Their observation and responses were centered on "right bank" and "autopilot".

Captain was alert with good concentration in the 2nd and 3rd stage as shown by his orders, responses and 3 appropriate actions taken (to the left):

- 1st action Lt input after words "How Right" يميني إزاي
- 2nd action Lt input "OK come out"
- 3rd action Lt input "OK come out"

During 1st stage (critical stage) there was signs indicating astonishment (How Right) also signs of Hesitation (turning right sir).

Crew members:

Include 3 persons Captain, 1st officer and extra crew 1.

Their behavior can be analyzed through two stages of C.V.R. record.

1st period (Pre-critical)

There were talks in between all crew members and between crew members and A.T.C. and attendant. Answers and comments are immediate and correct pointing to normal orientation and concentration. The mode and content of sentence show no evidence of disturbance of mood or intellectual functions. The conversations were calm and decisive with no evidence of anxiety or tension. There is no evidence of Euphoria or depressed mood.

2nd period (Critical)

Starting by the phrase "Eddilo" (time 2:44:1) this was followed in few seconds by an important observation of the captain indicating that something is going wrong with the airplane.

This was followed by a l---- period of hesitation, astonishment lasting for less than ten seconds.

These manifestations were mostly evident with the captain. This period ended by the captain saying "how turning right ", then " OK come out ".

During this stage of hesitation the other crew members F.O. & extra crew 1 their comments and answers were correct but the responses are anxious and rapid.

All crewmembers are anxious during this period of hesitation and astonishment ended by the captain saying "how turning right ".

All these problems were corrected to normal in the remaining period (after OK come out) according to the table of differentiation these are manifestation of distraction.

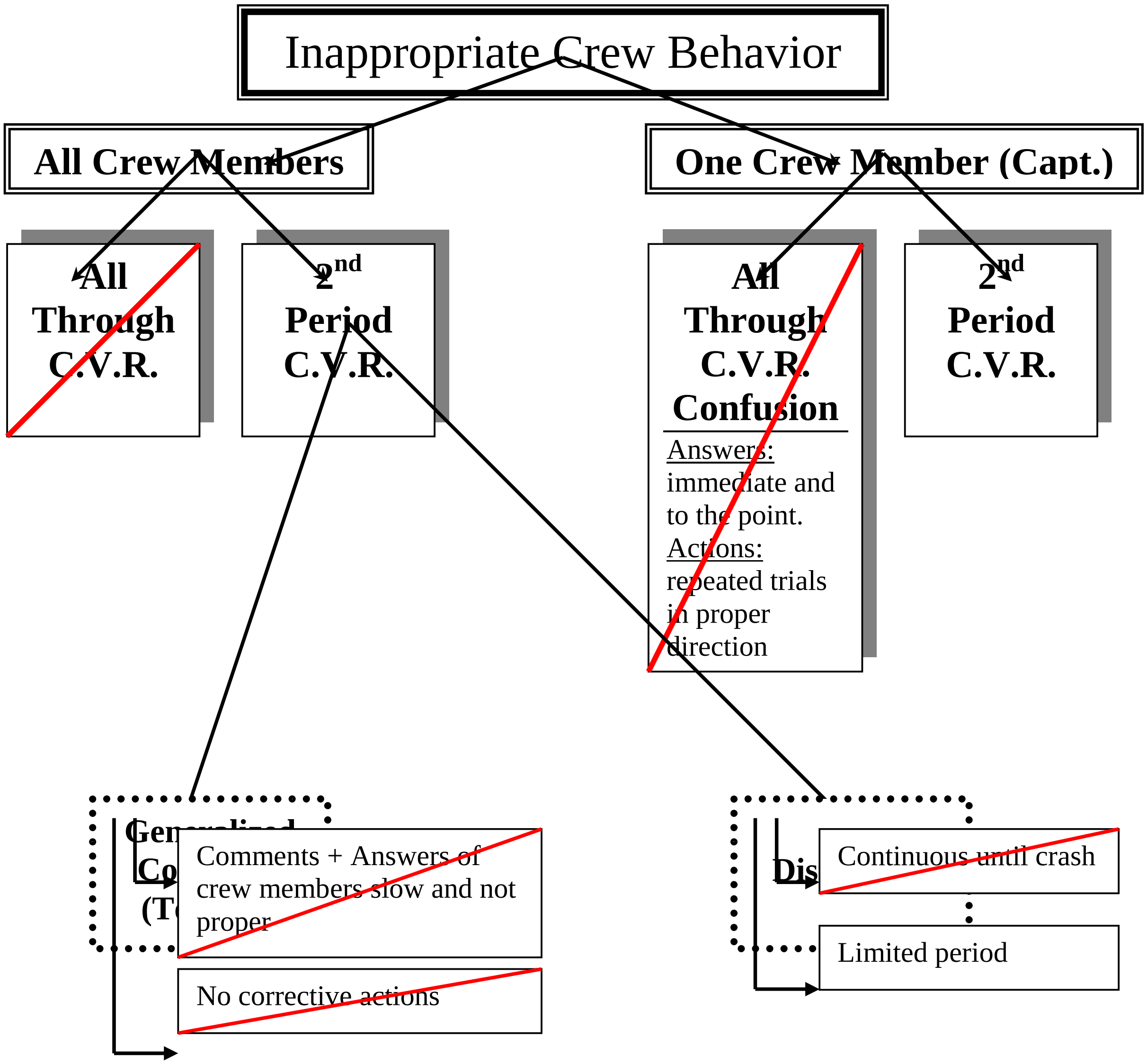
Both F.O. and extra crew 1 did not contradict the captain's orders or actions until the end of accident. This shows that in their estimation the captain was acting in the proper way.

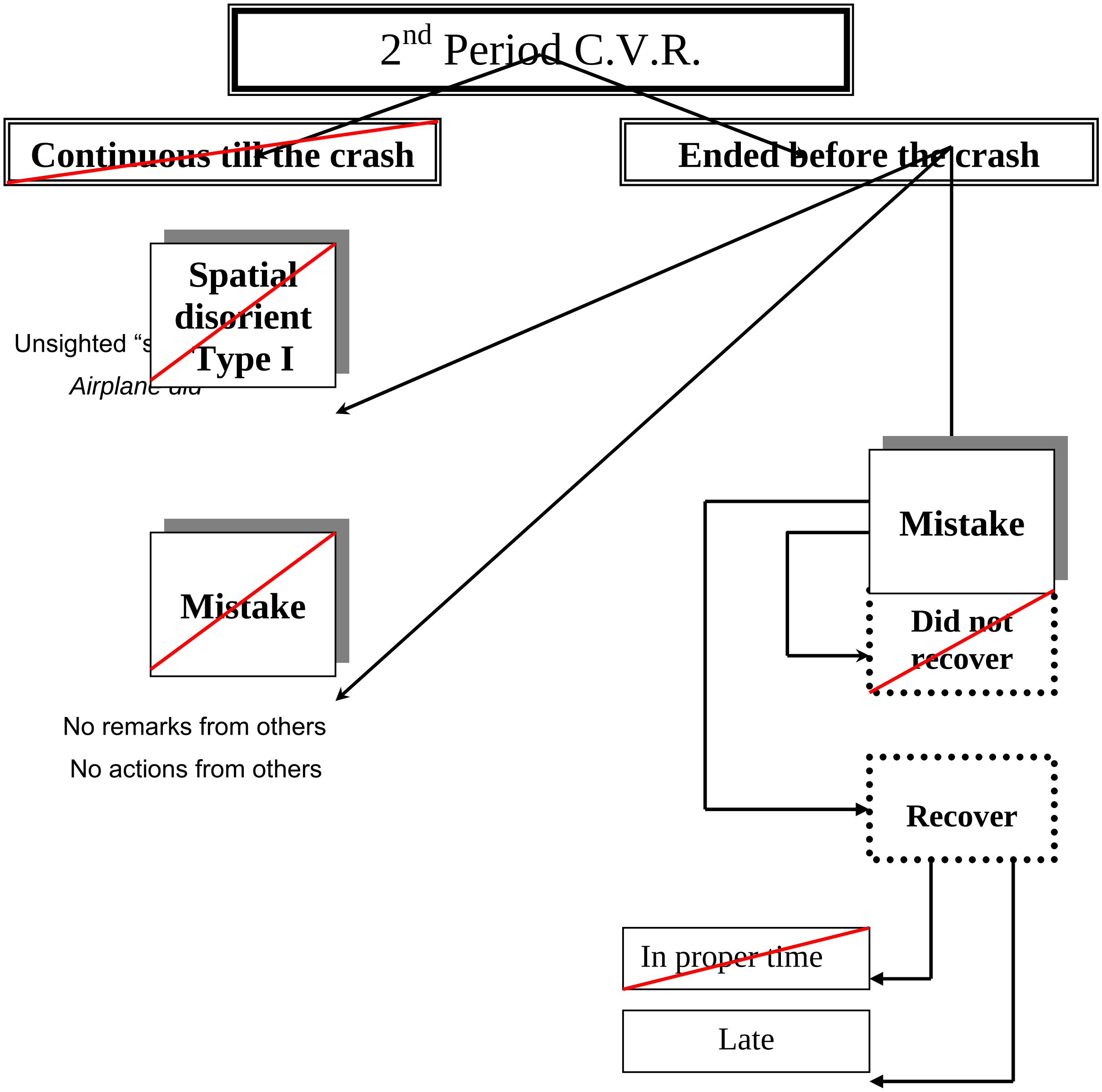
If they felt he is wrong they would have (at least) suggest any other action.

As the crew were in stress this logically abolishes the respect of seniority.

If captain is acting wrongly they would have screamed loudly and aggressively there is no evidence of this (C.V.R.).

The extra crew 1 is an experienced pilot – Age 42 – (4000 h. flight)


Inappropriate Crew Behavior
All Crew Members
One Crew Member (Capt.)
All Through C.V.R.
2nd Period C.V.R.
All Through C.V.R. Confusion
Answers: immediate and to the point.
Actions: repeated trials in proper direction
2nd Period C.V.R.
Comments + Answers of crew members slow and not proper
No corrective actions
Continuous until crash
Limited period



2nd Period C.V.R.
Continuous till the crash
Ended before the crash
Spatial disorient Type I
Unsighted “s
Airplane did
Mistake
No remarks from others
No actions from others
Mistake
Did not recover
Recover
In proper time
Late

2.6.3 Flash air CBS Sub-group comments (25 August 2005)

Flash Air CBS Sub-group Working Document

24 August 2005

Initial Factors for which we have evidence

Factors Conducive to a Fatigued State – Time of day, cumulative work hours, 2(3) early morning departures

Factors Conducive to the Occurrence of Spatial Disorientation- Dark night,, previous Russian ADI experience, low time in type,

Factors Conducive to a Authority Gradient Between Captain and Copilot: (a) large differences in aviation experience (Captain 7000 hours, copilot 800 hrs), (b) percieved differences in social status/rank (Captain retired Air Vice Marshal with prior military career, Copilot just beginning his career in aviation with no prior distinction), (c) large differences in age (53 years / 25 years)

The following facts exist

- No training in spatial disorientation, upset recovery, automation, or CRM training provided by Flash Airlines (not required by civil aviation)
- Captain and Copilot low time in type (automation, handling)

Pre takeoff events

Checklist execution and handling of interruptions-generally good

**Captain's questions regarding Cairo ceiling info provided by ATC – CRM issue because he never resolves the F/O and observer uncertainty on this issue

Discussion between Capt. and engineer regarding unknown aircraft discrepancy - Not enough information to evaluate crew handling of this issue

Takeoff briefing "Standard briefing." Airmanship and CRM issue – lack of professionalism and it is the first departure of day

Pre takeoff events

[Before takeoff Checklist– item change for CVR, he did say “Before takeoff check….”-transcript]

2:41:34 - Captain’s request that F/O verify departure altitude FO not repeating question to ATC initially- possible fatigue and workload factor in not hearing captain’s request to check altitude CRM - issue because of F/O’s responses.

Captain’s request that F/O verify departure altitude Fatigue or confirmation issue– Captain should have heard altitude during initial clearance from ATC. Also, altitude was already set in MCP heading.

Departure events

**Captain is possibly not using boom mike – professionalism/CRM or possible unintentional error unchallenged by F/O.

Captain's first heading select call occurred below 10 feet AGL, Error in sequence as he called it early. Possible fatigue issue. TOGA display inoperative proceedure called for heading select at 400 feet.

Departure events

- Failure to track pitch and airspeed deviations (22 degrees up and -30 knots speed error/eventually 35 knots) – indicators of distraction and possible fatigue. Failure to track FD for 15 seconds prior to autopilot call (25 seconds total), indicative of distraction (attention directed elsewhere), SD in pitch axis (following vestibular cues) – other items or inattention (from attempt to engage autopilot for last 10 seconds) or slow response

- Attempted autopilot engagement, disengagement, and subsequent mode changes- created a period of distraction. CRM issues - communications unclear during event, inadequate post event clarification; FO issued duties of after takeoff checklist and this item- after takeoff checklist completed not heard – could be reason for FO actions during this time

After takeoff issues

- Beginning of right bank- (at time of heading select statement)--- Lack of a quick correction indicates distraction from the attitude indicator, vestibular perceptions are inaccurate, captain does not realize airplane is entering a right bank, and the result is spatial disorientation for the captain. Distraction could result from any of the following causes: Fixation on a particular display or display element, following a shortest-distance flight director command (from undocumented MCP heading selection), lack of attention to roll and pitch with corresponding trim effects, or reflection on problems that may have occurred or the previous autopilot sequence or unexpected aircraft response or focusing on something else. CRM issue - FO not issuing timely notification of undesired bank – fatigue, distraction, authority gradient [Note: look at possibility of “step function” leans.]

- Captain’s statement “See what the aircraft did” and lack of verbal response from F/O – CRM, fatigue issues. Captain has never clearly communicated what is going on since the time of his exclamation during the attempted autopilot engagement sequence. Continued right bank indicates he is still distracted from airplane control.

After takeoff issues

- Lack of communications of the crew during right turn –CRM -regarding unintentional right turn or unsuccessful attempt to maintain wings level at 140 heading -22 seconds- fatigue (inattention/distraction)

- “Turning right sir” exchange- Indicates Captain is spatially disorientated and F/O is not. Captain’s reaction accompanying reply, “Ah” is to increase roll to the right for first 4 seconds – indicates SD, possible fatigue,, fixation on inappropriate element of attitude display (e.g., roll pointer) / perceptual reversal.

- “How turning right” exchange- attempt to get an explanation from self or FO. Indicates SD is being recognized and is transitioning to type 2 SD, captain attempting to resolve conflict between his internal perception of attitude and the attitude shown on the EADI (Took 18 to 20 seconds for resolution in one previously documented accident, or 27 to 33 seconds to resolve and stabilize airplane from climbing right attitude in Air Force study). No FO statement indicates inadequate CRM.

Departure events

“Ok, come out”- expression of necessity of action / statement of desired outcome. During an area of generally sustained inputs in the wrong direction there is aileron movement for a period of 3 seconds in the correct direction of movement with movement past neutral for 1 second.

Overbank callout by FO- Indicates CRM issues – late callout, (not directive).

Capt response to first overbank callout – no direct response and may not have been need based on his previous words

Wheel oscillations for the next 13 seconds, predominantly to right – oscillating wheel motions predominantly in inappropriate direction resulting in increased right bank.

“Autopilot” (Capt) – Suggests captain is looking for a solution to correct the overbank problem and/or spatial disorientation (bailout mechanism). Similar to previous statement autopilot engage, differs from previous comments describing problems (“edillo”, “see what the ...”) Command is inappropriate because the AP is not intended to recover from unusual attitudes. (Ref FCTM 1.30).

“Autopilot in command” (FO) - automatic response (when FO pushes AP button) following captain’s order

Departure events

“tsk, tsk” sound – vocalization by FO expressing disapproval or uncomfortable with situation.

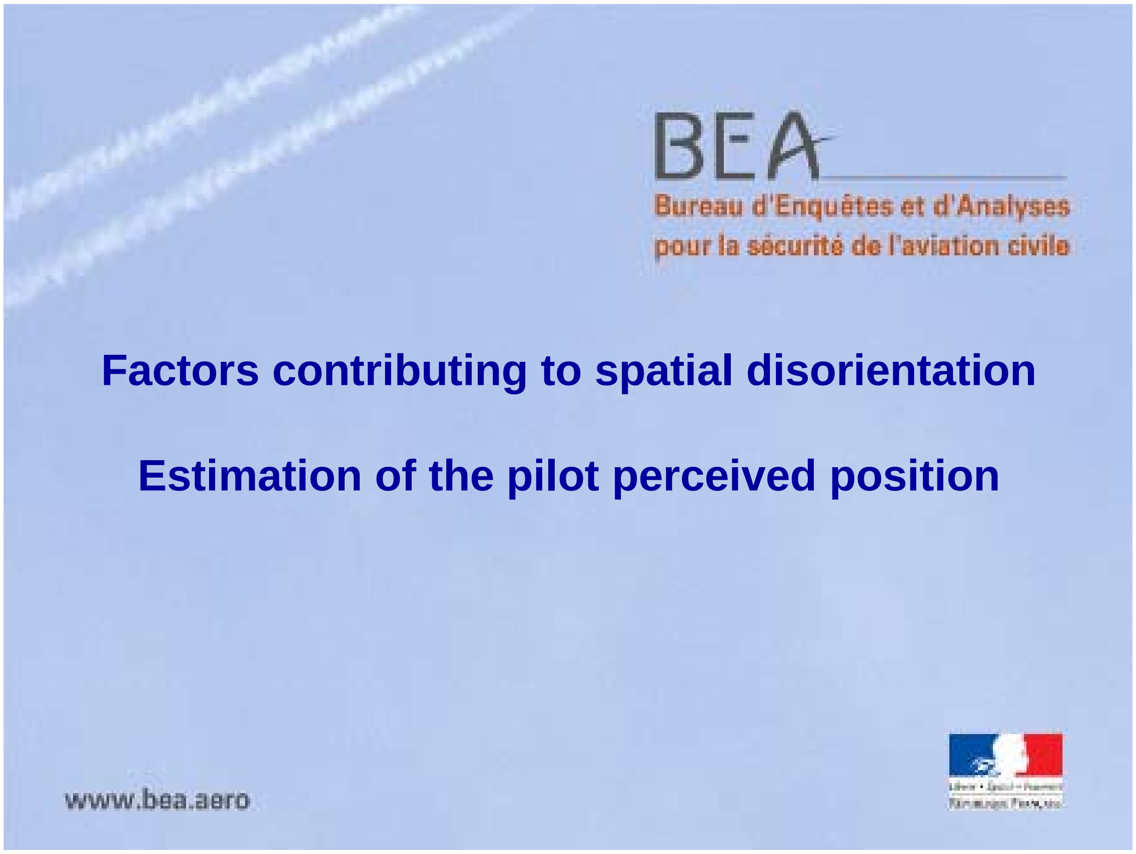
“Overbank, Overbank, Overbank” by FO. F/O continues to provide same observational callout, and does not escalate his assertiveness by asking questions, providing suggestions, issuing commands, or taking control of the airplane. Indicates possible problems with – inexperience, authority gradient

“No autopilot commander” - First officer is observing and communicating that autopilot is not connected.

Retard power calls from observer – comment very late in sequence. Observer did not comment on unsafe condition developing in the flight deck until very late in the sequence

Recovery effort - appropriate roll and power inputs, but pitch inputs were insufficient to recover within remaining altitude.

2.6.4 Major factors contributing to Spatial Disorientation (Contribution by BEA)



Major factors contributing to Spatial Disorientation

- ***Flight environment***
  - Night flying
    - Absence of clear references (lack of clear horizon, ground/sky confusion…)
    - Erroneous false horizons (shoreline, sloping cloud bank…)
    - Isolated light sources
  - IFR flights
    - Transfer from external visual to instruments cues
  - Flight over featureless terrain
    - False perception of height

- ***Aircraft Factors***
  - Inadequate or inoperative instruments
  - Visibility of instruments

BEA

Major factors contributing to Spatial Disorientation

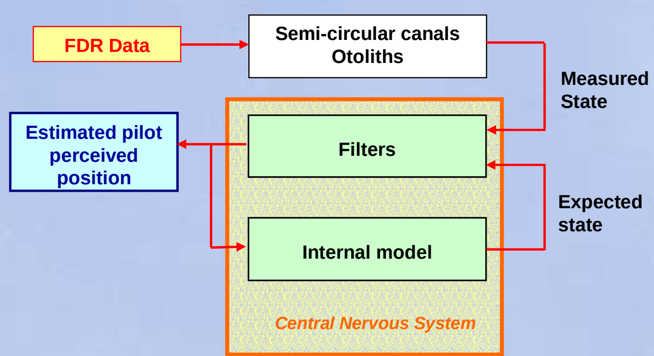
- ***Flight maneuvres***
  - Prolonged angular motion
    - sustained motion not sensed
    - somatogyral illusions on recovery
    - no sensation of bank during coordinated turn
    - cross-coupled and "g-excess" illusions if head movement is made while turning
  - Subthreshold changes in attitude
    - "the leans" induced on recovery
- ***Air crew Factors***
  - Training, flight experience, and proficiency in instrument flight
  - Physical and mental health
  - Alcohol and drugs
  - Workload and capacity
    - Fatigue
    - Circadian disrhhythmia (jet lag)
    - Additional communications or tasks

BEA

ESTIMATED PILOT PERCEIVED POSITION

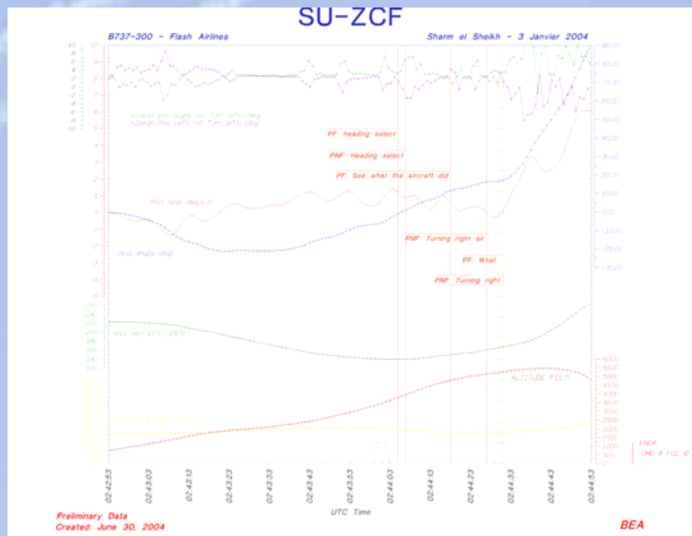
Merfeld, "Observer Theory Model", 2001

– Source:
  - FDR data
– Limitations:
  - No visual orientation data, no audio, proprioceptive inputs
  - Individual differences – especially threshold
  - Possible head movements not taken into account
– Results:
  - Estimated pilot perceived position



BEA

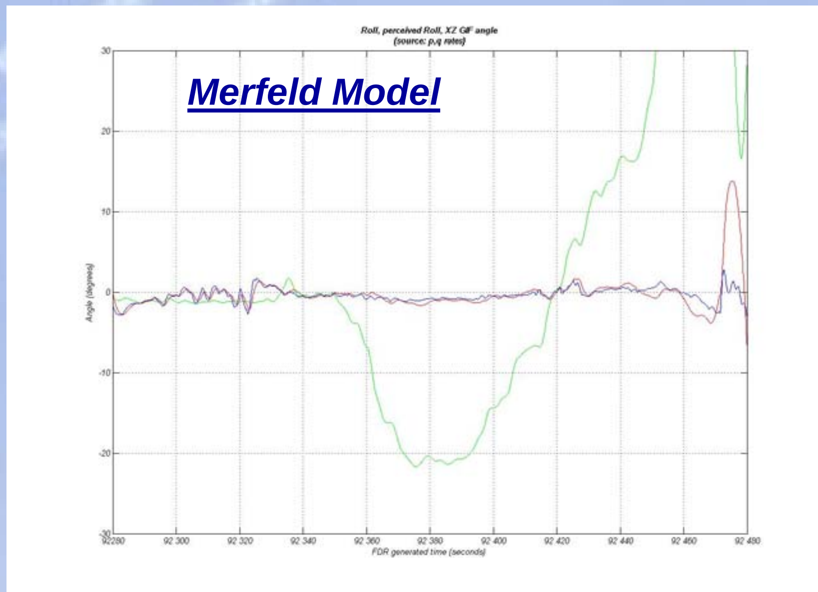
Roll, Roll rate and aileron movements



- ➢Possible sub-threshold roll input
  - ⇨Inducing "the leans" at the end of the turn
- ➢Prolonged angular motion
  - ⇨Approximately 50 seconds of slow roll rate to the right
  - ⇨Large aileron input to the right at the end of the slow roll rate

BEA

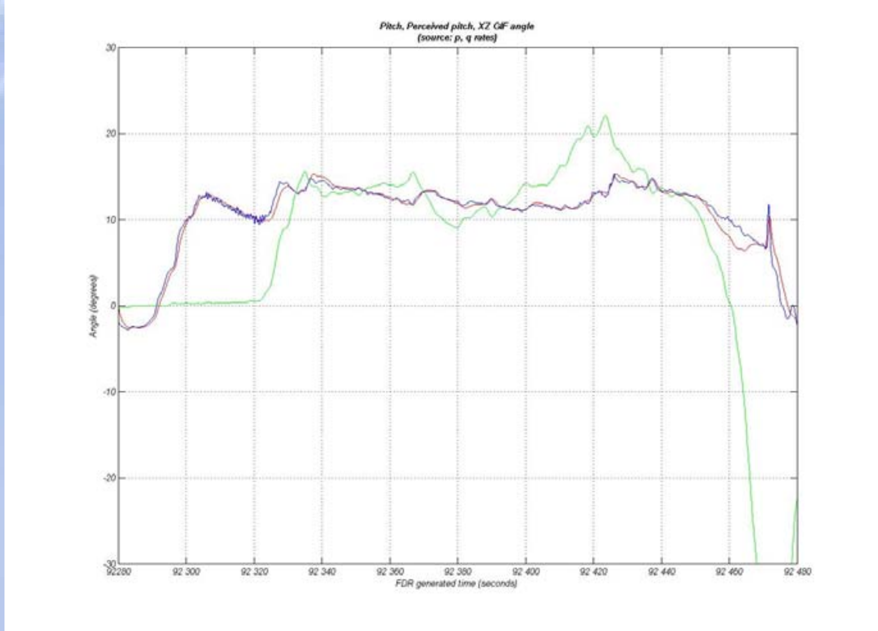
Roll, YZ GIF angle, Perceived Roll



- ➢Low sensation of the sustained and prolonged roll rate to the right
- ➢Low sensation of bank during turn to the right
    - ⇨Confirmation of Mc GRATH results

BEA

Pitch, XZ GIF angle, Perceived Pitch



BEA

2.6.5 Fatigue study in collaboration (Contribution by BEA)

LAA :

Laboratory of Applied Anthropologie

part of medicine university PARIS V

Activity : ergonomics

–Biomecanics,

–Psychophysiology,

–chronobiology

Numerous works in aviation for the DGAC and the BEA

BEA

Data and limitations

- Flight periods extracted from the factual report
  - Period 1 month
- Repositionning flights : unknown
- activity between the flights : unknown

The Avoidance of Excessive Fatigue in Aircrew

Arab Republic of Egypt ECAR Part 121
Ministry of Civil Aviation

- **Maximum cumulative duty hours** : the average weekly total of duty hours shall not exceed **50 hours, averaged over any 4** consecutive weeks. All types of duty, flying duty, ground duty, split duty, standby and positioning shall be counted in full for this purpose
  - We don't have the information (repositioning, standby…)
- **Maximum monthly flying hours**: the maximum number of flying hours which a cockpit crew member may be permitted to undertake during any **30 consecutive days shall be 100**.
  - According to the factual documents : nearly 80 flight hours

  discrepancies between the data collected in the factual report and the FDR data

  we're unable to conclude about these points of the regulation

but

BEA

Crewmembers shall :

- Not work more than seven consecutive days between days off;
  - 20/12 to 27/12 : **8 days without days off,**
- Have 2 consecutive days off in any consecutive 14 days;
  - 18/12 to 3/01 : **16 days without 2 consecutive days off.**

BEA

Results : cpt

Duty time (last month) :

- At least 140 duty periods hours
- At least 80 flight hours
- Period of 8 consecutive days on duty (legislation 7)
- Period of 16 consecutive days on duty, with only 1 day off (legislation 14)

BEA

Arab Republic of Egypt **ECAR Part 121**
Ministry of Civil Aviation

- The ECAA will **conduct periodic and spot checks of operator's records** and pilot in command reports to assess whether the operator's planning of flight schedules and duty in general is producing results which are **compatible with the limitations** provided for in the operator's scheme.
  - Available report ?

BEA

Results

- No evidence of circadian disrythmia (jet lag),
- **Heavy workload** for the captain
- **Sleep deficit** due to
  - workload,
  - Planning (2 early take-off in 2 days, copi 3)
- Influence of the new year celebration (ldg 2300 the 31 december), repositioning flights ?

BEA

Crew performance and fatigue

Sleep and alertness

Recommendations guide 1998

LAA

dgac

BEA

Results : fatigue

- Physiological
  - Reduces
    - Muscular strengh
    - Binocular vision
    - Muscular coordination
  - Increases
    - Visual accomodation delay
- Psychological
  - Reduces
    - Memory
    - Ability to communicate and cooperate
    - vigilance
  - Increase
    - Irritability, anxiety
    - Lapses, Errors
    - Response time…

Conclusion:

important to take into account the **influence of the fatigue (contributive factor)** in the crew behaviour (interference with spatial desorientation, CRM…)

need to know the **exact planning** to amend the LAA study

BEA

2.6.6 Flash Air Flight 604 Perceptual Study (Contribution by NTSB)

Flash Air Flight 604 Perceptual Study

B737
NIGHT TAKE-OFF

Preliminary Findings 20 AUG 2004

Braden J. McGrath, PhD.

Aircraft data from the flight data recorder (FDR) that influences spatial orientation is currently being analyzed and evaluated at NAMRL at the request of William J. Bramble, Jr., Ph.D., Senior Human Performance Investigator, National Transportation Safety Board, Office of Aviation Safety, Human Performance Division.

Background

Spatial disorientation (SD) and subsequent loss of situation awareness (LSA) mishaps for military air forces, commercial aviation, and general aviation have an estimated annual cost in the billions of dollars. From 1999 to 2002, the US Navy experienced 36 mishaps where SD was a major causal factor. The Naval Aerospace Medical Research Laboratory (NAMRL) has developed an SD mishap analysis tool to support US Navy mishap boards in their investigations, to provide insight into the problem of SD in naval aviation, and to train aviators to avoid SD mishaps. The SD mishap analysis tool uses spatial orientation models and computer animation techniques to produce three-dimensional (3-D) computer simulations of SD mishaps.

NAMRL provides no-cost assistance to other government agencies as it allows NAMRL researchers to make improvements to the SD mishap analysis tool by gaining access to different types of mishap profiles and data not often available in Navy mishaps. In particular, NAMRL is assisting the NTSB for the Flash Air Flight 604 mishap as it allows NAMRL researchers to investigate a mishap that has low rotation rates in a 1 G environment, and access to FDR data not often available in Navy mishaps.

Method

Step 1: Using data from the flight data recorder, estimates of the 3-D angular position and velocity, and 3-D linear acceleration experienced by the pilot of the mishap aircraft are calculated using the mathematical analysis software package, MatLab™ (The MathWorks, Inc.) in a format required for the SD analysis

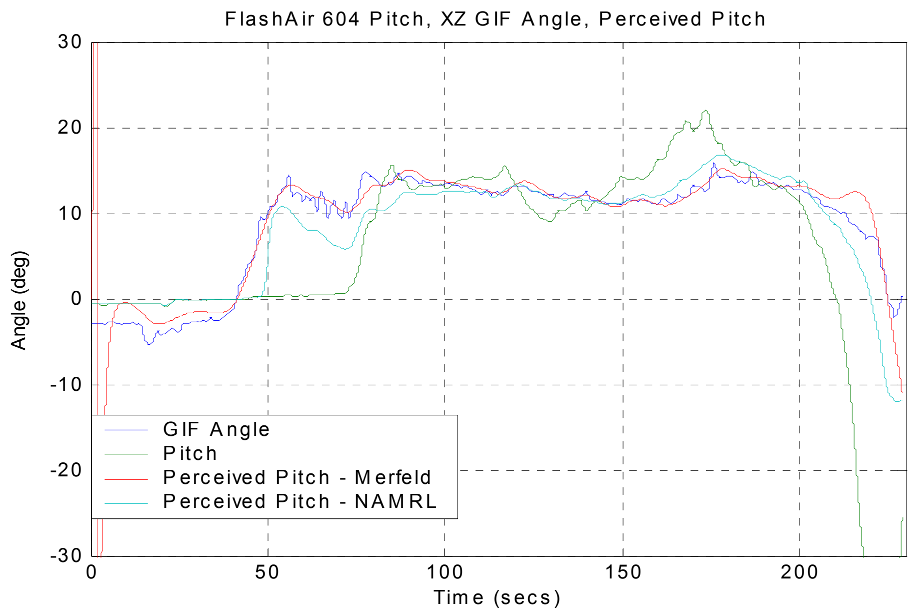
Step 2: The estimates of the 3-D angular position, angular velocity, and linear acceleration of the mishap aircraft are input into two spatial orientation models to produce an estimate of perceived pilot orientation. The SD mishap analysis tool uses both an observer theory model (Merfeld, 2001), and a classical systems model (Grissett, 1993) to estimate spatial orientation perception using the modelling analysis software package Simulink™ (The MathWorks, Inc.). Both of these spatial orientation models do not include visual or somatosensory inputs, and are based on vestibular models from current literature and additional data from centrifuge, aircraft experiments, and aircraft mishaps gathered at NAMRL over the previous 40 years. The spatial orientation models assume that the pilot is not using outside visual horizon cues, and the pilot does not look at the aircraft instruments.

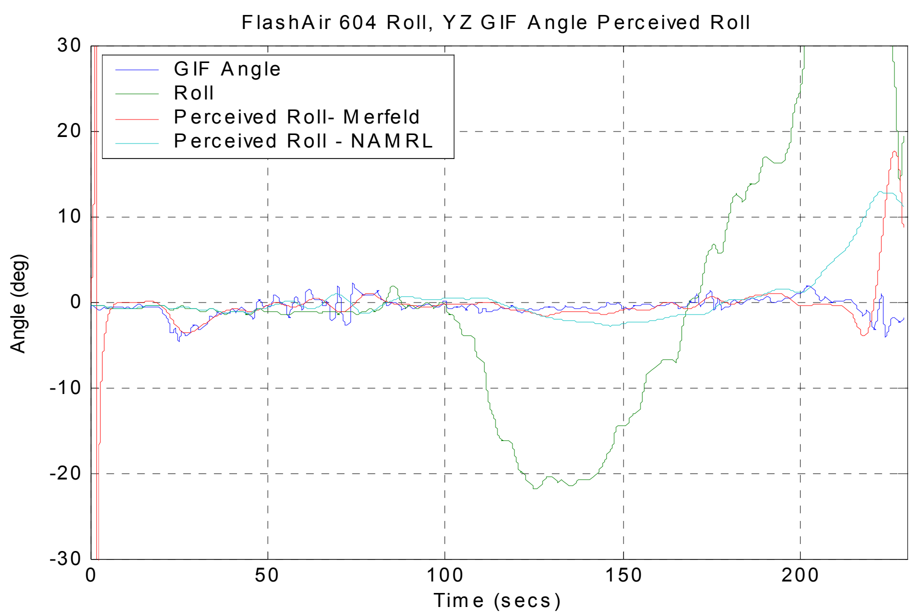
Step 3: To determine the accuracy and validity of the perceived pilot orientation, including analyses when the model results are significantly different, the perception results can be evaluated using data from other sources, including pilot control inputs, expert advice on the mission, cockpit voice recorder and eyewitness accounts. If required, the estimated perceptual results are modified to overcome the limitations of the spatial orientation models to produce a more accurate estimation of the perceived pilot orientation.

Results

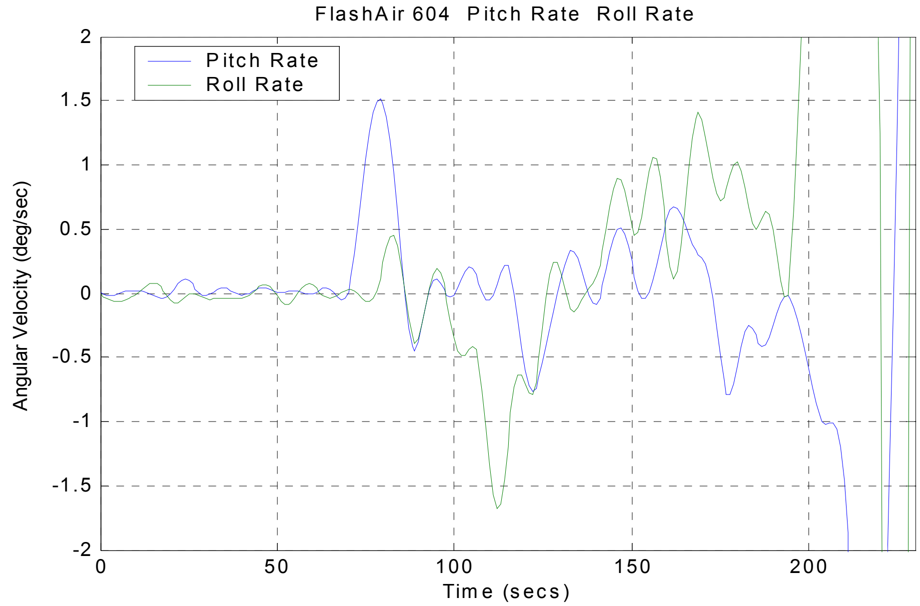
Step 1 is incomplete as the data analysis assumes pilot is situated at the FDR sensor location. If requested, NAMRL will recalculate the data using accurate pilot – sensor position data. For Step 2, both the NAMRL model (Grissett, 1993) and the Merfeld model (Merfeld, 2001) analyses are complete.

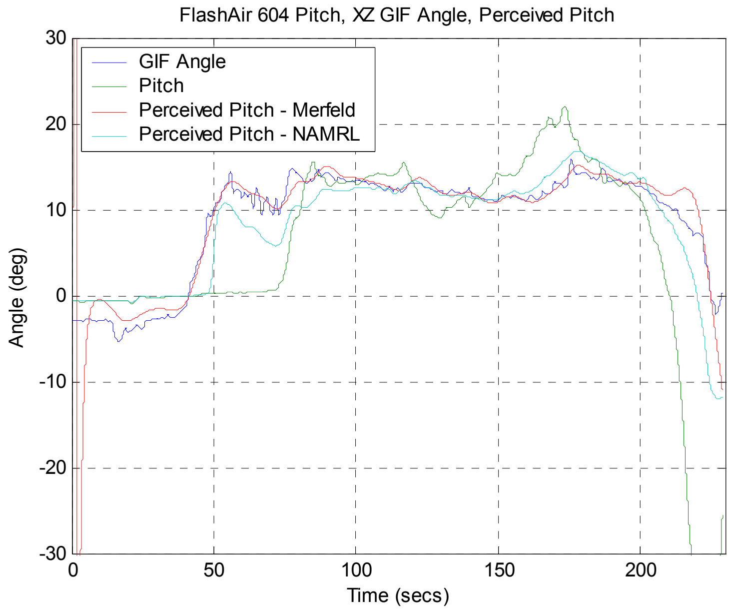
1) There is a difference between the resultant gravito-inertial vector angle and the aircraft attitude in pitch and roll. Due to this difference, both perceptual models estimate pitch and roll misperception. not been validated by additional analysis using the Merfeld or other perceptual models .

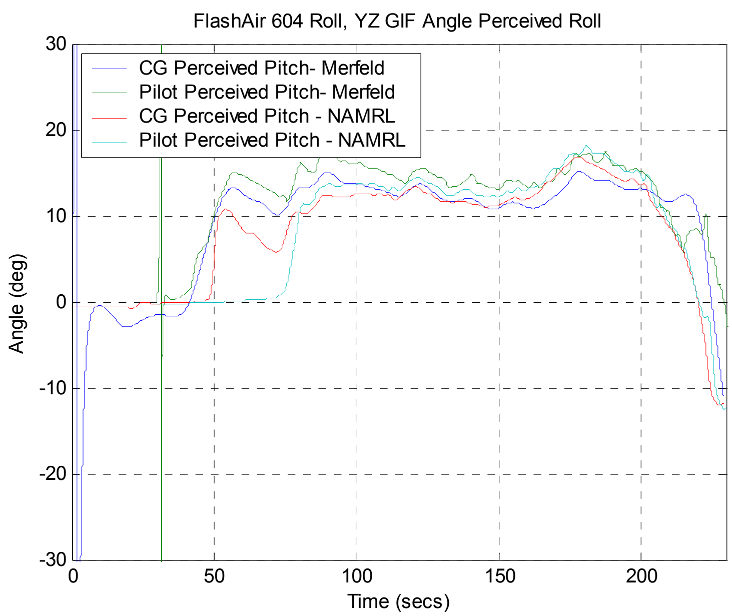


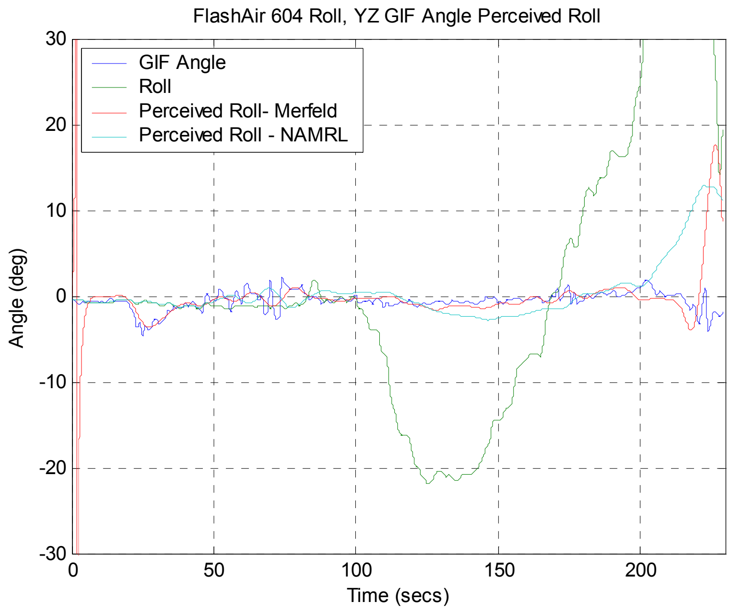


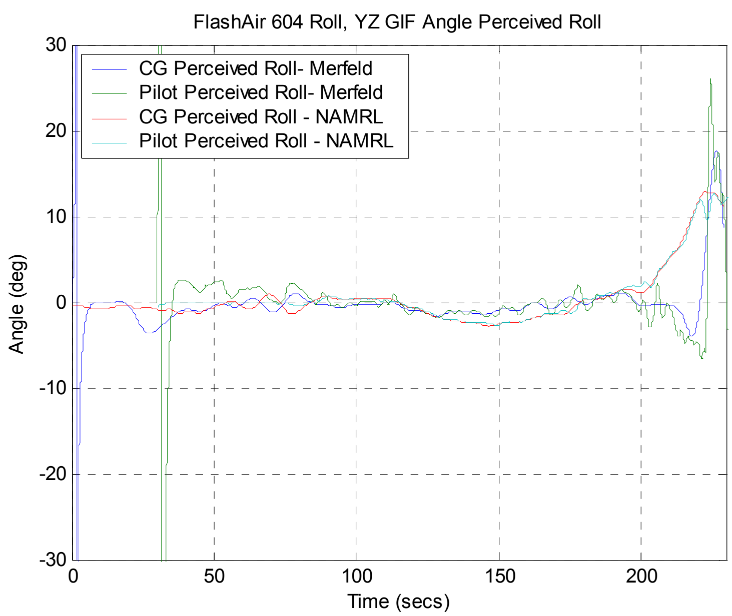
2) The angular rates are in the range of 1.0– 2.0 deg/sec. This magnitude is within the range of thresholds for detection of angular motion published in the literature. This indicates possible undetected attitude changes – especially the roll because of the resultant YZ GIF angle remains at zero. In addition to the Merfeld model, NAMRL researchers will attempt to investigate this possible sub-threshold roll input more thoroughly using additional models published in the literature.


FlashAir 604 Pitch Rate Roll Rate
Pitch Rate
Roll Rate
Angular Velocity (deg/sec)
Time (secs)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
50
100
150
200

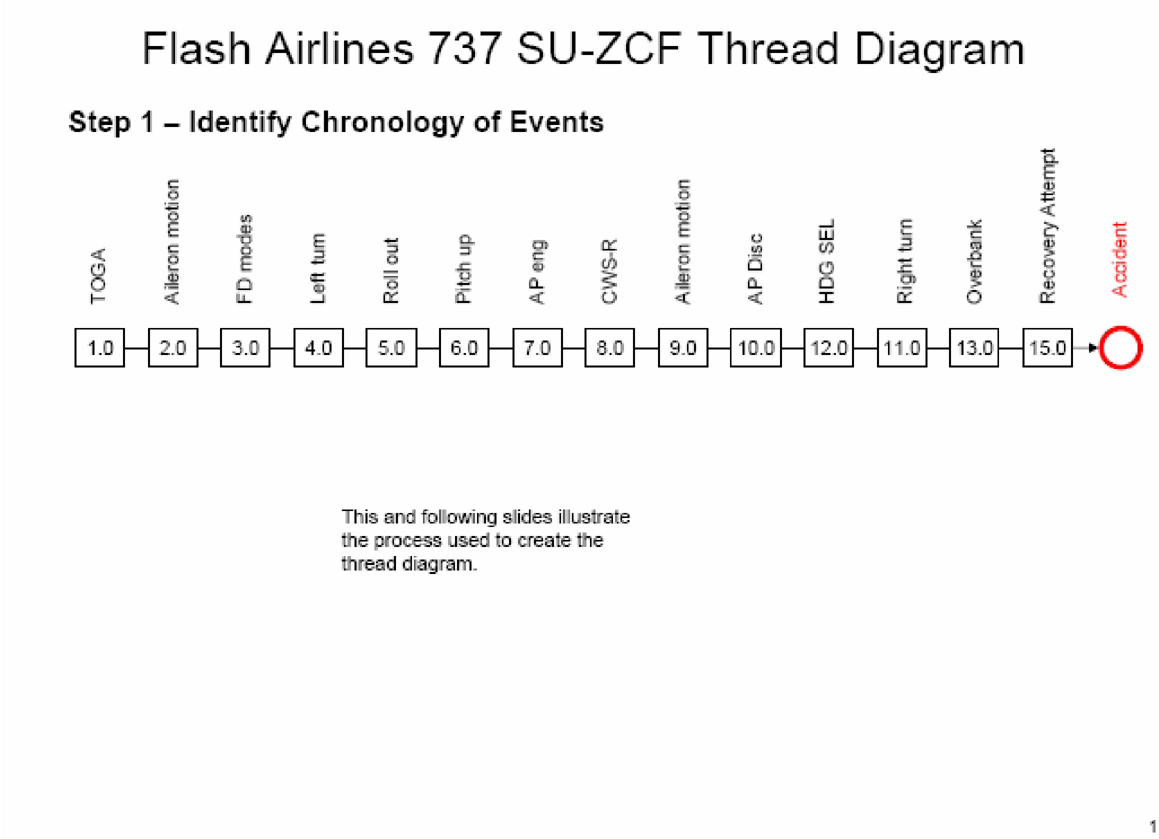

FlashAir 604 Pitch, XZ GIF Angle, Perceived Pitch
GIF Angle
Pitch
Perceived Pitch - Merfeld
Perceived Pitch - NAMRL
Angle (deg)
Time (secs)
30
20
10
0
-10
-20
-30
0
50
100
150
200


FlashAir 604 Roll, YZ GIF Angle Perceived Roll
CG Perceived Pitch- Merfeld
Pilot Perceived Pitch- Merfeld
CG Perceived Pitch - NAMRL
Pilot Perceived Pitch - NAMRL
Angle (deg)
Time (secs)
30
20
10
0
-10
-20
-30
0
50
100
150
200


FlashAir 604 Roll, YZ GIF Angle Perceived Roll
GIF Angle
Roll
Perceived Roll- Merfeld
Perceived Roll - NAMRL
Angle (deg)
Time (secs)
30
20
10
0
-10
-20
-30
0
50
100
150
200

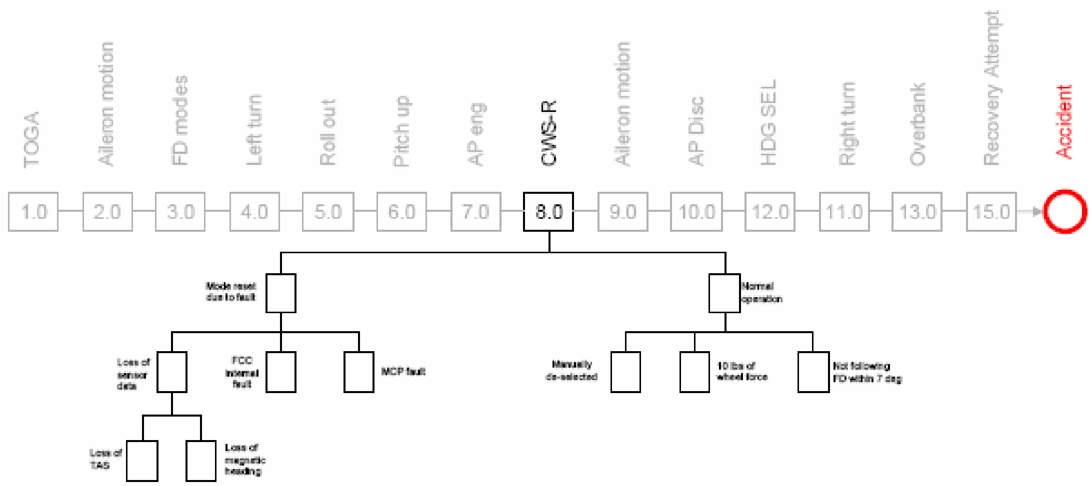

FlashAir 604 Roll, YZ GIF Angle Perceived Roll
CG Perceived Roll- Merfeld
Pilot Perceived Roll- Merfeld
CG Perceived Roll - NAMRL
Pilot Perceived Roll - NAMRL
Angle (deg)
Time (secs)
30
20
10
0
-10
-20
-30
0
50
100
150
200

2.6.7 Thread Overview Updates Cairo 26-Aug-05, Flash Air CBS Sub-group Comments (24 August 2005)"



Flash Airlines 737 SU-ZCF Scenario Tree

Step 2 – Develop candidate scenarios for each event



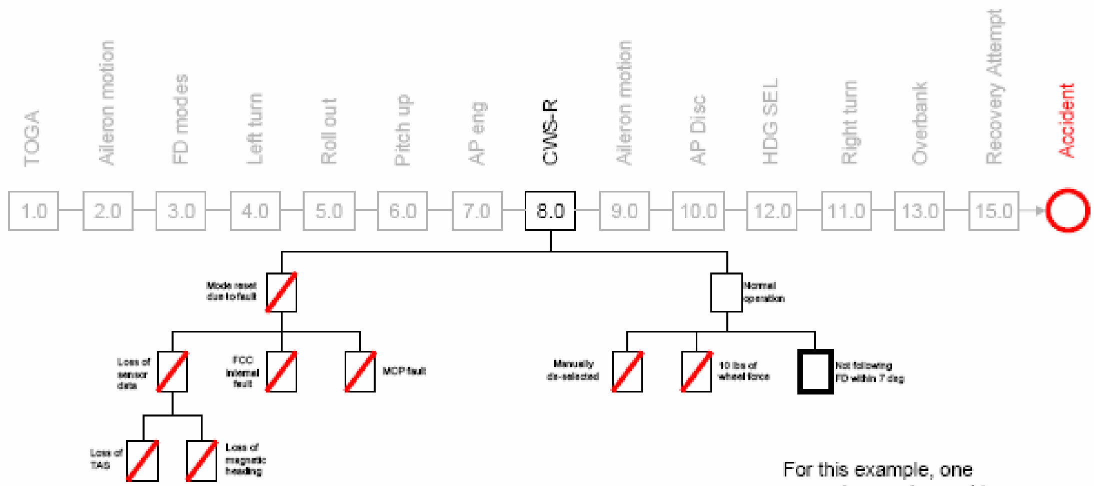
Example shows scenario tree structure for event 8.0

Similar trees were developed for each event

2

Flash Airlines 737 SU-ZCF Scenario Tree

Step 3 – Rule out scenarios based on known information



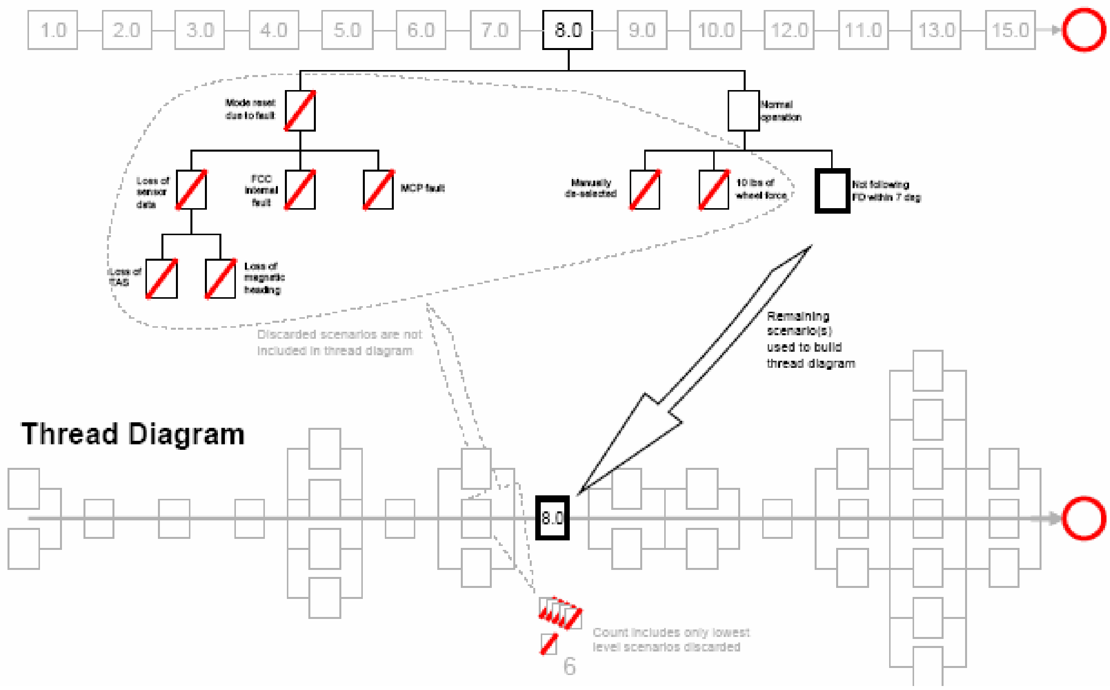
For this example, one scenario was deemed to match the data. The rest were ruled out.

For other events, multiple scenarios remained as they could not be ruled out.

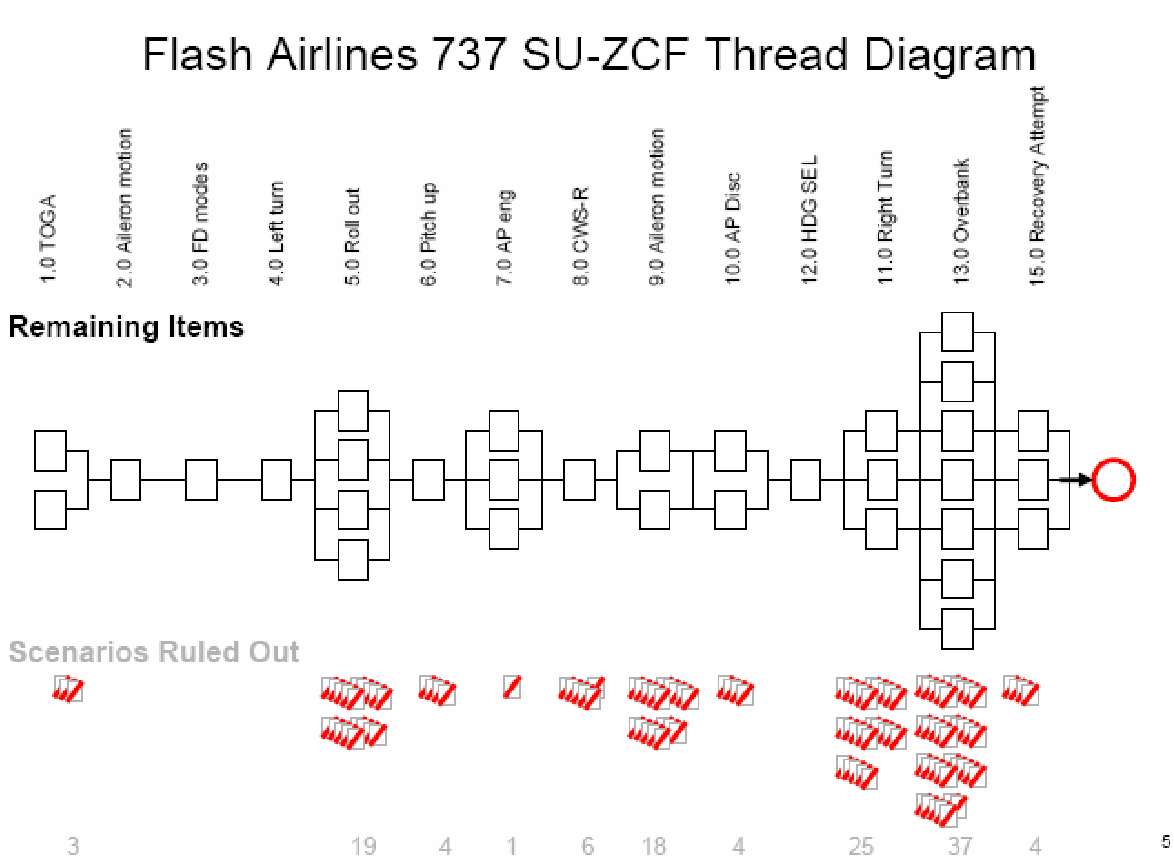
3

Flash Airlines 737 SU-ZCF Thread Diagram

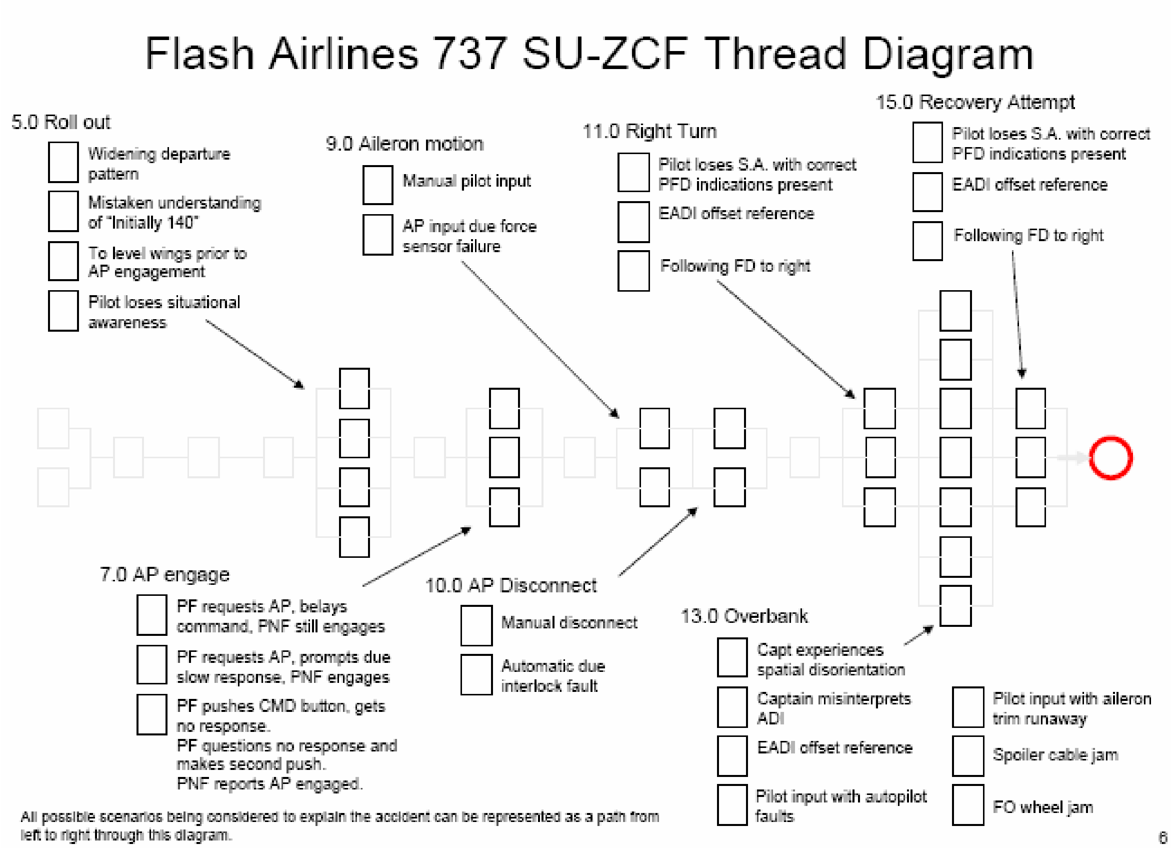
Step 4 – Collect remaining scenarios into thread diagram



4



Flash Airlines 737 SU-ZCF Thread Diagram
1.0 TOGA
2.0 Aileron motion
3.0 FD modes
4.0 Left turn
5.0 Roll out
6.0 Pitch up
7.0 AP eng
8.0 CWS-R
9.0 Aileron motion
10.0 AP Disc
12.0 HDG SEL
11.0 Right Turn
13.0 Overbank
15.0 Recovery Attempt
Remaining Items
Scenarios Ruled Out
3
19
4
1
6
18
4
25
37
4
5


Flash Airlines 737 SU-ZCF Thread Diagram
5.0 Roll out
Widening departure pattern
Mistaken understanding of "Initially 140"
To level wings prior to AP engagement
Pilot loses situational awareness
9.0 Aileron motion
Manual pilot input
AP input due force sensor failure
11.0 Right Turn
Pilot loses S.A. with correct PFD indications present
EADI offset reference
Following FD to right
15.0 Recovery Attempt
Pilot loses S.A. with correct PFD indications present
EADI offset reference
Following FD to right
7.0 AP engage
PF requests AP, belays command, PNF still engages
PF requests AP, prompts due slow response, PNF engages
PF pushes CMD button, gets no response.
PF questions no response and makes second push.
PNF reports AP engaged.
10.0 AP Disconnect
Manual disconnect
Automatic due interlock fault
13.0 Overbank
Capt experiences spatial disorientation
Captain misinterprets ADI
EADI offset reference
Pilot input with autopilot faults
Pilot input with aileron trim runaway
Spoiler cable jam
FO wheel jam
All possible scenarios being considered to explain the accident can be represented as a path from left to right through this diagram.
6

5.0 Roll back towards wings level

Scenario	Pros	Cons
Widening Departure Pattern p3 – G034 (Intentional control action)	Chief pilot reports some crews choose to widen their departure pattern by squaring turn at approximately 90° to runway heading. The wings level heading, 140°, is 80° from the runway heading. It has to be noticed that the crew never briefed the departure as it is usually done (headings, sets, displays,…). All the dialogues between the Capt and the FO before the turn is about "140". This match with what said Flash ex-Chief pilot in his last statement about widening pattern. The aircraft remained near heading 140 for 9 seconds. Roll rate decreases as aircraft nears 140. The observer was also a friend of the airline director of operations riding as a passenger. The PF (captain) may have wanted to ensure that he did not violate the local VOR altitude crossing practice in the presence of the director's friend. The previous day's departure from SSH included a 270 turn to right and the flight crossed the VOR below 7000 ft. The approach chart in the AIP states minimum quadrant altitude is 10,100 ft NW of VOR.	The same crew made a similar departure about 24 hours previously, at a heavier weight without widening their departure. There is no discussion about this maneuver recorded on the CVR. There is no evidence on FDR that flight director was used for this maneuver.
Mistaken understanding of "Initially 140" p3 – G035 (Intent.)	ATC clearance: "Destination Cairo as filed, climb initially flight level one four zero" FO read back "destination Cairo via flight plan route one four zero". Captain later asks for confirmation about "Initially 140" from FO and for FO to confirm with ATC. After initial clearance, neither ATC nor FO specify whether "140" refers to a heading or altitude. Airplane rolls wings level on exactly 140.	No request from captain to set selected heading to 140. Did not ask for clarification of altitude clearance. "Initially" phrase refers to altitude, not heading. "14000" set in altitude window immediately after ATC clearance and was in the window during subsequent discussion and confirmation with ATC.
To level wings prior to engaging autopilot p3 – G036 (Intent.)	On FDR flight 10, the crew did not engage the AP until wings level at approximately 9000 ft following completion of a series of turns after takeoff.	On FDR flight 9, the crew engaged the autopilot in the middle of a 270° turn at a bank angle of 20 to 25°.
Pilot loses awareness of heading or bank p3 – G039 (unintent.)	Roll out coincident with passing over coastline and resulting loss of outside visual references. Pitch begins to deviated from expected value. Misleading vestibular cues were present.	Attitude information available on displays to 3 flight deck occupants.

7

7.0 AP Engagement

Scenario	Pros	Cons
PF requests AP PF cancels request PNF pushes CMD button anyway	Consistent with company practice. Impression from CVR is that the first officer is manipulating the MCP Controls prior to AP engagement. CMD button is located on right side of MCP, closer to F/O.	Boeing procedure is for PF to push the CMD button.
PF requests AP PF prompts PNF due slow response PNF pushes CMD button	Consistent with company practice. Impression from CVR is that the first officer is manipulating the MCP Controls prior to AP engagement. CMD button is located on right side of MCP, closer to F/O.	Boeing procedure is for PF to push the CMD button.
PF pushes CMD button, gets no response. PF questions no response and makes second push. PNF reports AP engaged.	Boeing procedure is for PF to push the CMD button.	According to Flash chief pilot, procedure was for PF to request AP and PNF to push the button. The Flash chief pilot acknowledged this was opposite to Boeing recommended procedure on this point. A written procedure could not be found in the available Flash Operations Manual (some pages were missing).

8

9.0 Aileron Motion (Right Roll)
(Need to revisit)

Scenario	Pros	Cons
Manual pilot input p2 – G029	Magnitude and duration of aileron motion recorded on FDR data were compared to simulated autopilot behavior if engaged and to two previous manual control motions recorded in previous 30 seconds. The motion recorded of the FDR is more similar to the previous manual inputs than to the simulated autopilot behavior. (The simulated autopilot behavior presumed normal autopilot behavior. The recorded motions are within the autopilot authority limits.) *(there was no consensus on this point)*	Amplitude and direction of aileron motion recorded on previous FDR data showed some similarities with a/p behavior. *(there was no consensus on this point)*
AP input due force sensor failure p3 - G030.1		The force sensor was known to be working properly at AP engagement, about 1.5 seconds earlier. Motion of aileron was neither abrupt and nor in one direction only, as would be expected from a force sensor fault.

9

10.0 Autopilot Disengagement

Scenario	Pros	Cons
A/P disengages due to manual disconnect p2 – G029	Warning length is consistent with "double click" typical of manual disconnects (within allowable warning duration tolerance).	No disengagement callout by crew on CVR.
A/P disengages due to interlock fault p1 – G001.1.1		Requires interlock fault in the 3 seconds since the AP successfully engaged.

10

11.0 Right Bank Begins (<20° bank)

Scenario	Pros	Cons
Capt loses situational awareness with correct PFD indications present (e.g. distraction, misinterpretation, etc) p3 – G039	Refer to CBS report.	Captain just asked for heading select and therefore was likely looking at PFD at that time.
Capt loses S.A. while following erroneous EADI offset reference p3 – G037		Fault display on EADI unusual enough to be evident to crew and unlikely to be mistaken for valid data Captain's control inputs more closely match response to perceived valid input. We know the EADI was OK. Even if it fails (it would have black screen), Stand by Horizon was supposedly functioning. We have no comment from the Capt nor from the FO nor the Observer about failures on this instrument.
Capt loses S.A. while following FD commands due to erroneous selected heading (p5 – G047) or unintended turn direction (p6 – G051, G049.1)	The captain just asked for the flight director by calling for "Heading Select" FDR data shows heading select mode engages. The pitch FD error is decreasing during this time, therefore the pilot was likely following the flight director in both pitch and roll. Accident airplane had "shortest direction" turn behavior on FD for turns >180 degrees. Simulator used for training at RAM did not behave this way – it always honored direction of turn on MCP knob.	Capt asked for Heading select. FDR data for selected heading (recorded at 64 second intervals) indicate the FD would have been commanding a left, not a right, turn.

11

13.0 Overbank (1 of 2)

Scenario	Pros	Cons
Capt experiences spatial disorientation (Type II)	Refer to CBS report.	
Capt misinterprets ADI indications	Refer to CBS report.	
Following erroneous EADI – offset airplane reference p7 – G094		This fault may have served to confuse the captain, but two other sources of attitude information would be available. The fault would not likely have led to a drastic change in the pilot inputs, as is evidenced by the change from <1°/sec to >3 °/sec roll when the FO announces "turning right".
Pilot input in the presence of autopilot actuator hardover due to intermittent triple faults p11 – G055, G056, G057)	Refer to CBS report regarding CVR comments.	Requires multiple faults to occur simultaneously. Failures could affect the aircraft trajectory. Demonstrated in the M-Cab that all the faults except the quintuple fault (i.e. 80 lbs on the wheel) were easily recoverable.

12

13.0 Overbank (2 of 2)

Scenario	Pros	Cons
Pilot input in the presence of aileron trim runaway a) Full p20 – G043 b) Partial p20-G044	Refer to CBS report regarding CVR comments.	Requires two faults to occur simultaneously (one of which may be latent) or manual activation. Trim could affect the aircraft trajectory unless additional wheel forces are applied to counter the trim. Demonstrated in the M-Cab to be easily recoverable.
Scenario 10 (Spoiler wing cable jam) in at time 92450 and clears at 92472	MCA requests simulation be redone at point on maximum wheel deflection.	MCA requests simulation be redone at point on maximum wheel deflection. Recorded wheel deflection requires maximum of ~ 60 lbs which may result in an audible change in voice. Recorded aileron position indicates wheel was moved smoothly through the point of ~60 lbs force increase on multiple occasion. Voice effects and smoothness of control require further study.
Scenario 10a (F/O wheel jam) in at time 92450 and clears at 92472	MCA requests simulation be redone at point on maximum wheel deflection.	MCA requests simulation be redone at point on maximum wheel deflection. Recorded wheel deflection requires maximum of ~ 60 lbs which may result in an audible change in voice. Recorded aileron position indicates wheel was moved smoothly through the point of ~60 lbs force increase on multiple occasion. Voice effects and smoothness of control require further study.

15.0 Recovery Attempt

Scenario	Pros	Cons
Capt Input Only p1 - G009	Captain was the pilot flying with nothing on CVR to suggest that control was transferred.	Refer to CBS report regarding CVR comments.
FO Input Only p1 - G011	Refer to CBS report regarding CVR comments.	FO does not announce he is taking control.
Joint Attempt	Previous upset events have resulted in multiple crew making control inputs.	FO does not announce he is taking control.

14

The study performed by a team of qualified Human Performance Specialists have come up with findings summarized as follows:

- *An event starting from the time of call for autopilot engagement through the time of the captain statement "see what the aircraft did" caused obvious crew distraction. This distraction may have developed to Spatial Disorientation (SD) to the captain until the time the F/O announced "A/C turning right " and acknowledged by the captain.*

- *There are conflicting signals in the following period of time (~ 17 seconds), it is unclear whether the captain remained in SD or was the crew unable to perceive the cause that was creating an upset condition until the time when the F/O announced that there was no A/P in action.*

  After the time when the F/O announced "no A/P commander" the crew behavior suggests that recovery attempts were consistent with expected crew reaction, evidences show that the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery.

3 Conclusion

SUMMARY

General background:

The A/C was serviceable at take off and was operated within the approved limitations.

The crew members held appropriate licenses and were qualified for this flight.

There was no indications of specific concerns about the flight or any tension between the crew members

1. Airplane Performance Evaluation:[1]

Note:

The evaluation is based on factual information (FDR data and CVR recorded information) and the data gathered during the investigation

1.1 Simulation procedure

Based on the FDR data, a kinematic consistency (KINCON) process was used to supplement the FDR data and calculate additional parameters to be used in the performance analysis. Additional simulation was conducted using the Boeing M-Cab facility.

Analysis of the simulation results showed the following:

- The motion of the control surfaces showed consistency with the recorded motion of the control inputs, with the exception of control wheel (because of the unreliable recorded parameter)

- The results obtained from the M-Cab tests indicate that the computed parameters are quite sensitive to the values of the used input parameters.

1.2 Weight and Balance

Although the average weight for passenger used in Load and Trim sheet for the Weight and Balance calculation was not the one given in the airline Flight Operations Manual, none of the available data relevant to the airplane weight and balance showed evidences of airplane loading abnormality. Computations of the airplane weight, c.g. location, stabilizer setting and the Take Off speeds V1, VR, V2 were correct.

[1] See section 2.2 Airplane Performance Evaluation

1.3 Analysis of radar data

An examination of the radar data and the FDR data showed that the path of the accident airplane as derived from the radar data is consistent with the path as derived from the FDR date

2. Analysis

2.1 Airplane systems behavior[2]

No failure or abnormal behavior was found in the following systems:

- Environmental Control System (ECS)
- Fire Fuel system
- Landing Gears
- Engines
- APU.

Thus, a possible contribution of these systems to the accident could be ruled out. Within the technical area, only “Flight Controls” and “Auto Flight” could have contributed to the accident

2.2 Crew behavior[3]

Evidence of distraction possibly becoming spatial disorientation is observed from the time of start of right turn until the announcement of aircraft turning right, after which it is unclear whether the captain recovered or remained in the state of spatial disorientation. After the call “No autopilot commander”, the crew behavior appears normal.

[2] See section 2.3 Analysis of Airplane systems behavior
[3] See section 2.6 Crew Behavior

3. Analysis of the chronological main events:[4]

Based on the facts collected about the flight, as well as the aircraft and the flight crew, a fault tree was established and examined in details, which lead to the ruling out of a number of possible conditions for the accident. Only a few of such conditions could not be ruled out and are reflected hereafter (organized according to the fault tree structure)

3.5 Roll back towards wing level[5]

The following conditions could not be ruled out:

- Pilot widening departure pattern (intentional control action)
- To level wings prior to engaging autopilot (intentionally)
- Pilot loses awareness of heading or bank (unintentional)
- Anomalies with the lateral control system

The investigation could not determine a higher possibility to any of the above findings based on the given data.

[4] See section 2.5 Anaysis of the chronological main events

[5] Numbering is consistent with the Fault tree structure numbering. Refer to Chapter 2 Analysis

3.7 Autopilot engage sequence

The following conditions could not be ruled out:

- Captain requests autopilot, F/O pushes CMD button anyway
- Captain requests autopilot, Captain prompts F/O due slow response, F/O pushes CMD button
- Captain pushes CMD button, gets no response. PF questions no response and makes second push. F/O reports autopilot engaged.

The investigation could not determine a higher possibility to any of the above findings based on the given data.

3.8 Mode change from HDG SEL to CWS-R

The following conditions could not be ruled out:

- Autopilot Engagement with FD Roll Bar > 7 Degrees (with time lag) (no failure condition)

3.9 Aileron move in direction of right roll

- Pilot input
- Lateral system fault:

The investigation could not determine a higher possibility to any of the above findings based on the given data.

3.10 Autopilot Disengagement indications on the FDR and CVR

The following conditions could not been ruled out:

- Automatic Disconnect Interlock invalid
- Manual Disconnect

The investigation could not determine a higher possibility to any of the above conditions based on the given data.

3.11 Airplane begins roll to right

G- Lateral control system:

G.1. Pilot input:

G.1.1 Following FD, FD Commands Erroneous, Erroneous Selected Heading Data

G.1.2 Loss of Situational Awareness

G.2 Autopilot Initiated

G.2.2 Uncommanded (actuator faults only)

G.3- Lateral System Fault

G.3.6 Trim/Feel Unit Fault

3.13 Right roll continues to overbank with ailerons activities

The following conditions could not be ruled out

1. NA

2. Lateral Control System

2.1 Conditions related to pilot input: (See section2.6)

2.1.1 Following Erroneous EADI, Alternate Instruments Not Cross-Checked

2.1.2 Loss of Situational Awareness, Captain experiences SD Type II

2.1.3 Loss of Situational Awareness, Captain misinterprets ADI indications

2.2 Conditions related to Autopilot:

2.2.1 Autopilot Actuator Hardover Fault

2.3 Conditions related to Lateral System Faults:

2.3.1 Trim/ Feel Unit Fault.

2.3.2 Temporarily, Spoiler wing cable jam (Spoiler offset of the neutral position)

2.3.3 Temporarily, F/O wheel jam (spoilers offset of the neutral position)

The investigation could not determine a higher possibility to any of the above conditions based on the given data.

3.14 Flight crew CVR autopilot announcements

1. Requests for Autopilot Engagement

2. Announcement of Autopilot Status (Announcement of "Autopilot in Command" made by the F/O):

3. Announcement of "No autopilot commander" made by the F/O:

4. Announcement of Perceived Autopilot Behavior

5. Requests for Autopilot Disengagement

The investigation could not determine a higher possibility to any of the above conditions based on the given data.

3.15 Rapid left roll towards wings level

1- Capt. Upset Recovery Attempt

2- First Officer Upset Recovery Attempt

3- Joint Upset Recovery Attempt

From the above, Captain Upset Recovery Attempt seems a higher possibility

3.16 Impact with water

Although an attempt to correctly recover was initiated, the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery.

FINDINGS

3.1 Possible causes :

- Trim/ Feel Unit Fault (Aileron Trim Runaway)
- Temporarily, Spoiler wing cable jam (Spoiler offset of the neutral position)
- Temporarily, F/O wheel jam (spoilers offset of the neutral position)
- Autopilot Actuator Hardover Fault

3.2 Possible contributing factors :

- A distraction developing to Spatial Disorientation (SD) until the time the F/O announced “A/C turning right“with acknowledgement of the captain.
- Technical Log copies were kept on board with no copy left at departure station.
- Operator write up of defects was not accurately performed and resulting in unclear knowledge of actual technical status
- There are conflicting signals which make unclear whether the captain remained in SD or was the crew unable to perceive the cause that was creating an upset condition until the time when the F/O announced that there was no A/P in action.
- After the time when the F/O announced “no A/P commander” the crew behavior suggests the recovery attempt was consistent with expected crew reaction, evidences show that the corrective action was initiated in full, however the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery.

3.3. Additional findings:

- The ECAA authorization for RAM B737 simulator was issued at a date later than the date of training for the accident crew although the inspection and acceptance test were carried out at an earlier date.

- Several recorded FDR parameters were unreliable and could not be used for the investigation.

CONCLUSION

No conclusive evidence could be found from the findings gathered through this investigation to determine a probable cause. However, based on the work done, it could be concluded that any combination of these findings could have caused or contributed to the accident.

Although the crew at the last stage of this accident attempted to correctly recover, the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery.

4. Recommendations:

Manufacturers- Operators:

1. Joint effort should be made to minimize MEL-CDL-DDL allowances to avoid lowering safety standards by overloading pilots, and ensure that whenever found necessary to maintain such items, very clear procedures addressing pilots and maintenance crews to be made available
2. Efforts should be made to enhance the function and reliability of FDR and CVR due to the importance of the data obtained to the safety of the aviation industry
3. Clear engagement status indication for the autopilot should be made available to the crew to avoid any possibility of incorrect perception or ambiguity.
4. Based on data collected from different operators using this autopilot and the number of reports of unexpected autopilot behavior some of which are unexplained, re-assessment of this autopilot system is recommended and operators should be made aware of any problems and manufacturers analysis actions and recommendations.

Civil Aviation Authority

5. Ensure that all operators strictly adhere to CAA regulations and requirements, especially in remote stations

Pilot Training:

Emphasis should be made in pilot training on the following:

6. Early detection and recognition of conditions that could lead to upset condition.
7. Timely and appropriate recovery action from upset conditions to counteract sudden unknown abnormal conditions.

Human Factors:

8. Recommend in depth studies of the Spatial Disorientation, ways of early recognition between crew members and appropriate crew action to overcome it and increase crew awareness of this phenomena
9. Although a level of CRM was observed, it is clear that more emphasis in this area of training will achieve earlier recognition and recovery from abnormal conditions

Attachments

Comments from participating parties

MCA response to U.S. Comments

Reference: U.S. Summary Comments on Draft Final Report of Aircraft Accident
Flash Airlines flight 604, Boeing 737-300, SU-ZCF
January 3, 2004, Red Sea near Sharm El-Sheikh, Egypt

SUMMARY:

U.S. Comment: [1]

During the investigation, the accident investigative team, which consisted of Egyptian, French, and U.S. investigators, adopted a "scenario tree" methodology to determine the accident sequence of events. As part of this methodology, the investigative team identified possible accident scenarios, and sufficient evidence existed for the team to rule out most of the identified scenarios. The team then examined the remaining scenarios and the evidence collected during the investigation to determine which scenario most likely explained the accident sequence of events.

MCA response:
Both the “scenario trees” addressing the systems and the Human issues as agreed upon by the different parties participating in the accident investigation have been fully included in the report. These scenario trees which were based on factual information included in the factual report and agreed upon by all parties were used as the basis for the analysis.

The MCA’s position is that the scenarios that could not be ruled out must all be considered as possibilities. Trying to speculate a more likely scenario does not comply with standard investigative practices.

U.S. Comment:

The only scenario identified by the investigative team that explained the accident sequence of events and was supported by the available evidence was a scenario indicating that the captain experienced spatial disorientation, which resulted in his making inadvertent actions that caused the accident. The remaining scenarios and possible causes were not consistent with the evidence and did not explain the sequence of events identified by the investigative team.

Specifically, no evidence of any airplane-related malfunction or failure was found. The exhaustive examination of the 737's autopilot and lateral control systems identified no fault that could explain the airplane's motion during the accident flight. In fact, as the MCA's draft final report properly concludes, the accident airplane's motion is consistent with the flight control movements recorded on the flight data recorder.

MCA response:

Referring to the Fault tree analysis (13.0 Right roll Continues to overbank with aileron activity), it could be noted that the analysis did not lead to the above conclusion. Also, the analysis does not

---

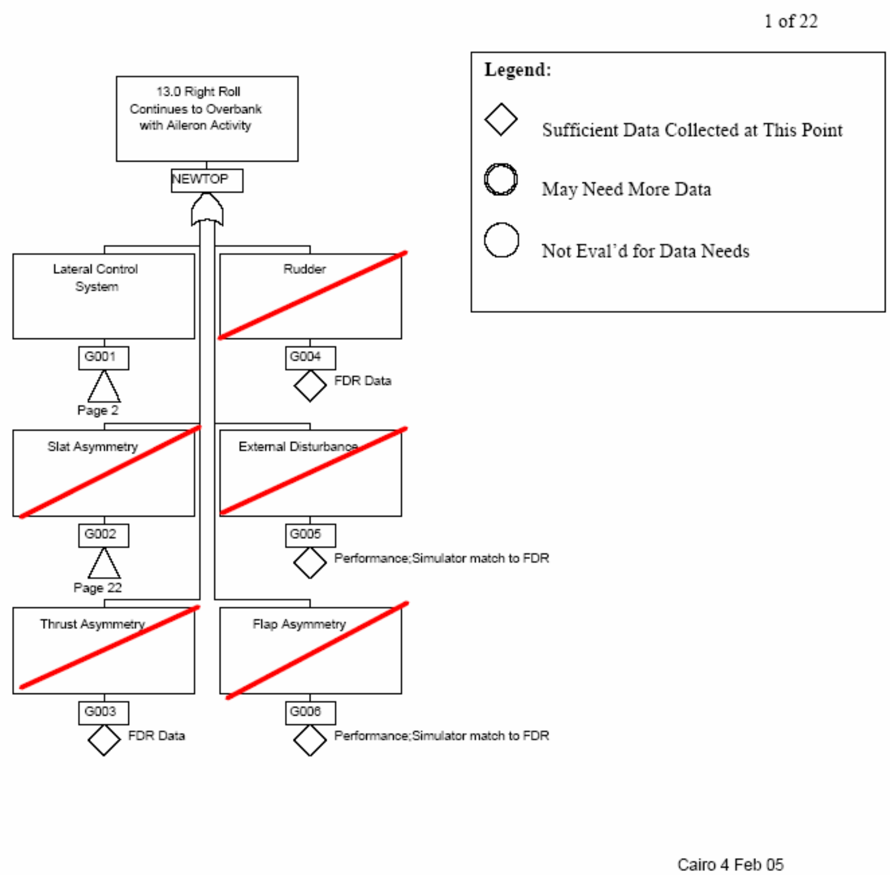
[1] U.S. comments are shown in Italian with yellow background

support the above U.S. statement. Had this been the case, these scenarios would have been ruled out as the rest of scenarios considered by the fault tree.

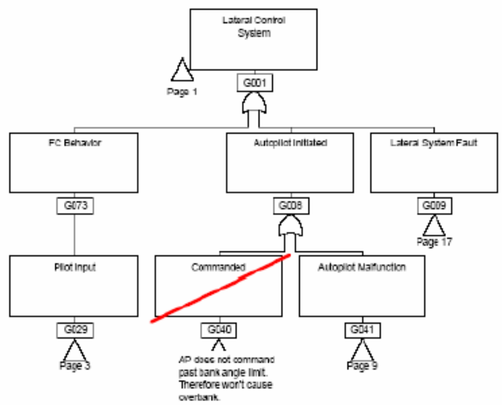
With regard to the statement that there was supporting evidence that the captain experienced spatial disorientation is inaccurate to say the least. The investigation team studied this scenario extensively, numerous conflicting evidences appeared leading to the MCA adopting the position that no conclusive evidence could be found to explain this accident

The Fault Tree that was developed and agreed upon by the participating investigation parties addressing the probable causes included in the Report are shown hereafter, including the scenarios that could not be ruled out due to their level of consistency with the available factual data.

1- Autopilot Actuator Fault (Actuator Hardover without Force Limiter 17 to 20 lb Force) was not ruled out (refer to pages 1, 2, 9 and 11 of the fault tree)



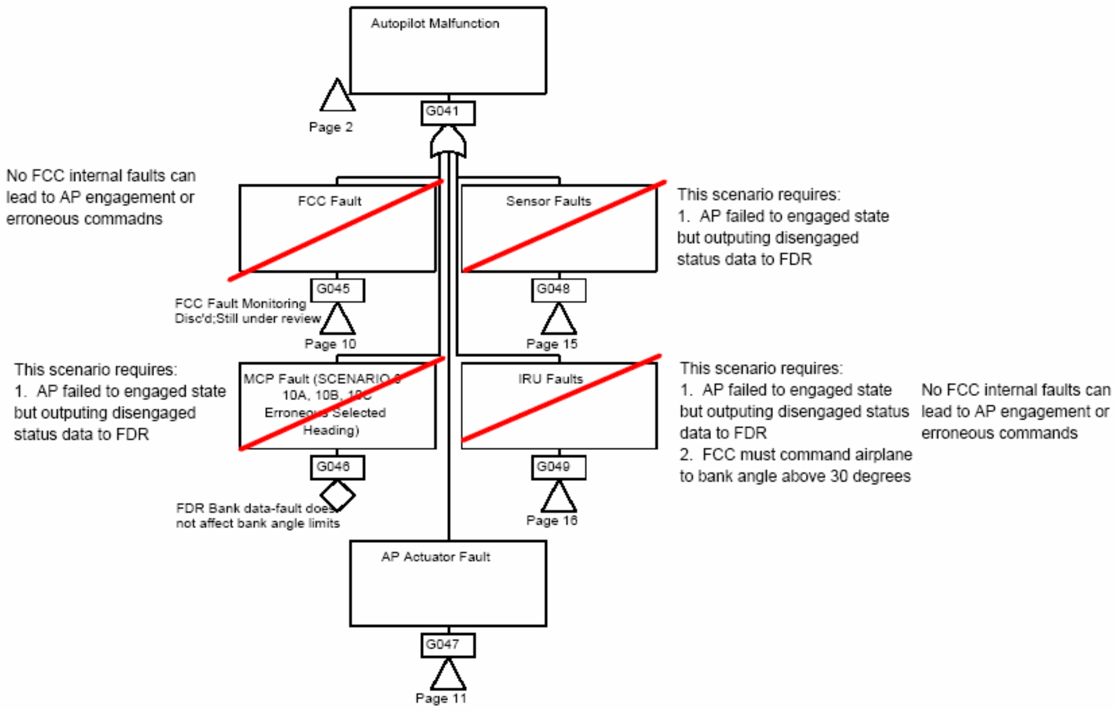
13.0 Right Roll Continues to Overbank with Aileron Activity



Cairo 4 Feb 05

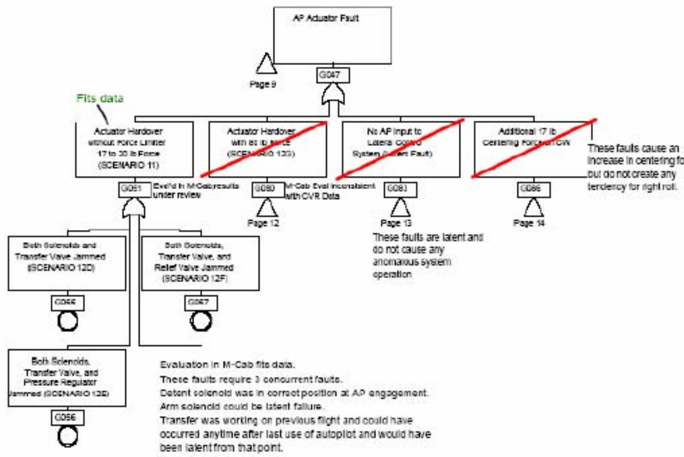
13.0 Right Roll Continues to Overbank with Aileron Activity

N.B.
For the "Lateral System Fault" block, See Appendix 2-1 lateral control analysis



Cairo 4 Feb 05

13.0 Right Roll Continues to Overbank with Aileron Activity

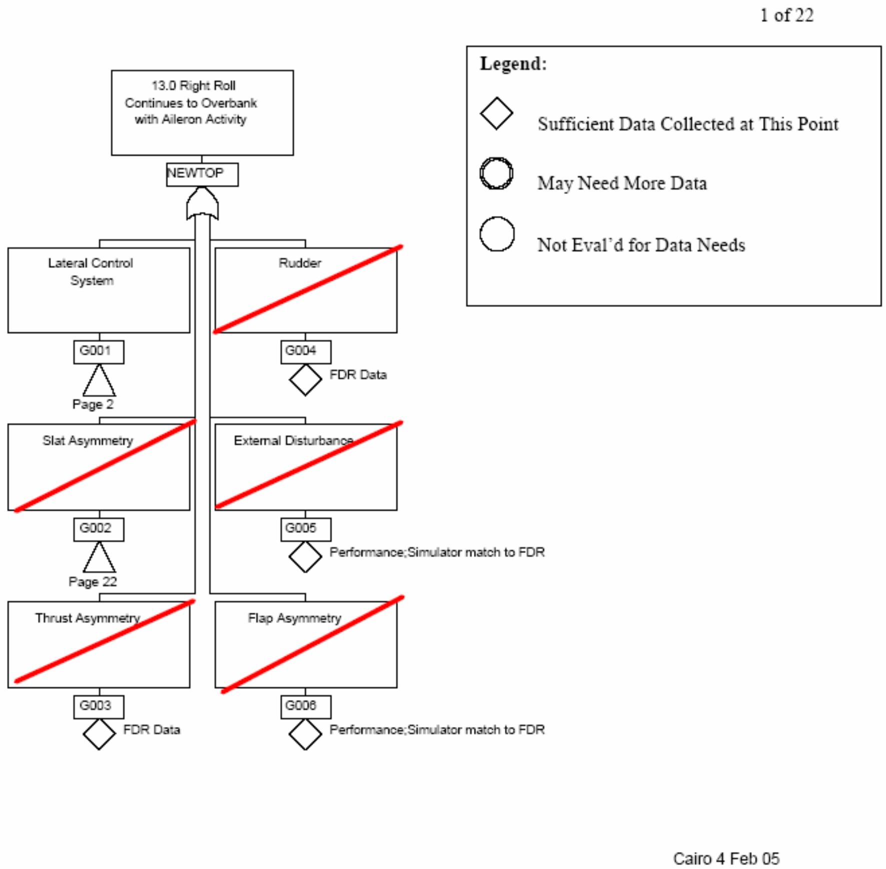


Cairo 4 Feb 05

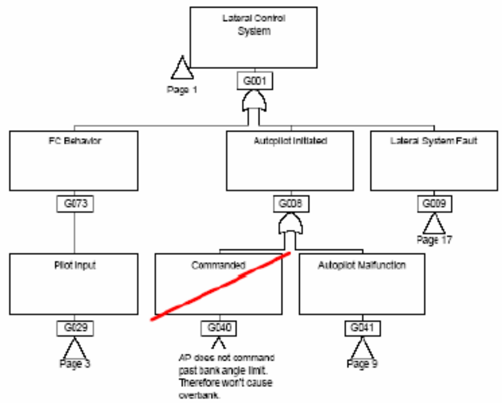
13.0 Right Roll Continues to Overbank with Aileron Activity

N.B.
For the "Actuator Hardover without Force Limiter 17 to 20 lb Force (SCENARIO 11)" block, See Appendix 2-1 lateral control analysis

2- Trim/Feel Unit Fault was not ruled out (refer to pages 1, 2, 17, 20 of the fault tree)



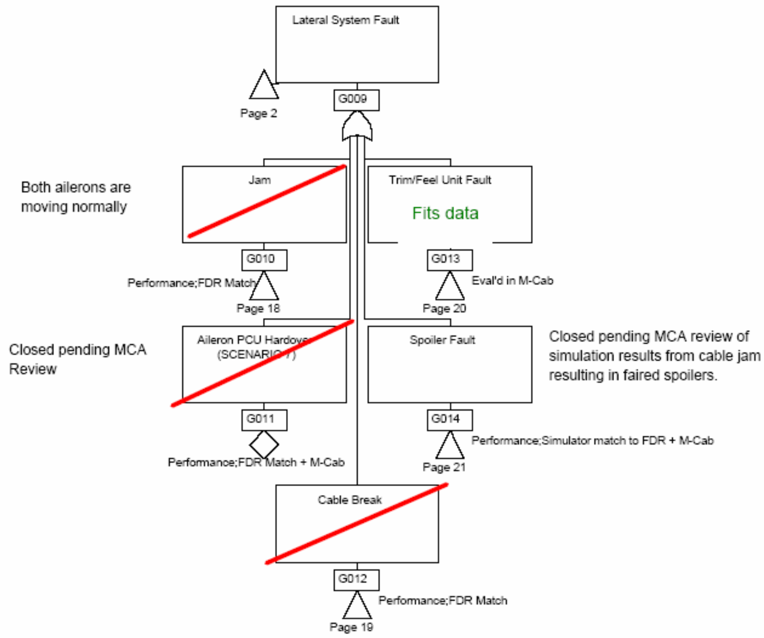
13.0 Right Roll Continues to Overbank with Aileron Activity



Cairo 4 Feb 05

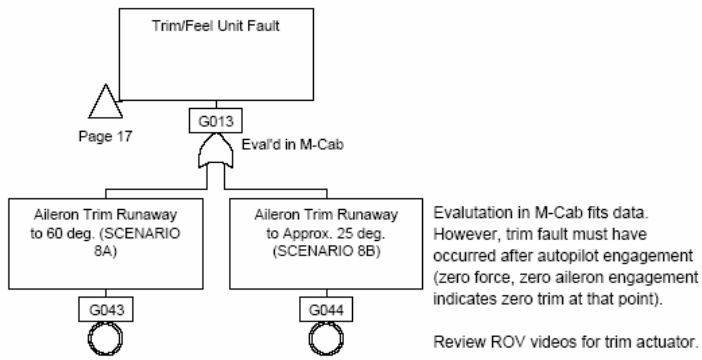
13.0 Right Roll Continues to Overbank with Aileron Activity

N.B.
For the “Lateral System Fault” block, See Appendix 2-1 lateral control analysis



Cairo 26 Aug 05

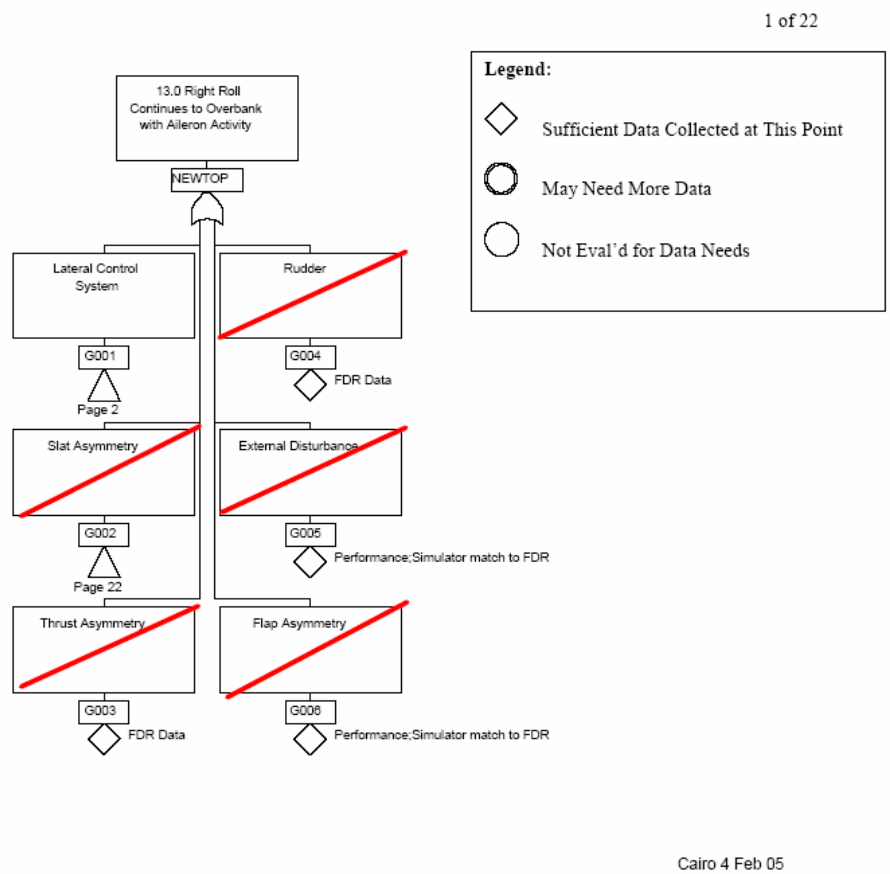
13.0 Right Roll Continues to Overbank with Aileron Activity



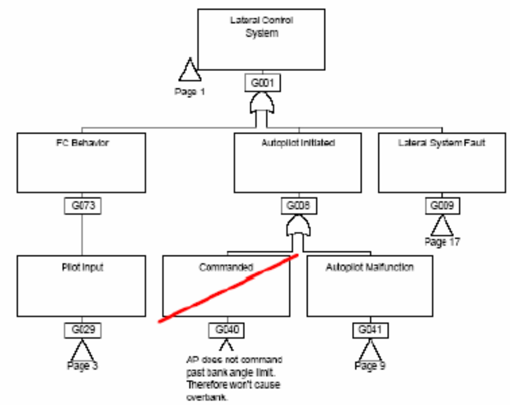
Cairo 4 Feb 05

13.0 Right Roll Continues to Overbank with Aileron Activity

3- Spoilers wing cable jam and F/O wheel jam were not ruled out (refer to pages 1, 2, 17, 21 of the fault tree)



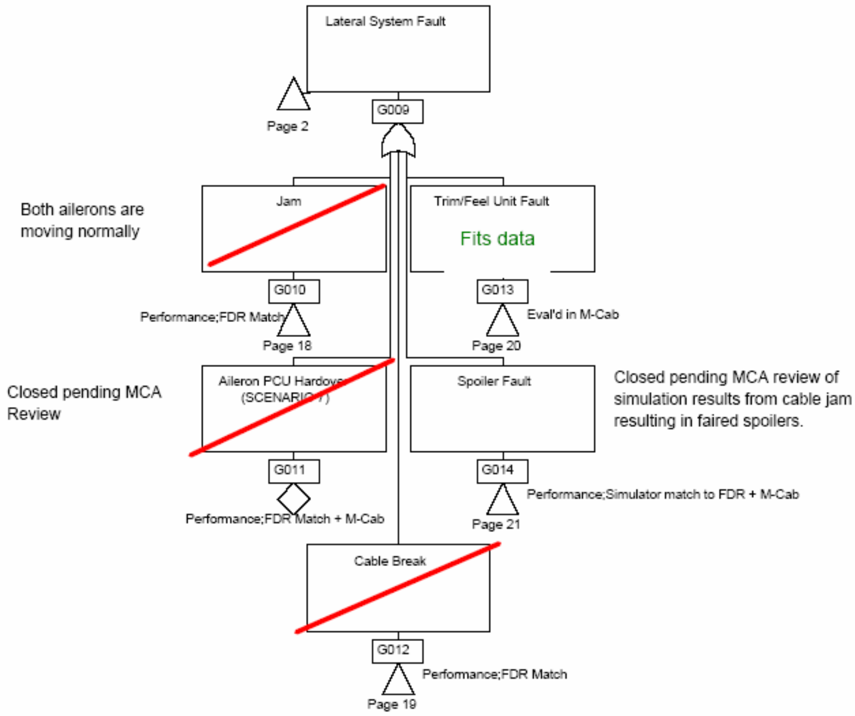
13.0 Right Roll Continues to Overbank with Aileron Activity



Cairo 4 Feb 05

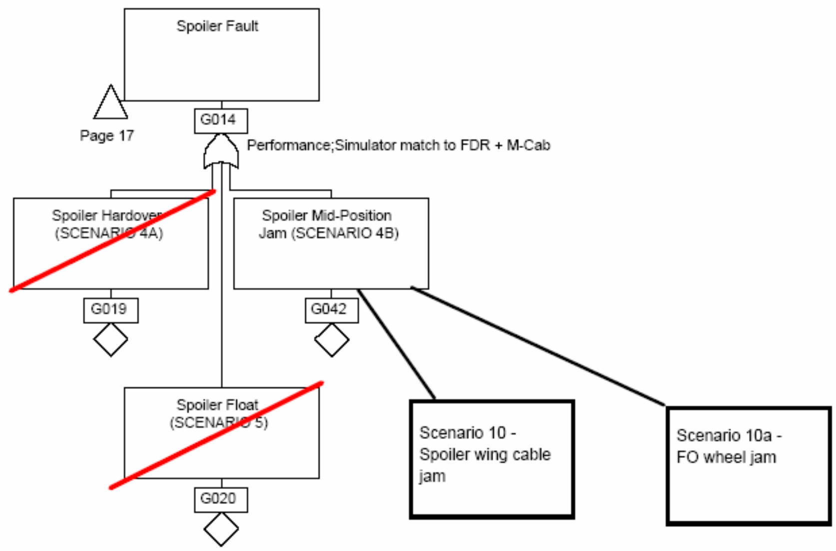
13.0 Right Roll Continues to Overbank with Aileron Activity

N.B.
For the "Lateral System Fault" block, See Appendix 2-1 lateral control analysis



Cairo 26 Aug 05

13.0 Right Roll Continues to Overbank with Aileron Activity



13.0 Right Roll Continues to Overbank with Aileron Activity

U.S. Comment:

SUMMARY (continue)

The MCA's draft final report stated, "no conclusive evidence could be found from the findings gathered through this investigation to determine a probable cause." Instead, the draft final report offered a list of findings, including "possible causes," even though the identification of possible causes is not consistent with international protocol concerning aviation accident investigations. Specifically, International Civil Aviation Organization Annex 13, paragraph 3.2.5, stipulates, "a list of possible causes should not be given." The report also indicated that "any combination of these findings could have caused or contributed to the accident." Three of the four possible causes identified in the MCA's draft final report were an aileron trim fault, an autopilot actuator fault, and a spoiler jam, none of which were supported by the evidence collected during the investigation.

MCA response:

- MCA does not agree with U.S. statement because, had this been the case, these scenarios would have been ruled out as well. On the contrary they were not ruled out because of their level of consistency with the available factual data.

U.S. Comment:

SUMMARY (continue)

The MCA' s investigation of the operational and human factors related to the accident was minimal. Further, its documentation of the captain's training history and performance and issues related to flight crew proficiency, fatigue, and crew resource management (CRM) were not fully developed and analyzed in the draft final report, despite being pertinent to the circumstances of the accident. If the MCA had obtained additional information about these areas, the investigative team could likely have identified specific corrective actions that would prevent recurrence.

MCA Response:

- The “scenario trees” addressing the Human issues as agreed upon by the different parties participating in the accident investigation have been fully included in the report. This scenario tree was used as the basis for the analysis.

U.S. Comment:

SUMMARY (continue)

This letter provides the U.S. investigative team's position on the cause of this accident, which is consistent with the available evidence, and an overview of the primary areas of concern with the MCA's draft final report. The attachment to this letter provides comments and suggests specific corrections, clarifications, and/or additions for each area of concern in the draft final report. As discussed further in this letter, the. U.S. investigative team concludes the following:

1. *no evidence indicated that an airplane-related malfunction or failure caused or contributed to the accident,*
2. *the aileron inputs and the corresponding right roll precipitating the upset resulted from inadvertent flight crew inputs,*
3. *the captain experienced spatial disorientation as the right roll inputs occurred, (4) the first officer did not assume timely control of the airplane, and*
4. *the airplane remained fully controllable and responsive to the flight controls throughout the flight.*

MCA Response:
Refer to the following analysis

U.S. Comments:

1- No evidence indicated that an airplane-related malfunction or failure caused or contributed to the accident.

To fully evaluate the role of the airplane and its systems in this accident, the investigative team relied on evidence such as cockpit voice recorder (CVR) and flight data recorder (FDR) information and flight performance and simulation evaluations. The operating aspects and potential failure modes of the various systems were also reviewed. Evidence from the investigation does not indicate that a failure of the airplane's autopilot or lateral control systems occurred. Further, during flight simulator evaluations, Egyptian, French, and U.S. investigators were able to maintain airplane control with relatively minor inputs during the demonstrations of all but one of the simulated system failures. This simulated failure involved a quintuple failure within an autopilot actuator that would result in an uncommanded roll input and require up to 80 pounds of control wheel force to overcome. FDR, CVR, and flight simulations data showed no evidence that such a failure occurred.

During subsequent meetings of the investigative team, the MCA presented numerous additional system failure scenarios for consideration. Factual evidence presented during these meetings and in follow up correspondence with the MCA and discussions between team members and MCA personnel eliminated all but two of these scenarios from consideration. The hypothetical failures that could not be fully ruled out because of a lack of associated data were the possibility that an aileron trim runaway had occurred or that an uncommanded autopilot flight control actuator hardover fault had occurred. Analysis of FDR data and simulation studies of the effects of these two failure scenarios (each of which required two or more system failures) indicated that it is highly improbable that these failures occurred. Further discussion of these two hypothetical failures follows.

Aileron trim runaway. The MCA' s draft final report accurately stated that an aileron trim runaway had not occurred before the autopilot was disconnected. After the autopilot was disengaged and as the airplane continued to roll to the right, FDR data showed aileron deflection rates well in excess of the aileron trim actuator rate of 0.6° per second. The rates recorded by the FDR could only have been achieved through manual wheel input because they exceeded the capabilities of the aileron trim system. Further, during flight simulations in Boeing's Multipurpose Engineering Cab (M-cab) simulator, investigators easily identified and controlled the aileron trim runaway and demonstrated that only 15 pounds of control wheel force were required to return to and maintain the aileron surfaces at the neutral position.

MCA Response:

Aileron trim runaway:

Reference:
Section 2.5.13 Right roll continues to overbank with ailerons activity, item 6.3.4.2 of the Report (Aileron Trim Runaway to 60 deg. Scenario)

Assumptions:

- One trim switch stuck at closed position (a latent failure), the second trim switch has stuck at closed position with trim input from the flying crew, leading to trim motor hardover position driving the ailerons to 15 degrees (maximum trim authority) towards right turn.
- This failure is assumed to occur after autopilot disconnect.

Consequences of the hypothetical failure:

- The aileron trim actuator will reach its hardover position driving the ailerons to 15 degrees (maximum trim authority) at no load on the aileron control wheels.
- Both aileron wheels will be driven away from the neutral position when released.
- The ailerons and flight spoilers will always follow the aileron wheels.
- The new position for the wheel will be about 65 degrees at no load on the aileron control wheels. The force-wheels relation will change (refer to Figure 2.5.13.7 Ailerons and spoilers behavior with aileron trim actuator at its hardover position)
- Whenever the aileron wheels are released, the wheels will move to the hardover position (65 degree).
- The ailerons wheels will always follow each others simultaneously.
- No cockpit light or aural warning will support identifying this fault
- The Captain and F/O will be able to resist the trim action and control the ailerons and spoilers but with additional force (Refer to Fig Figure 2.5.13.7)
- Whenever the Captain and F/O release the ailerons control wheels, the ailerons will tend to move towards right turn unless one of the flying crew exerts forces on the aileron control wheels to restore the airplane attitude.

Results of the M-Cab test (This test was done on Boeing M-Cab, Seattle, Washington):

M-Cab results confirmed the analytical studies for the failure.

This fault could not be ruled out, based on the following:

- The results obtained from the analytical studies and the M-Cab test show a very close consistency with the available data.

- The airplane behavior is consistent with the consequences of the hypothetical fault:

  1. The ailerons movements towards airplane right roll are highly consistent with the expected position resulted from this hypothetical fault.

  2. This fault always drive the airplane in the right roll direction

  3. Movement of the aileron surfaces as shown in the FDR towards the neutral position are consistent with captain attempts to control the airplane attitude with the existence of the failure, the rate of airplane rolling to the right is always reduced with these attempts. The forces required to move the ailerons by the captain are higher than the forces required in normal condition with no fault.

  4. Whenever the captain control wheel is released, the ailerons move towards the offset position showing high consistency with the fault existence. The fault was continually driving the airplane towards more right roll

  5. At the end of the flight, the FDR shows considerable aileron movements towards the wing level condition, which are consistent with crew inputs (attempt) to control the airplane attitude with the existence of the failure (forces are higher than normal to overcome the centering springs). Based on evaluation in M-Cab, this event fits the data. However, trim fault must have occurred after autopilot engagement (zero force, zero aileron engagement indicates zero trim at that point). This hypothetical condition

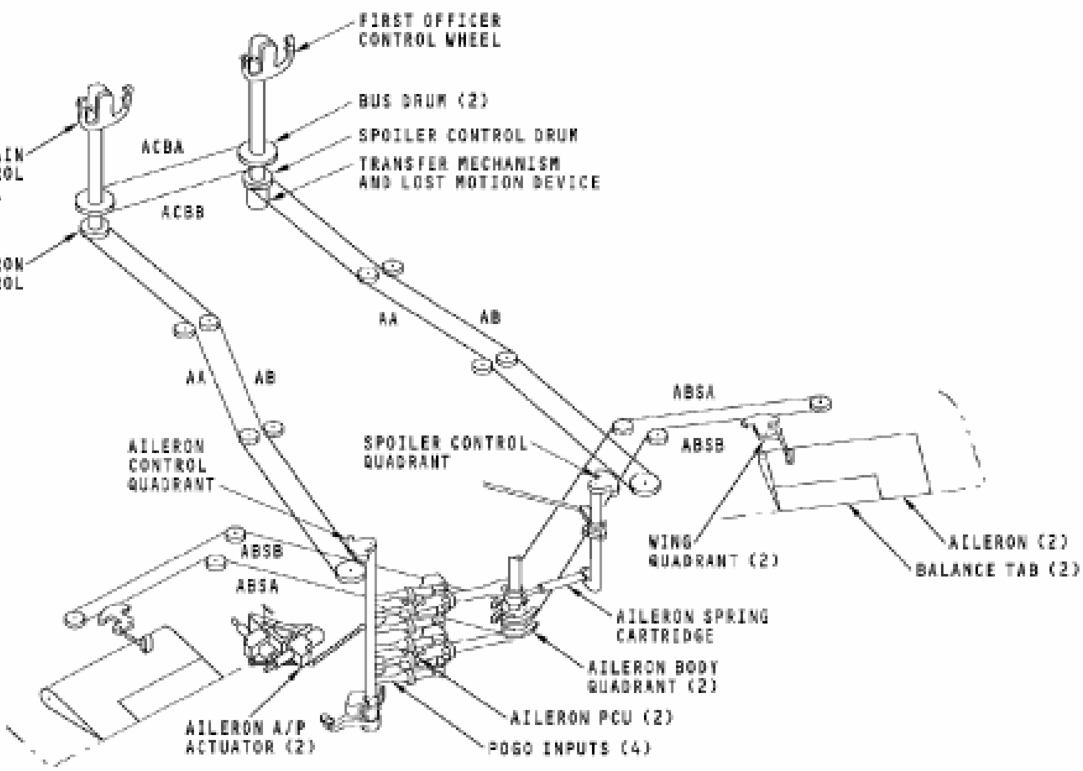
shows close consistency with the event. This condition is also consistent with the possibility of recovering the airplane when appropriate quantity of input is applied timely on the airplane.

6. The movements of the ailerons throughout the last recovery phase highly support this scenario. The FDR data shows that even with the captain attempt to recover the airplane at the last stages, the ailerons always had the trend to move towards the opposite direction of correction which is highly consistent with the fault existence when the captain effort to restore the airplane is reduced.

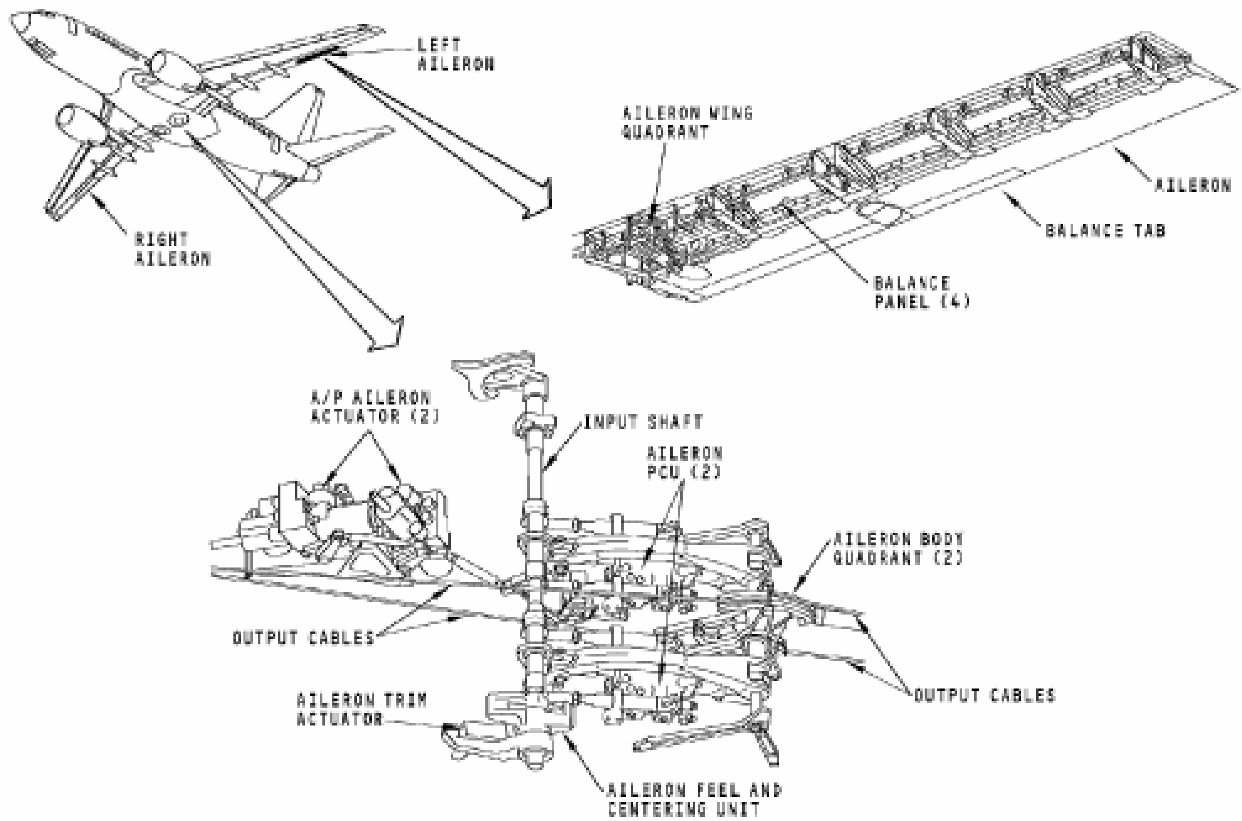
7. Referring to U.S. comments, it is stated that *"The rates recorded by the FDR could only have been achieved through manual wheel input because they exceeded the capabilities of the aileron trim system which is 0.6 degrees"*. The max rate is meaningful only if the aileron control wheels are released. If the aileron wheels are held firmly and not released, the aileron trim runaway will not cause any movement to the ailerons, only an induced increasing force will be generated on the control wheels. Wheel forces are not recorded in the FDR. The moment the aileron wheels are released, the aileron wheels and the ailerons will immediately move to the new trimmed condition. Based on the above analysis, the MCA does not agree with the U.S. comment

8. Crew behavior study does show consistency.

9. Although an attempt to correctly recover was initiated, the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery within the available remaining time before impact.



AILERON AND AILERON TRIM CONTROL SYSTEM - GENERAL DESCRIPTION 2



AILERON AND AILERON TRIM CONTROL SYSTEM - COMPONENT LOCATIONS 2

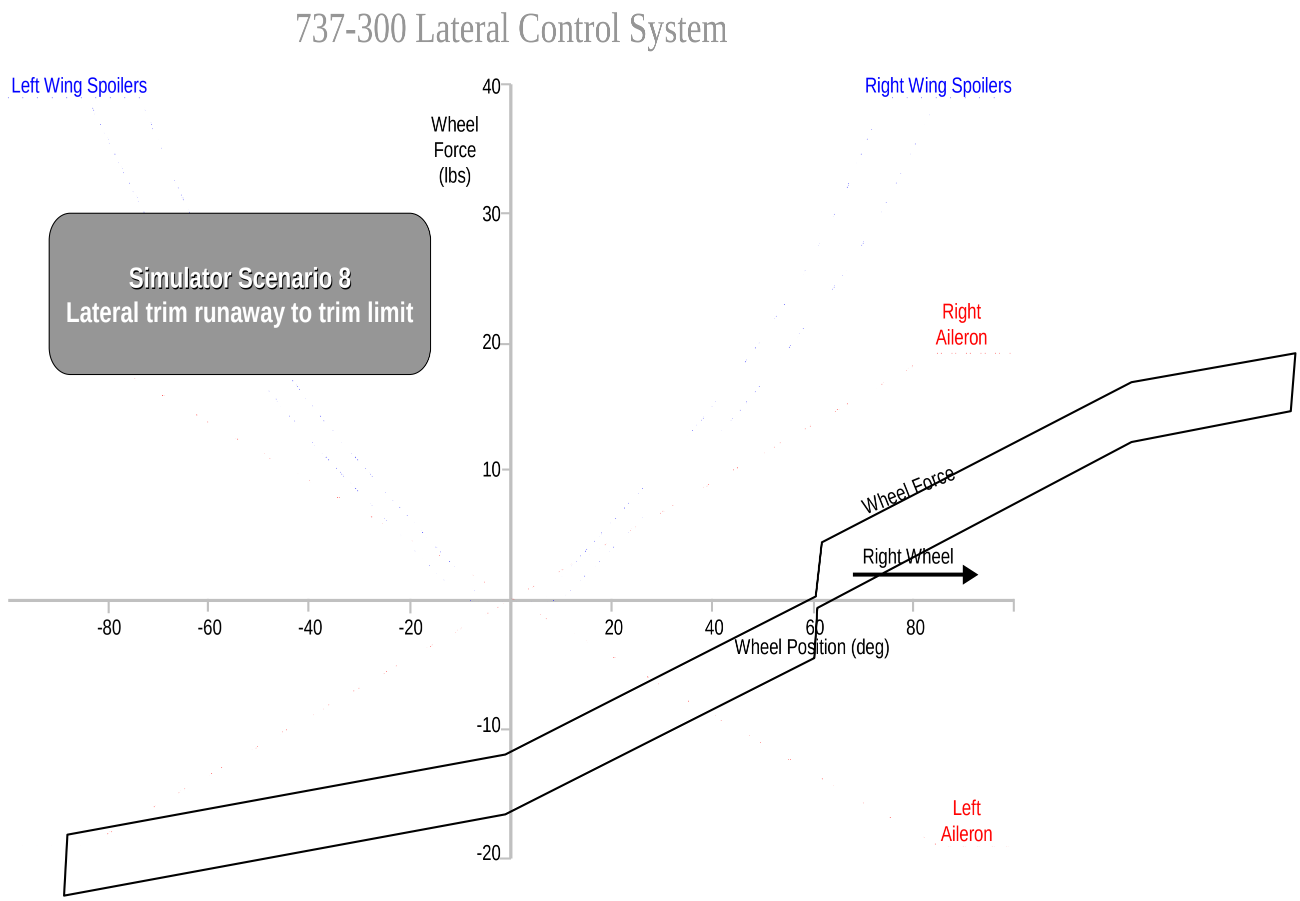
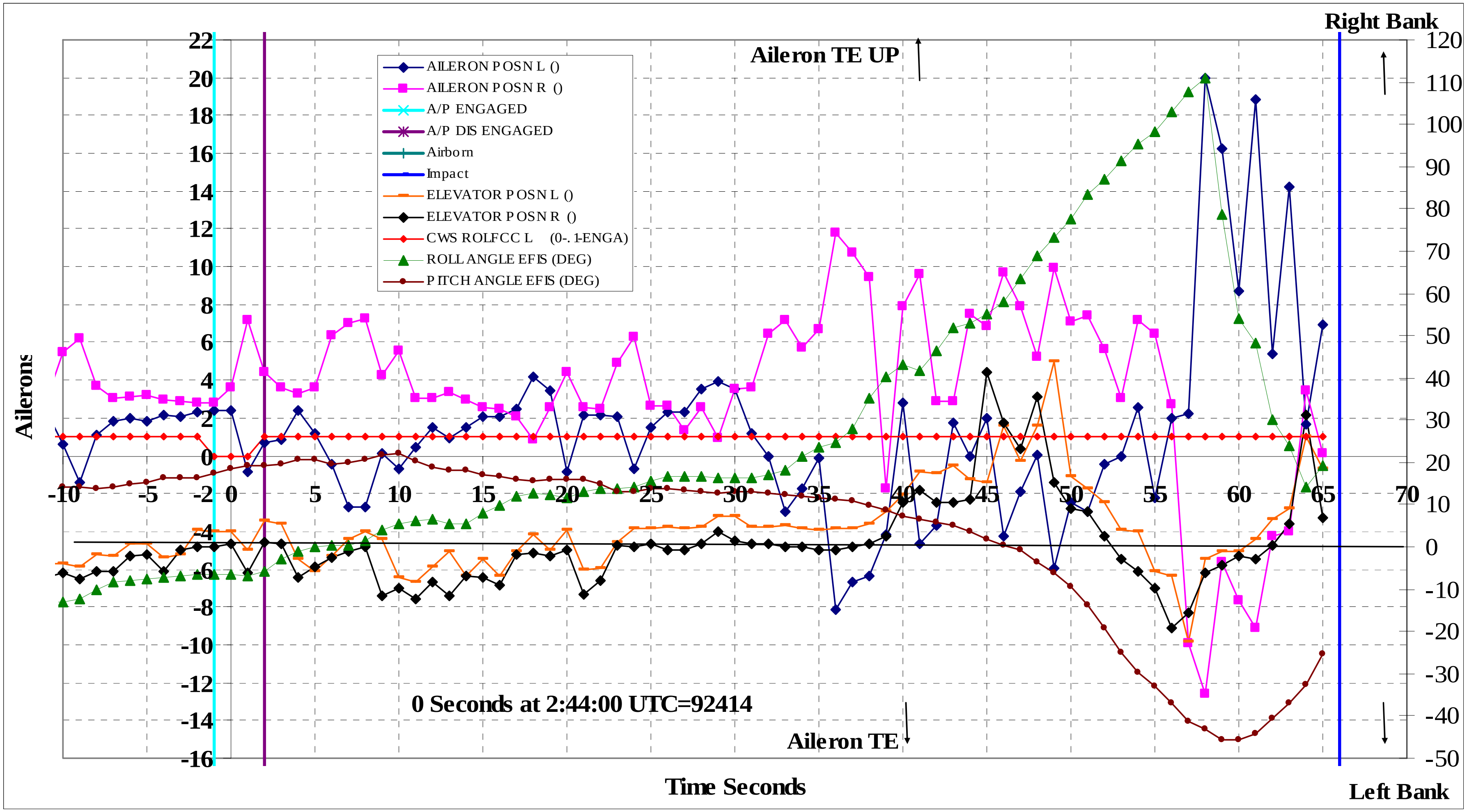
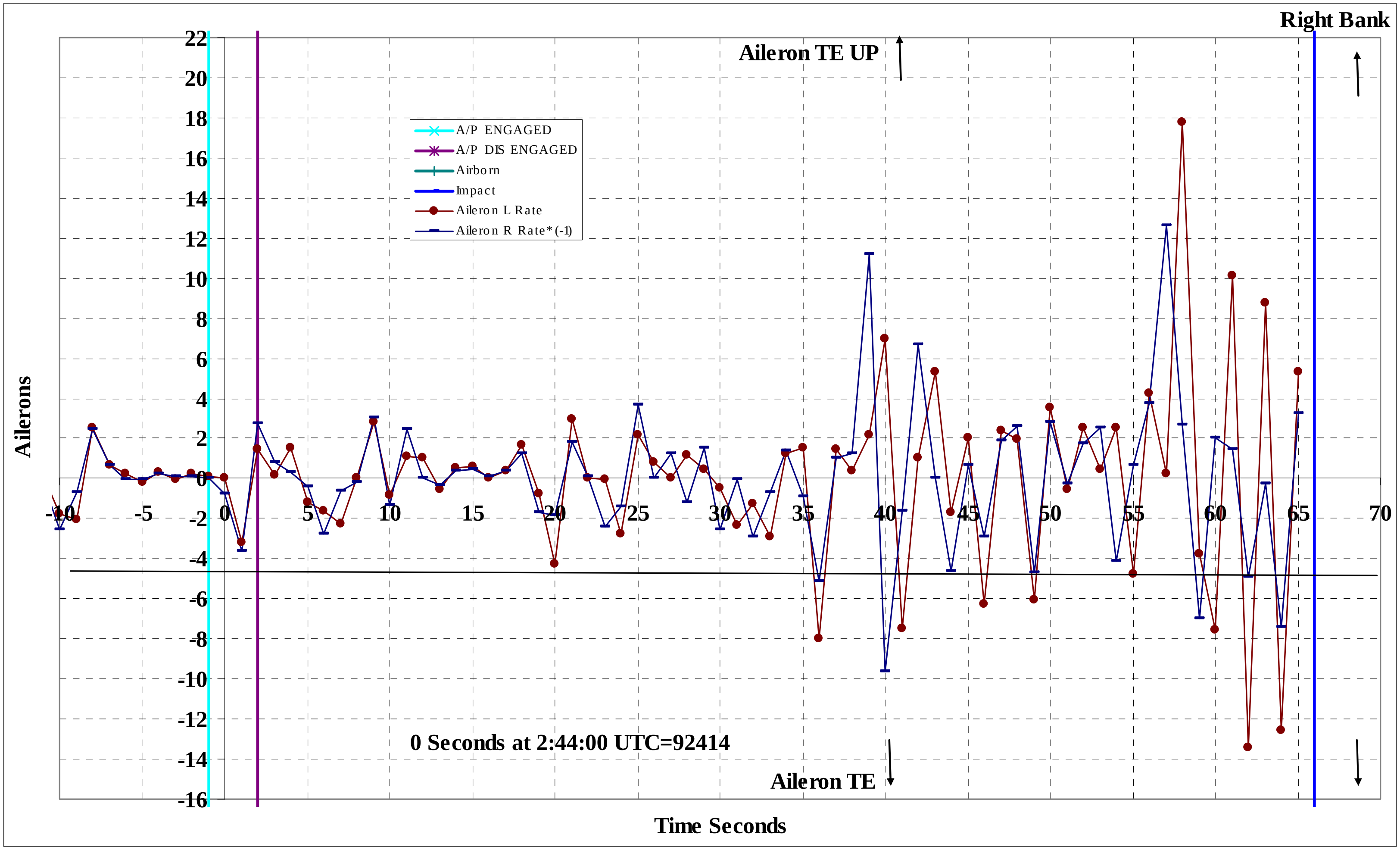


Figure 2.5.13.7 Ailerons and spoilers behavior with aileron trim actuator at its hardover position



Ailerons Movement- FDR data



Derived Aileron Rate[2]

---

[2] Using the average linear rate before and after each point, the right aileron rate is sign inverted for comparison

U.S. Comment:

Autopilot flight control actuator hardover. The MCA's draft final report accurately stated that an aileron autopilot flight control actuator hardover most likely had not occurred. An autopilot flight control actuator can only provide an uncommanded aileron control system input if three separate faults occur simultaneously within the actuator: the arm solenoid must be commanded open, the detent solenoid must be commanded open, and the transfer valve spool must be jammed off center. This failure scenario would result in a hardover to the autopilot actuator authority limit, ultimately commanding the aileron surfaces to a maximum position of ±15° and the control wheel to 60° (in the absence of manual input). The effects of this failure scenario were inconsistent with the FDR data. Further, during M-cab flight simulations, investigators easily identified and controlled the hardover and demonstrated that only 17 to 20 pounds of control wheel force were required to counter the hardover effects.

MCA Response:

Reference:

Section 2.5.13 Right roll continues to overbank with ailerons activity, item 6.2.2.3.1.1 Both Solenoids and Transfer Valve Jammed (Autopilot actuator, both Solenoids and Transfer Valve Jammed (Actuator Hardover without Force Limiter 17 to 20 lb Force)) (section 2.5.13) of the Report

Assumptions:

- These faults require 3 concurrent faults. Detent solenoid was in correct position at autopilot engagement. Arm solenoid could be latent failure. Transfer was working on previous flight and could have occurred anytime after last use of autopilot and would have been latent from that point.
- Both the Arm and the Detent solenoid are assumed to fail (stuck open). The transfer valve is assumed to fail in the position commanding right bank

The cause of these failures can not be conclusively identified. However the failure of the arm solenoid (stuck open solenoid) might have been the result of a stuck closed contact (MCP engage relay A). Also these failures might be the result of an electric short within the electrical socket on the autopilot actuator.

Consequences of the hypothetical failure:

- This triple fault will result in an A/P actuator hardover.
- The crew will not be able to engage the autopilot.
- With autopilot disengaged, the affected autopilot actuator will always try to drive the ailerons and spoilers towards the actuator hardover position, driving the airplane towards airplane right roll direction. Both aileron wheels will be driven away of the neutral position and will be positioned at about 60 degrees wheel position, The Captain and the F/O will be able to control the ailerons and flight spoilers with an additional force of 17 lbs to overcome detent piston pressure and override the autopilot actuator.
- The ailerons and flight spoilers will follow movement of the ailerons control wheels.
- Whenever the control wheels are released, the control wheel will tend to return to the relevant autopilot actuator hardover position (60 degrees wheel position), resulting in an aileron deflection of about ± 13 degrees and spoilers deflection and driving the airplane towards airplane right roll direction.
- This fault will not be associated with any visual indication or audio warning in the cockpit

Results of the M-Cab test (This test was done on Boeing M-Cab, Seattle, Washington):

M-Cab results confirmed the analytical studies for the failure. Therefore, the MCA does not agree with the U.S. comment that this is not consistent with the FDR data".

MCA agrees with the U.S. statement that *"Further, during M-cab flight simulations, investigators easily controlled the hardover and demonstrated that only 17 to 20 pounds of control wheel force were required to counter the hardover effects" provided that the failure is well recognized and anticipated.."*

MCA does not agree with the U.S. comment that *"the fault was easily identified by the investigators"* for the following reasons.

- This fault is not associated with any visual or audio warning in the cockpit.
- This failure is not included in the FCOM (Flight Crew Operating Manual)
- This failure is not included in any airplane training phase.

This fault could not be ruled out, based on the following:

- The results obtained from the analytical studies and the M-Cab test show a very close consistency with the available data.

- The airplane behavior is consistent with the consequences of the hypothetical fault:

  1. The ailerons movements towards airplane right roll are highly consistent with the expected position resulted from this hypothetical fault.

  2. This fault always drive the airplane in the right roll direction

  3. Movement of the aileron surfaces as shown in the FDR towards the neutral position are consistent with captain attempts to control the airplane attitude with the existence of the failure, the rate of airplane rolling to the right is always reduced with these attempts. The forces required to move the ailerons by the captain are higher than the forces required in normal condition with no fault.

  4. Whenever the captain control wheel is released, the ailerons move towards the offset position showing high consistency with the fault existence. The fault was continually driving the airplane towards more right roll

  5. The movements of the ailerons throughout the last recovery phase highly support this scenario. The FDR data shows that even with the captain attempt to recover the airplane at the last stages, the ailerons always had the trend to move towards the opposite direction of correction which is highly consistent with the fault existence when the captain effort to restore the airplane is reduced.

  6. The Captain repeated announcement "Autopilot" and the F/O announcement "Autopilot is engaged commander" support this hypothetical scenario and

indicating that the autopilot was still interfering and driving the airplane not the way it should be in the normal conditions.

7. Crew behavior study shows consistency.

8. Although an attempt to correctly recover was initiated, the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery within the available remaining time before impact.

U.S. Comment:

The MCA subsequently proposed two additional hypothetical failure scenarios: a temporary spoiler wing cable jam and a temporary first officer control wheel jam. The MCA's draft final report properly concluded that the accident airplane's motion is defined by FDR- recorded control surface deflections, including spoiler and aileron (control wheel) deflections. The effects of a temporary spoiler wing cable jam or of a temporary first officer control wheel jam would render the previous statement (and the simulation data analyses upon which it is based) false. Therefore, considering these hypothetical failure scenarios is illogical.

Further, the MCA's draft final report did not explain how the airplane got to the point in the right roll at which the temporary jams supposedly occurred. Initially, the airplane was in a left bank, but it then started banking right. The MCA proposes that the fault occurred as the airplane was increasing through a bank angle of about 25°; however, the airplane's initial departure from the 20°-left-bank attitude occurred about 45 seconds before the hypothetical faults would have started. In addition, the first officer's comment, "turning right, sir," occurred about 9 seconds before the hypothetical faults would have started.

MCA Response:

3- Spoiler wing cable jam offset of the neutral position

Reference:

Item 6.3.5.3.1 (section 2.5.13) of the Report Scenario 10 - Spoiler wing cable jam offset of the neutral position at time 92450 (maximum wheel deflection).and clears at 92472, the following are the Results of the M-Cab test[3]

Assumptions:

- The spoiler wing cable is assumed to jam offset of the neutral position at time 2:44:36 (92450 time frames in seconds). At this time the ailerons and the aileron wheels were at their maximum deflections (based on the FDR data)
- The left aileron was at 8.1 degrees (Trailing Edge Down), the right aileron was at 11.8 degrees (Trailing Edge Up). The airplane pitch angle was 11.25 degrees. The roll angle was 24.6 degrees (right roll)
- This fault is assumed to be cleared at 2:44:58 (92472 time frames in seconds) (beginning of the recovery effort.

Consequences of the hypothetical failure:

- The ailerons control wheels will, when released (no load condition) move and remain at a position equal to the position at the moment of the jam (about 40 degrees right roll-FDR data) minus 12 degrees (transfer mechanism lost motion, caused by the effect of the feel and centering spring), resulting in about 28 degree wheel deflection in the right

[3] This test was done on Boeing M-Cab, Seattle, Washington

roll direction. This corresponds to about 7 degrees of aileron deflections. (considering ailerons offset).

- “The flight spoilers will remain in the position corresponding to the position of the jammed spoilers wing cables, irrespective of any mechanical inputs from either control wheel (about 12 degrees- FDR data).

- The ailerons can still be controlled via the captain's wheel. However, movement of aileron wheel towards airplane left turn (to correct for the right bank tendency) will be opposed by the override mechanism spring, consequently the forces required to move the ailerons in this direction will be significantly higher than the normal forces at no fault (about 50 lbs additional force)

- The F/O will not be able to control the ailerons in the direction of airplane left turn, with limited ability to control it in the direction of airplane right turn.

- This fault will not be associated with any visual indication or audio warning in the cockpit

Results of the M-Cab test (This test was done on Boeing M-Cab, Seattle, Washington):

The simulations take into account the effects of blowdown on the ailerons. However, the blowdown effects on the spoilers are not included because of the way in which these hypothetical faults were simulated.

The longitudinal plot includes the following parameters:

- Press Altitude (Feet)
- Airspeed (Knots)
- Right engine N1 (%)
- Longitudinal acceleration (g's)
- Air/ Ground switch
- Autopilot status
- Pitch attitude (Degrees)
- Body angle of attack (Degrees)
- Column deflection (Degrees)
- Elevator deflection (Degrees)
- Stabilizer position (Units)
- Normal load factor (g's)
- Right main gear down
- Flap detent (Degrees)

The lateral plot includes the following parameters:

- Press Altitude
- Airspeed (Knots)
- Right engine N1 (%)
- Roll attitude (Degrees)
- Wheel force (lbs)
- Control wheel deflection (Degrees)
- Left aileron deflection (Degrees)
- Right aileron deflection (Degrees)
- Left spoiler deflection (Degrees)
- Right spoiler deflection (Degrees)
- Lateral acceleration (g's)
- Magnetic heading (Degrees)
- Rudder deflection (Degrees)

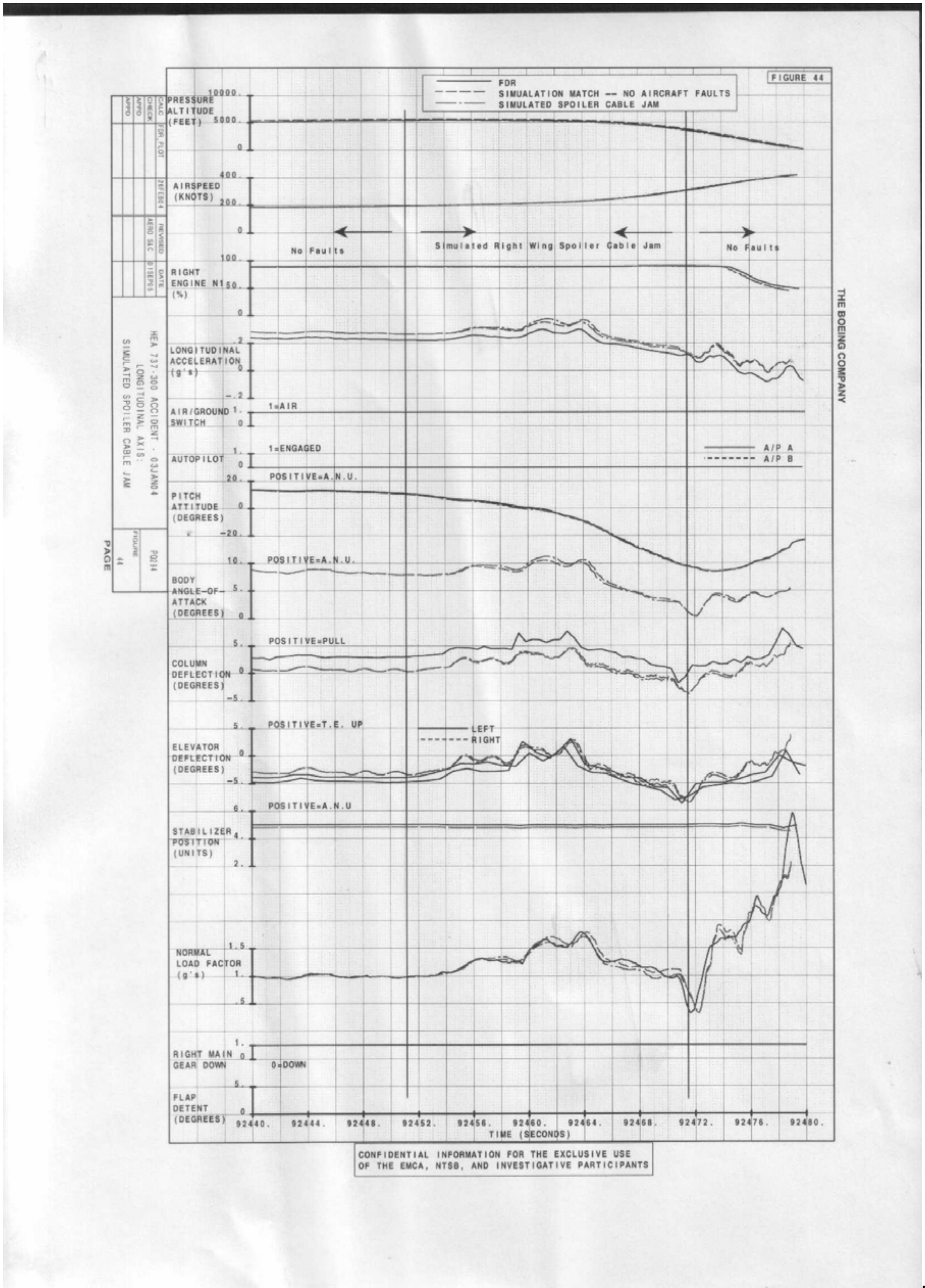


Figure 2.5.13.15a Scenario 10 - Spoiler wing cable jam (longitudinal parameters)

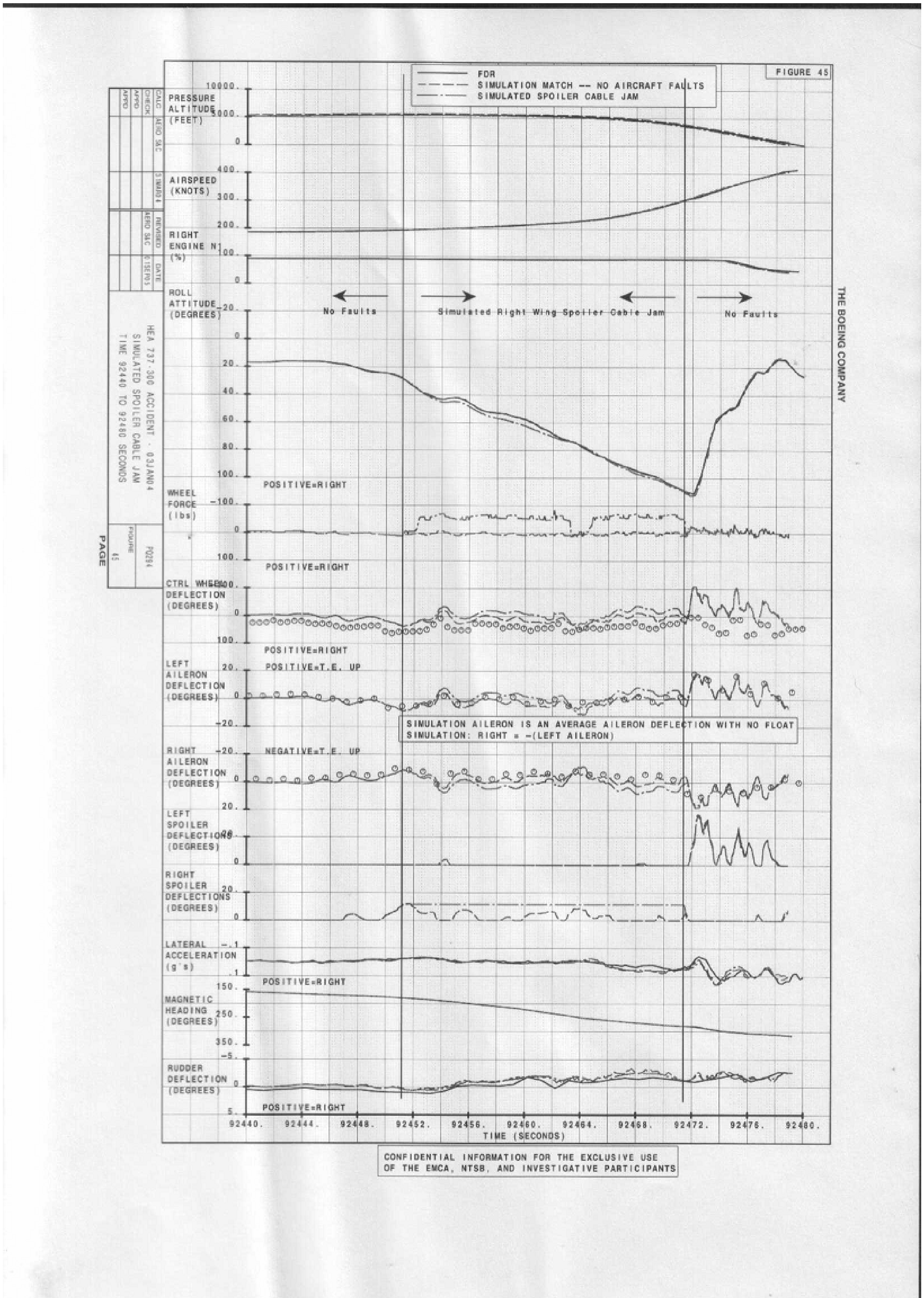


Figure 2.5.13.15b Scenario 10 - Spoiler wing cable jam (lateral parameters)

As shown from the two plots, the results obtained from the M-Cab test show a very close consistency with the FDR data which may explain this event. The estimated aileron wheel forces needed to move the wheel to correct for the right turn tendency is ~ 50 lbs.

In response to the comment *"The MCA's draft final report properly concluded that the accident airplane's motion is defined by FDR- recorded control surface deflections, including spoiler and aileron (control wheel) deflections. The effects of a temporary spoiler wing cable jam or of a temporary first officer control wheel jam would render the previous statement (and the simulation data analyses upon which it is based) false"*, the statement is incorrect due to the close consistency showed in above.

This fault could not be ruled out, based on the following:

- The results obtained from the analytical studies and the M-Cab test show a very close consistency with the available data.
- The airplane behavior is consistent with the consequences of the hypothetical fault:

1. The spoiler wing cable jams offset of the neutral position at time 2:44:36 (92450 time frames in seconds) and clears at 2:44:58 (92472 time frames in seconds, beginning of the recovery effort).
2. The ailerons movements towards airplane right roll are highly consistent with the expected position resulted from this hypothetical fault.
3. This fault always drive the airplane in the right roll direction
4. Movement of the aileron surfaces as shown in the FDR towards the neutral position are consistent with captain attempts to control the airplane attitude with the existence of the failure, the rate of airplane rolling to the right is always reduced with these attempts. The forces required to move the ailerons by the captain are considerably higher than the forces required in normal condition with no fault.
5. Whenever the captain control wheel is released, the ailerons move towards the offset position showing high consistency with the fault existence. The fault was continually driving the airplane towards more right roll
6. The movements of the ailerons throughout the last recovery phase highly support this scenario. The FDR data shows that even with the captain attempt to recover the airplane at the last stages.
7. In the analysis in section 2.5.11 studying the chronological event where the airplane stopped the left turn and started a right turn at about 92420, the pilot input probability was not ruled out as one of the possible causes for this event. The analysis in section 2.5.11 concluded that is not possible to determine a higher possibility to any of the mentioned possibilities based on the given data4 including the pilot input.

[4] Refer to the Final Report Section 2.5.11 for full information

This explains how the airplane got to the point in the right roll at which the temporary jams supposedly occurred.

8. It is expected that wheel forces with higher magnitude can affect the speech pattern, however, it is noticed that there were no captain speeches when the ailerons were near to their neutral position, most of the speeches were made at the timing where the ailerons were moving back to their position relevant to spoilers cables jammed condition. The timing and length of the Captain speeches through this event does not provide sufficient information to verify the effect of this force on the speech tone

9. Crew behavior study shows consistency

10. Although an attempt to correctly recover was initiated, the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery within the available remaining time before impact.

4- Temporarily, First Officer wheel jam (offset of the neutral position) at time 92450 (maximum wheel deflection), and clears at 92472

Assumptions:

- The F/O wheel jam is assumed to jam offset of the neutral position at time 2:44:36 (92450 time frames in seconds). At this time the ailerons and the aileron wheels were at their maximum deflections (based on the FDR data)
- The left aileron was at 8.1 degrees (Trailing Edge Down), the right aileron was at 11.8 degrees (Trailing Edge Up). The airplane pitch angle was 11.25 degrees. The roll angle was 24.6 degrees (right roll)
- This fault is assumed to be cleared at 2:44:58 (92472 time frames in seconds) (beginning of the recovery effort.

Consequences of the hypothetical failure:

- The ailerons control wheels will, when released (no load condition) remain at a position equal to the position at the moment of the jam (about 40 degrees right roll-FDR data). This corresponds to about 10 degrees of aileron deflections (considering ailerons offset).
- The flight spoilers will remain in the position corresponding to the position of the jammed spoilers wing cables (about 12 degrees- FDR data), however the captain will have a limited control on the spoilers within the transfer mechanism lost motion gap (± 12 degree) of aileron wheel deflection.
- The ailerons can still be controlled via the captain's wheel. However, movement of aileron wheel in either directions will be opposed by the override mechanism spring, consequently the forces required to move the ailerons in both directions will be significantly higher than the normal forces at no fault (about 50 lbs additional force)
- The F/O will not be able to control the ailerons nor the spoilers in either direction.
- This fault will not be associated with any visual indication or audio warning in the cockpit

Results of the M-Cab test (This test was done on Boeing M-Cab, Seattle, Washington):

The simulations take into account the effects of blowdown on the ailerons. However, the blowdown effects on the spoilers are not included because of the way in which these hypothetical faults were simulated.

The longitudinal plot includes the following parameters:

- Press Altitude (Feet)
- Airspeed (Knots)
- Right engine N1 (%)
- Longitudinal acceleration (g's)
- Air/ Ground switch
- Autopilot status
- Pitch attitude (Degrees)
- Body angle of attack (Degrees)
- Column deflection (Degrees)
- Elevator deflection (Degrees)
- Stabilizer position (Units)
- Normal load factor (g's)
- Right main gear down

- Flap detent (Degrees)

The lateral plot includes the following parameters:

- Press Altitude
- Airspeed (Knots)
- Right engine N1 (%)
- Roll attitude (Degrees)
- Wheel force (lbs)
- Control wheel deflection (Degrees)
- Left aileron deflection (Degrees)
- Right aileron deflection (Degrees)
- Left spoiler deflection (Degrees)
- Right spoiler deflection (Degrees)
- Lateral acceleration (g’s)
- Magnetic heading (Degrees)
- Rudder deflection (Degrees)

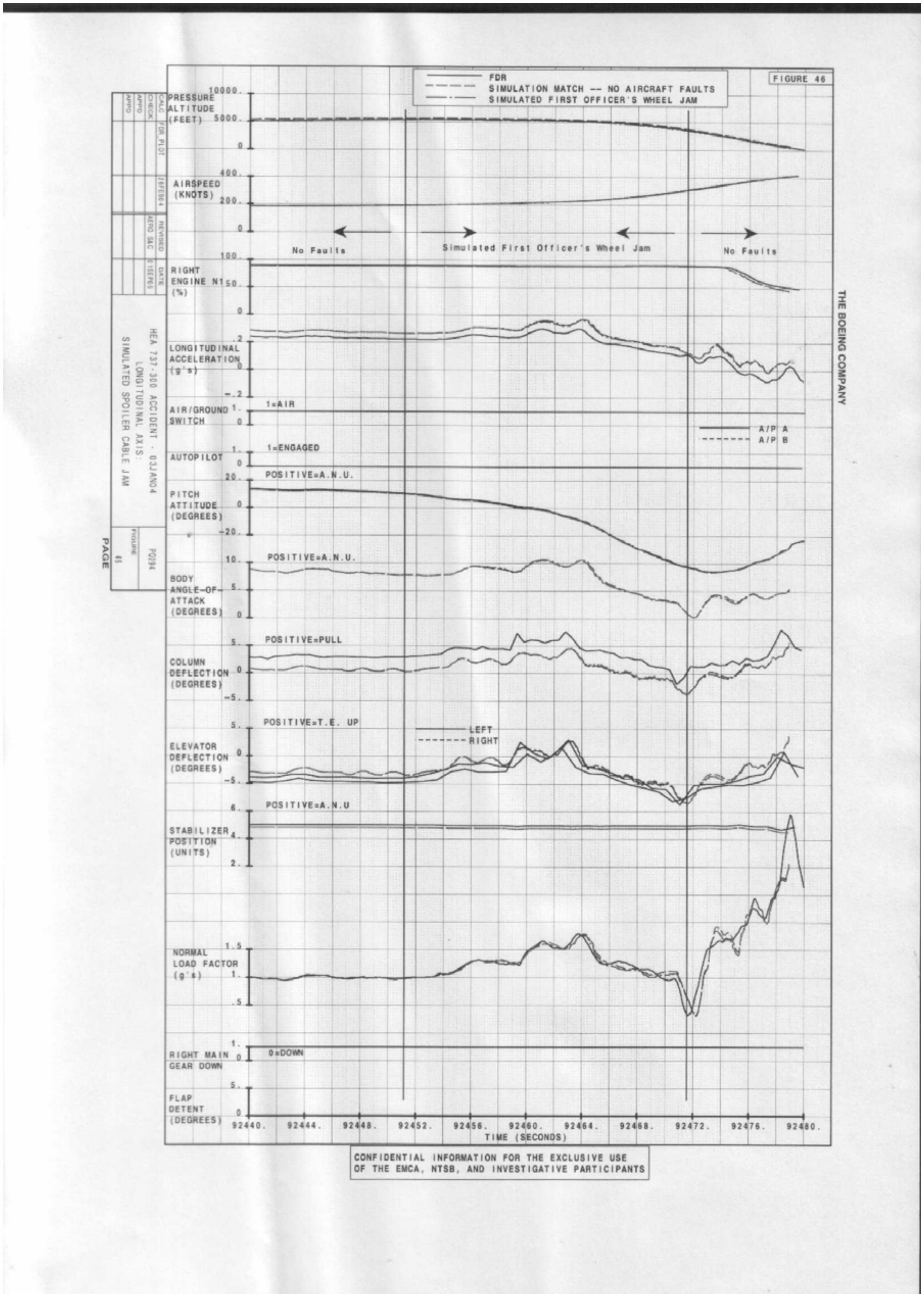


Figure 2.5.13.16a Scenario 10a - F/O wheel jam (longitudinal parameters)

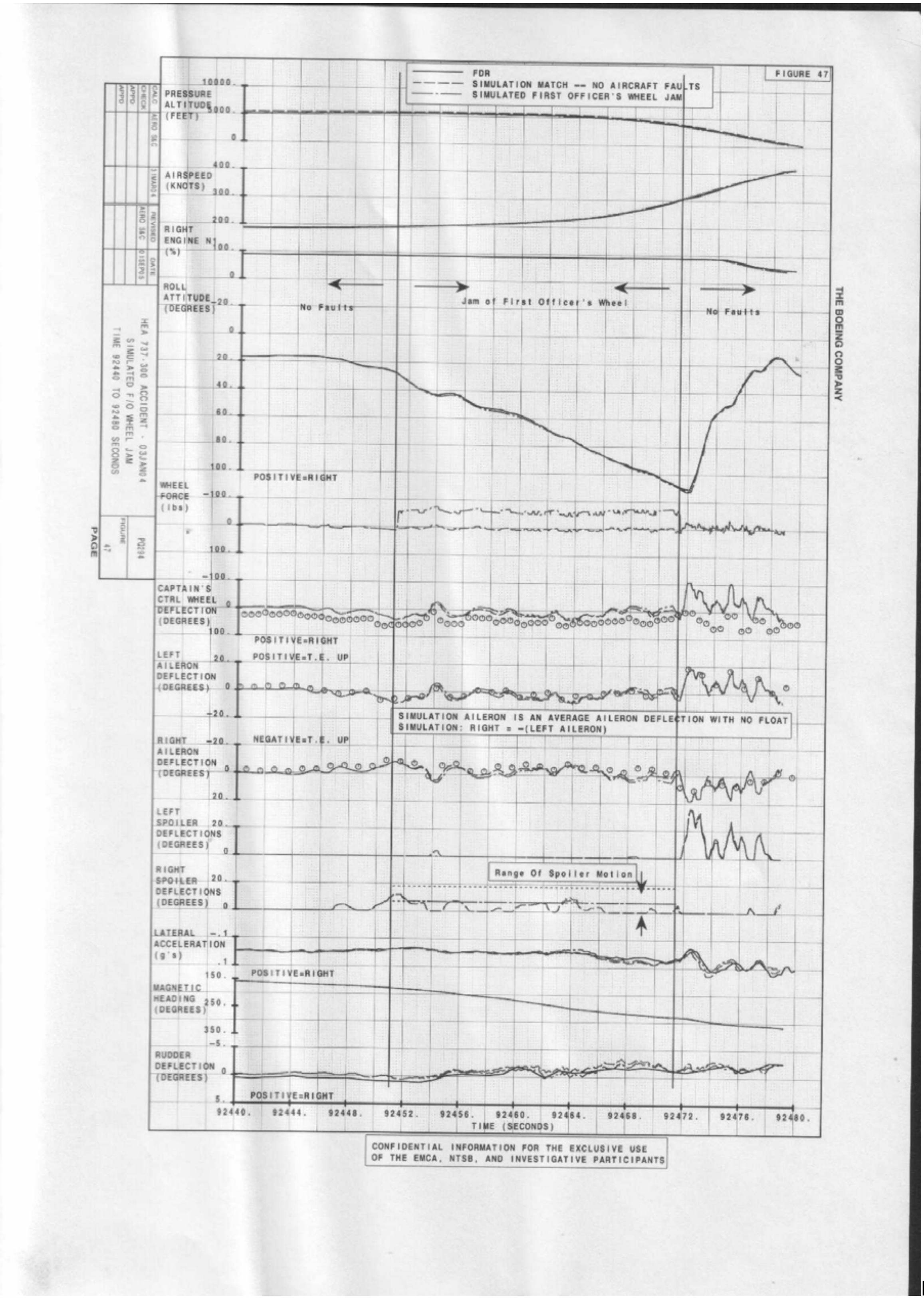


Figure 2.5.13.16b Scenario 10a - F/O wheel jam (lateral parameters)

As shown from the two plots, the results obtained from the M-Cab test show a very close consistency with the FDR data which may explain this event. The estimated aileron wheel forces needed to move the wheel to correct for the right turn tendency is ~ 50 lbs.

In response to the comment *"The MCA's draft final report properly concluded that the accident airplane's motion is defined by FDR- recorded control surface deflections, including spoiler and aileron (control wheel) deflections. The effects of a temporary spoiler wing cable jam or of a temporary first officer control wheel jam would render the previous statement (and the simulation data analyses upon which it is based) false"*, the statement is incorrect due to the close consistency showed in above..

This fault could not be ruled out, based on the following:

- The results obtained from the analytical studies and the M-Cab test show a very close consistency with the available data.

- The airplane behavior is consistent with the consequences of the hypothetical fault:

  1. The First Officer wheel jams offset of the neutral position at time 2:44:36 (92450 time frames in seconds) and clears at 2:44:58 (92472 time frames in seconds, beginning of the recovery effort).

  2. The ailerons movements towards airplane right roll are highly consistent with the expected position resulted from this hypothetical fault.

  3. This fault always drive the airplane in the right roll direction

  4. Movement of the aileron surfaces as shown in the FDR towards the neutral position are consistent with captain attempts to control the airplane attitude with the existence of the failure, the rate of airplane rolling to the right is always reduced with these attempts. The forces required to move the ailerons by the captain are considerably higher than the forces required in normal condition with no fault.

  5. Whenever the captain control wheel is released, the ailerons move towards the offset position showing high consistency with the fault existence. The fault was continually driving the airplane towards more right roll

  6. The movements of the ailerons throughout the last recovery phase highly support this scenario. The FDR data shows that even with the captain attempt to recover the airplane at the last stages.

  7. In the analysis in section 2.5.11 studying the chronological event where the airplane stopped the left turn and started a right turn at about 92420, the pilot input probability was not ruled out as one of the possible causes for this event.

     The analysis in section 2.5.11 concluded that is not possible to determine a higher possibility to any of the mentioned probabilities based on the given data[5]

[5] Refer to the Final Report Section 2.5.11 for full information

including the pilot input.

This explains how the airplane got to the point in the right roll at which the temporary jams supposedly occurred.

8. It is expected that wheel forces with higher magnitude can affect the speech pattern, however, it is noticed that there were no captain speeches when the ailerons were near to their neutral position, most of the speeches were made at the timing where the ailerons were moving back to their position relevant to spoilers cables jammed condition. The timing and length of the Captain speeches through this event does not provide sufficient information to verify the effect of this force on the speech tone

9. Crew behavior study shows consistency

10. Although an attempt to correctly recover was initiated, the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery within the available remaining time before impact.

Faults Contributing Factors:

The following contributing factors apply for the hypothetical faults:

- The faults were not associated with any visual indication or audio warning in the cockpit.
- The faults were not included in the FCOM (Flight Crew Operating Manual)
- The faults were not included in any training phase.
- There were no outside visual cues
- Although an attempt to correctly recover was initiated, the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery within the available remaining time before impact.

U.S. Comments:

2. The aileron inputs and corresponding right roll precipitating the upset resulted from flight crew inputs.

The MCA's draft final report correctly stated that FDR data and flight simulation analyses of the 737 showed that the lateral control inputs required to reproduce the airplane's recorded motion closely matched the aileron deflections recorded on the FDR. As discussed in the previous section, the data were not consistent with a jam or runaway of the aileron actuators or a spoiler or control wheel jam; rather, the data revealed that the ailerons remained active and available until the end of the recording. The airplane's left and right roll inputs, including the maximum right roll of 111 °, resulted from left and right wing aileron surface deflections during the time in which the autopilot was disengaged. The evidence indicates that the aileron inputs were commanded by the flight crew.

MCA Response:
With reference to the previous MCA analysis, it is clear that the referred to scenarios are still consistent with the FDR data.

MCA agrees with the U.S. comment *"the data revealed that the ailerons remained active and available until the end of the recording".* However, with the existence of any of the technical faults scenarios included in the report, the pilot will need additional higher forces compared to the normal conditions at no failures to be able to control the ailerons, and that *"The airplane's left and right roll inputs, including the maximum right roll of 111 °, resulted from left and right wing aileron surface deflections during the time in which the autopilot was disengaged."* This statement supports the MCA conclusion regarding these scenarios.

MCA does not agree with the U.S. comment *"The evidence indicates that the aileron inputs were commanded by the flight crew".* This is highly speculative and not the only possible indication of this action.

All the technical failures included in the Report (Conclusion section) result in aileron movement towards right airplane roll. Movement of the aileron surfaces as shown in the FDR towards the neutral position are consistent with captain attempts to control the airplane attitude with the existence of the failure.

U.S Comment:

3. The captain experienced spatial disorientation as the right roll inputs occurred.

Investigators sought to understand how a professional flight crewmember could have initiated and sustained the manual flight control inputs that resulted in the unintentional loss of the airplane. Available evidence suggests that the captain guided the airplane into an overbanked, airplane-nose-down attitude because he lost spatial orientation during the departure. Evidence consistent with factors that can contribute to spatial orientations were present before the crash. This evidence includes the following:

1. *dark night conditions,*
2. *misleading vestibular cues,*
3. *flight crew distraction, and*
4. *inappropriate control inputs.*

Dark night conditions. *At the time of the accident, dark night, visual meteorological conditions prevailed. The only external visual references were lighted areas on the coast near Sharm EI-Sheikh. Soon\.after takeoff, the airplane passed over the coastline, and these external visual references were no longer visible to the flight crew.*

Misleading vestibular cues. *Studies performed by U.S. and French authorities, which were conducted at the MCA' s request, revealed that the vestibular sensations experienced by the flight crew would have been misleading throughout much of the flight. The flight crew's vestibular systems would have provided them with little or no information about the changes in the airplane's bank angle until after the right bank angle exceeded 30° because the gradual changes in the airplane's attitude would have been below the threshold of perception. As the airplane became fully involved in the right overbank and the angle of the bank continued to increase, the vestibular sensations of the bank angles would have underrepresented the actual bank angles, and the flight crew might even have felt brief vestibular sensations leading them to perceive that the airplane was banked slightly to the left. These findings indicate that, after the airplane passed over the coast and the external visual cues were lost, the captain could only have maintained an accurate awareness of flight attitude by continuously monitoring the attitude indications on his flight instruments.*

Distraction. *A few seconds before the captain called for the autopilot to be engaged, the airplane's pitch began increasing and airspeed began decreasing. These deviations continued during and after the autopilot engagement/disengagement sequence. The captain ultimately allowed the airspeed to decrease to 35 knots below his commanded target airspeed of 220 knots and the climb pitch to reach 22°, which is 10° more than the standard climb pitch of about 12°. During this time, the captain also allowed the airplane to enter a gradually steepening right bank, which was inconsistent with the flight crew's departure clearance to perform a climbing left turn. These pitch, airspeed, and bank angle deviations indicated that the captain directed his attention away from monitoring the attitude indications during and after the autopilot disengagement process. .*

Changes in the auto flight system's mode status offer the best explanation for the captain's distraction. The following changes occurred in the auto flight system's mode status shortly before the initiation of the

right roll: (1) manual engagement of the autopilot, (2) automatic transition of roll guidance from heading select to 9 control wheel steering-roll (CWS-R), (3) manual disengagement of the autopilot, and (4) manual reengagement of heading select for roll guidance.
The transition to the CWS-R "mode occurred in accordance with nominal system operation because the captain was not closely following the flight director guidance at the time of the autopilot engagement. The captain might not have expected the transition, and he might not have understood why it occurred. The captain was probably referring to the mode change from command mode to CWS-R when he stated, "see what the aircraft did?," shortly after it occurred. The available evidence indicates that the unexpected mode change and the flight crew's subsequent focus of attention on reestablishing roll guidance for the auto flight system were the most likely reasons for the captain's distraction from monitoring the attitude indications.

According to CVR information, 24 seconds elapsed after the airplane entered the right bank before either flight crewmember acknowledged or attempted to correct the steepening right bank. However, as the airplane-was rolling from 16° to 40° right bank, the first officer stated, "turning right sir," and the captain replied, "what?" The first officer repeated, "aircraft is turning right," and the captain asked, "ah...turning right...How turning right?" The surprise evident in the captain's responses to the first officer's announcements about the airplane's attitude indicate that he was distracted from monitoring the attitude indications for at least 24 seconds after entering the right bank.

<u>Inappropriate control inputs.</u> The control wheel inputs made by the captain after the first officer told him about the right turn indicate that the captain had become spatially disoriented and that he had experienced some delay in reacquiring an accurate sense of his (and the airplane's) orientation with respect to the Earth's surface.

An appropriate response to the first officer's advisories about the right turn would have been for the captain to direct his attention to the attitude indications, confirm the airplane's attitude, and apply sufficient left control wheel force to stop the right roll and sustain a roll back toward the left. However, such corrective inputs did not begin until 17 seconds after the flight crew's exchange about the right turn. Instead, the captain made inappropriate, oscillating control wheel inputs, with rightward control wheel inputs being dominant, which caused the airplane to roll to a right bank angle of 111° and a pitch attitude of 46° airplane nose down.
The persistent inappropriate nature of the captain's right control wheel inputs suggest that he was unable to immediately regain an accurate awareness of spatial orientation. Studies indicate that pilots may require some time to recover from an unknown attitude and transition to stable instrument flight after a lengthy period of distraction from flight instruments. Investigations of roll upset accidents and incidents involving commercial airline flights have also revealed that from 4 to 18 seconds may elapse between the time that a pilot becomes aware of a problem with airplane attitude and the time that sustained, appropriate control wheel inputs begin.

MCA Response:
With reference to section 2.6. Crew Behavior, Report, the study performed by a team of qualified Human Performance Specialists has come up with findings summerized as follows:

- An event starting from the time of call for autopilot engagement through the time of the captain statement “see what the aircraft did” caused obvious crew distraction. This distraction may have developed to Spatial Disorientation (SD) to the captain until the time the F/O announced “A/C turning right “ and acknowledged by the captain.

- There are conflicting signals in the following period of time (~ 17 seconds), it is unclear whether the captain remained in SD or was the crew unable to perceive the cause that was creating an upset condition until the time when the F/O announced that there was no A/P in action.

- After the time when the F/O announced “no A/P commander” the crew behavior suggests that recovery attempts were consistent with expected crew reaction, evidences show that the the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery.

U.S Comment:

4. The first officer did not assume timely control of the airplane.

The first officer's lack of assertiveness during the accident sequence indicated that he had inadequate CRM skills. The first officer's verbal communications indicated that he had an accurate awareness of the airplane's flight attitude during the upset sequence. However, he did not escalate his assertiveness to prevent the captain from overbanking the airplane to the right. The first officer could have offered suggestions, issued commands, or attempted to take control of the airplane. Instead, as the airplane's bank angle exceeded 40°, the first officer began repeatedly calling out, "overbank," and issuing routine responses to the captain's requests for autopilot engagement.

MCA Response:
MCA does not agree with the U.S. comment. All evidences extracted from the FDR and CVR do not support this statement. On the contrary, the first officer's verbal communications indicated that he had an accurate awareness of the airplane's flight attitude during the upset sequence. MCA analysis of the crew behavior (F/O and Observer) indicate that actions taken in the cockpit did not call for any additional intervention supporting the view that the PF was counteracting some unusual condition..

U.S Comment:

Differences in flight crewmember status. *Disparities between the captain's and first officer's aviation experience likely produced differences in perceived status between the two men, which might have reduced the first officer's willingness to escalate his assertiveness to the point of taking control of the airplane. The 53-year-old captain had been a pilot for over 35 years, held an airline transport pilot certificate, and had accumulated about 7,400 flight hours. He had retired from the Egyptian Air Force in 2000 with the rank of Air Vice Marshal (equivalent to a U.S. brigadier general). He had served as a pilot and flight instructor in high-performance military jets, and he had flown as pilot-in-command on four different types of transport-category airplanes. The 25-year-old first officer had been a pilot for 7 years, held a commercial pilot certificate, and had accumulated about 800 flight hours. The first officer had no prior experience with transport-category airplanes before joining Flash Airlines.*

MCA Response:
MCA does not agree with the above U.S. comment. Based on the factual information regarding both the cockpit crew members included in "Chapter 1 (Factual Information), Sections 1.5.1 and 1.5.2, Final Report", both cockpit crew members were satisfying all the regulatory requirements. In addition, it is quite normal to have a captain that is older than the first officer with higher flying experience and in this case a positive response of the F/O indicating airplane turning right and overbank clearly shows that he was not negatively influenced by authority gradient. Also the observer pilot (43 years old, 4000 flying hours, U.S. license holder) reaction also supports that actions in the cockpit did not require any intervention with the PF

U.S. Comment:

Flash Airlines CRM training. Many previous accidents have occurred when captains' errors went unchallenged by first officers. Aviation studies have provided further evidence about the role of poor CRM in accidents and about the importance of emphasizing CRM skills in airline training. Guidelines for CRM training encourage carriers to train their pilots how to promote a course of action they feel is best, even if it involves conflict with others. This is a difficult issue for many carriers, because encouraging flight crewmembers to challenge a captain's authority could increase disagreements between flight crewmembers, potentially creating a new set of safety concerns. However, the accident record suggests that safety benefits may be obtained by encouraging first officers to be appropriately assertive if a captain does not appropriately address an imminent threat to flight safety.

Flash Airlines' training manual contained a CRM ground training course outline marked,

effective January 2, 2003." The manual stated that CRM training would be provided to pilots during initial and recurrent training and would consist of 12 hours of instruction over 2 days. One of the topics included in this training was "communication skills of inquiry, advocacy, and feedback." The airline's Flight Operations Manual stated, "During flying training on aeroplanes with a flight crew of 2 particular emphasis will be placed on the practice of Line Orientated Flying Training (LOFT) with emphasis on Crew Resource Management (CRM) and the use of correct crew coordinated procedures." Despite the existence of these documents and policies, the MCA's report stated that Flash Airlines did not provide CRM training to either of the accident pilots. Therefore, the first officer did not receive training in skills that could have helped him playa more active role in the airplane's recovery.

MCA Response:

It is to be noted that the CRM training was not mandatory at the time of the accident. MCA believes that, although a level of CRM was observed, it is clear that more emphasis in this area of training will achieve earlier recognition and recovery from abnormal conditions

U.S Comment:

5. The airplane remained fully controllable and responsive to the flight controls throughout the flight.

Analysis of the FDR data revealed that the airplane remained controllable throughout the entire flight. The maximum recorded bank and pitch angles during the airplane's descent were about 111° right wing down and 46° airplane nose down, respectively. As a result of flight crew corrective roll and pitch inputs, the airplane began to recover; however, the recovery attempt began too late to prevent the accident. FDR data indicated that, just before impact, the bank and pitch angles had decreased to about 14° right wing down and 23°oirplane nose down, respectively.

MCA Response:

MCA agrees with the U.S. remark that the analysis of the FDR data revealed that the airplane remained controllable, on condition that any failure condition was correctly perceived and timely correction applied.

U.S. Comment:

CONCLUSIONS

In summary, the evidence collected during this c investigation strongly supports the conclusions that no airplane-related malfunction or failure caused or contributed to the accident and that the accident can be explained by the captain's spatial disorientation and the first officer's failure to assume timely control of the airplane.

MCA response:

An event starting from the time of call for autopilot engagement through the time of the captain statement “see what the aircraft did” caused obvious crew distraction. This distraction may have developed to Spatial Disorientation (SD) to the captain until the time the F/O announced “A/C turning right “and acknowledged by the captain.
There are conflicting signals in the following period of time (~ 17 seconds), it is unclear whether the captain remained in SD or was the crew unable to perceive the cause that was creating an upset condition until the time when the F/O announced that there was no A/P in action.
After the time when the F/O announced “no A/P commander” the crew behavior suggests that recovery attempts were consistent with expected crew reaction, evidences show that the the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery.

MCA believes that the, with reference to section 3 Conclusion of the report, the possible accident causes are as follows:

- Trim/ Feel Unit Fault (Aileron Trim Runaway)
- Temporarily, Spoiler wing cable jam (Spoiler offset of the neutral position)
- Temporarily, F/O wheel jam (spoilers offset of the neutral position)
- Autopilot Actuator Hardover Fault

Possible contributing factors are as follows:

- A distraction developing to Spatial Disorientation (SD) until the time the F/O announced “A/C turning right” with acknowledgement of the captain.
- There are conflicting signals which make unclear whether the captain remained in SD or was the crew unable to perceive the cause that was creating an upset condition until the time when the F/O announced that there was no A/P in action.
- After the time when the F/O announced “no A/P commander” the crew behavior suggests the recovery attempt was consistent with expected crew reaction, evidences show that the corrective action was initiated in full, however the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery.

U.S. Detailed Comments on Draft Final Report of Aircraft Accident
Flash Airlines flight 604, Boeing 737-300, SU-ZCF
January 3, 2004, Red Sea near Sharm El-Sheikh, Egypt

FACTUAL[6]

U.S. Comment:

Page 24, Section 1.5.1.2., Background information, ii

The third bullet point notes the captain's work experience at Scorpio Aviation.

This section and elsewhere, as appropriate, should address the apparent shortcomings with the captain's ATR 42 training and/or records (the captain did not meet ATR training minimums recommended by the airplane manufacturer, and the draft final report does not establish how these compared to ECAA minimum requirements). It also appears that some of the captain's ATR flight training was performed during passenger flights.

Page 24, Section 1.5.1.2., Background information, ii
The fourth bullet point should correct the accident date to be 3 January 2004.

MCA Response

Corrected

U.S. Comment:

Page 24, Section 1.5.1.2., Background information, v

Section v currently reads:

> History of position flown for specific aircraft, and dates of upgrades (i.e., copilot to captain)
> Refer to page 14 of the Factual Report

Information on the captain's positions flown (i.e., flight engineer, first officer, captain) for specific airplanes and dates of his position upgrades (in the military and in civil aviation) should be inserted or referenced here. This information is not contained on p. 14.

Page 24, Section 1.5.1.2., Background information, vi

[6] U.S. comments are shown in yellow background

Section vi is currently titled:

"All" captain's training records (including his last recurrent training).

Records documenting the captain's hours of Boeing 737 ground training and Flash Airlines company indoctrination training should be included in the pages of training records that follow page 24. Such records were included for the first officer. If such records are unavailable for the captain, this should be explained.

Page 1 of 40

MCA Response:

Added

U.S. Comment:

Page 61, Section 1.5.1.7., Additional factual documentation (Captain)

A note at the bottom of the page states that the captain took a deadhead flight from CAI to SSH on January 1, 2004.

This section should list other deadheading flights by the captain during the period covered by the table.

MCA Response:

Adopted

U.S. Comment:

Page 63, Section 1.5.1.7., Additional factual documentation (Captain)

The first paragraph on this page states:

> The captain's time on Russian aircraft (MiG-21). Hercules transport aircrafts C130 (dates and number of hours). ADI display configuration in comparison with B737-300 ADI display. Refer to captain CV, and item 1.5.1.2 (vi)

Neither the captain's C.V. nor his training records contain this information.

The captain's flight experience on MiG-21 and C-130 airplanes and a comparison of their attitude displays with the displays of the accident airplane should be provided here.

MCA Response:

Captain flew approximately in this sequence:
Russian Mig: 1000 flying hours (Russian ADI display)
C130: 5000 hours (Conventional ADI display)
ATR: 700 hours (Conventional ADI display)
Boeing 737: 700 hours (Conventional ADI display)

U.S. Comment:

Page 65, Section 1.5.2.2., Background information

Section i of this page, titled "Beginning of his flying career" summarizes the first officer's Boeing 737-300 initial training. It states:

- The F/0 began his ground training on the aircraft type 737-300 at Luxor Airway from 4 May 2002 to 16 May 2002
- The F/0 completed the Full Flight Simulator Training and the Flight Training at Flash Airline on 30 June 02

Section 1.17.2.1, page 312, states that a January 2003 ECAA audit found Flash Airlines had no training program. Information should be provided here describing the training program used for the first officer's May 2002 Boeing 737 ground training.

The first officer's initial simulator proficiency check form, dated June 30, 2002 states that a Boeing 737-300/400/500 simulator was used. Information should be provided about which variant the simulator was configured to represent, and whether the first officer received any differences training for the 300/400/500 variants.

MCA Response:

Note: (added)
Luxor Air training forms are approved training syllabus by ECAA. The audit of Flash Airline carried on January 2003 comment that Flash was still using training forms under the name of the previous operator who was also ECAA approved but they should change the forms to the name of Flash.

U.S. Comment:

Page 76, Section 1.5.2.2., Background information

This page contains a copy of the first officer's training record titled "Proficiency Check Form," dated July 02. A notation on the document says it is page 1 of 2, but the second page is not included. It states that it is from the flight training department of Heliopolis

Airlines, and that the first officer's proficiency check was conducted in a Flash Airlines airplane. MCA has added a notation to the bottom of the page stating that Flash Airlines took over some of the Heliopolis Airlines routes, but this does not explain the use of Heliopolis training forms.

Information should be provided about whether Flash Airlines was utilizing the training program of Heliopolis Airlines and whether the use of Heliopolis training forms by Flash Airlines was acceptable under ECAA regulations.

MCA Response:

Added

U.S. Comment:

Page 97, Section 1.5.2.3., 72-hour history of the F/0

This section refers the reader to pages 72 and 73 of the factual report for information on the F/0's 72-hour history. Neither pages 72 and 73 of the factual report, nor pages 72 and 73 of the draft final report provide a narrative description of the first officer's activities in the 72 hours before the accident.

The first officer's work schedule and any other known activities in the 72 hours before the accident should be summarized here in a narrative format.

Page 107, Section 1.6.2.1 Electronic Attitude Direction Indicator (EADI)

Some of the original text for the description of the EADI is missing. The original text stated:

> The artificial horizon line which separates the upper blue portion of the display from the lower brown portion moves up and down as the airplane pitches and tilts.

The sentence should read:

> The artificial horizon line which separates the upper blue portion of the display from the lower brown portion moves up and down as the airplane pitches and tilts left and right as the airplane rolls.

MCA Response:

Adopted

U.S. Comment:

Page 120, Section 1.6.6.3, section C

This section states:

> On January 3rd, 2003, aircraft SU-ZCF, a daily check was performed in accordance with the approved checklist as per the company maintenance

schedule at SSH station just before the flight. The check was carried out by the accident flight on board engineer.

Date should be changed to 3 January 2004, not 2003. The report should clarify how it is known that this check was completed, as the maintenance records were reportedly lost with the aircraft.

MCA Response:

Adopted

U.S. Comment:

Page 121, Section 1.6.6.4, The maintenance log sheets for the flights after 12/31/03

This section states:

> Lost on board and no copies prior to departures from SHH which is a violation of ECAA regulations. Necessary measures are taken by ECAA to ensure adherence.

The specific ECAA regulations that apply should be provided here, as well as the steps taken by ECAA to ensure adherence.

U.S. Comment:

Page 121, Section 1.6.6.5, The lack of write-ups on the TOGA problem and slat indication that existed on the entire 25-hours of FDR

This section states:

> Status of the technical log is not known due to being lost on board

The Flash Air chief pilot stated during the investigation that the airline was aware of the problem and had established a work-around procedure. The report should note this here and discuss why the TOGA problem was not addressed.

MCA Response:

Note:

The pages lost on board covers 25 hours

U.S. Comment:

Page 133, Section 1.10, Aerodrome Information

This section states, in part:

> Clearance was provided to the accident flight crew while on the ground and the departure included a left turn at pilot's discretion and to climb to Flight Level (FL) 140 and to intercept the 306 VOR radial. MEA for this sector is 10500 ft.

The report should clarify the existence of various published minimum altitudes in the area of SSH. The report does not include any enroute charts showing Minimum Enroute Altitudes (MEA) in the vicinity of SSH. Commercially available charts for the area indicate that the MEA along the A411 airway, which is defined by the 306 radial of the SSH VOR is 12,000 feet. The SSH minimum radar vectoring altitude chart on p. 126 of the report (Section 1.8.1) indicates that a minimum radar vectoring altitude of 10,500 DME begins many miles to the northwest of the VOR.

U.S. Comment:

Page 142, Section 1.13.1, Egyptian Air Force - Medical Board Report

This section states, in part:

1. Sequence of medical records

a) Medically fit for all flying duties as from his first medical examination dated 30/05/1970.

b) Amend to be medically fit for all flying duties to be reexamined every sis months as of 14/07/1982.

c) Amend to be medically fit for all flying duties (remove six months restriction) as of 22/04/1985.

The report should explain the reason for the amendment that required the captain to be medically re-examined every six months from July 1982 until April 1985.

U.S. Comment:

Page 142, Section 1.13.1, Egyptian Air Force - Medical Board Report

This section states, in part:

> During Service A.F. Pilots are subjected to the following:
> a) Tests for Spatial Disorientation as part of his routine periodic physical examination.
> b) Sessions of physiologic training which include:
> - Sudden Decompression.
> - Certificate.
> - Spatial Disorientation Training Chair.

A detailed description of the purpose and nature of the captain's prior spatial disorientation tests and training, referenced here, should be added to the report.

U.S. Comment:

Page 146, Section 1.13.2. Medical factors related to SD (Spatial Disorientation)

Section C of this page states:

> C- Medical records for the captain related to any of the conditions conducive to spatial disorientation.
> No report found

A description of the types of medical conditions conducive to spatial disorientation that were considered during this search should be inserted here.

MCA Response:

No conditions inducive of spatial disorientation recorded

U.S. Comment:

Page 153, Section 1.16.1, Section F

The spoiler control drum jam and control wheel shaft jam scenarios were not evaluated in the MCAB. These cases were accomplished by "background" simulation analysis.

MCA Response:

Adopted

U.S. Comment:

Pages 177-204, 214-218, 221-222, 227-235, 237-242, 247, 249-250, 252, 254-263, and 265

These pages contain references to Boeing proprietary information that cannot be released.

Boeing has no objection to the release of information contained on these pages of the draft final report.

MCA Response:

Adopted

U.S. Comment:

Pages 187 -188, Section 1.16.1.2. FDR data plots (presented by Boeing)

The data in this section should use the latest revision provided to the MCA, dated 21 Sept 04.

MCA Response:

Adopted

U.S. Comment:

Page 247, section 1.16.1.9. Flash Airlines AI236 RAM Simulator Configuration (Flash Airlines AI236RAM Simulator Configuration.htm, Program_Pins.pdf)

"Boeing proprietary information and will not be available for public use"

The file referred to on this page is the request made to Royal Air Maroc (RAM) by Boeing on behalf of the MCA. The answer from RAM that defines the simulator configuration was provided to the MCA on 1 August 2005 and should be summarized here.

MCA Response:

Adopted

U.S. Comment:

Page 266, Section 1.16.1.10. Boeing response to raised questions.doc
"Flash Airlines Autopilot Answer to Questions - 31 Jan 2005.ppt

Boeing proprietary information and will not be available for public use"

Boeing was unable to locate a file by this name.

MCA Response

The unidentified file had been mailed to Boeing

U.S. Comment:

Page 267, Section 1.16.1.10. Boeing response to raised questions.doc
"Answers to questionnaire meeting05.ppt Boeing/ Honeywell

Boeing/ Honeywell proprietary information and will not be available for public use"

Boeing and Honeywell were unable to locate a file by this name.

MCA Response:

The unidentified file had been mailed to Boeing

U.S. Comment:

Pages 270-281,1.16.2., Tests and researches conducted by NTSB

This section contains PowerPoint slides from a presentation prepared for the MCA by an NTSB investigator.

The name of the NTSB investigator should be removed from the report, and the Powerpoint slides should be replaced with a brief description of the method used for this study and a description of its findings.

MCA Response:

Adopted

U.S. Comment:

Pages 283-303, Section 1.16.4., Tests and researches conducted by MCA

This section contains general information on spatial disorientation that appears to have been copied verbatim from a U.S. Army Field Manual, FM 3-04.301, Aeromedical Training for Flight Personnel.

Suggest that the original source for this material be identified and cited in the report. Suggest that relevant information from this source be summarized in a brief format, rather than including the entire document.

MCA Response:

Adopted

U.S. Comment:

Page 304, Section 1.16.4., Tests and researches conducted by MCA

Any information contained in the various documents cited on this page that the MCA believes is of particular relevance to this accident should be summarized in a narrative format.

U.S. Comment:

Page 312, Section 1.17.2.1 Safety oversight carried out on Flash Airline during the period from 2 Jan, 2003 to 16 Jan 2003 before AOC renewal

The table on this page labeled "Operation Findings" states:

> Findings: There is no Training Program
> Actions Taken: Training Program is submitted and approved

The report should explain how the airline had originally received its AOC when it had no training program.

MCA Response:

Refer to previous note about Flash Airline previous operator

U.S. Comment:

Page 312, Section 1.17.2.1 Safety oversight carried out on Flash Airline during the period from 2 Jan, 2003 to 16 Jan 2003 before AOC renewal

The table on this page labeled "Operation Findings" states:

> Findings: There are no DRM &CRM Training course performed for cockpit crews, dispatchers and cabin crews
> Actions Taken: The Airline has introduced a training plan starting on Sep 2003 to be done in PAS Airline

It is suggested that this section include some explanation as to why the accident pilots did not receive this training.

U.S. Comment:

Page 312, Section 1.17.2.1 Safety oversight carried out on Flash Airline during the period from 2 Jan, 2003 to 16 Jan 2003 before AOC renewal

The table on this page labeled "Operation Findings" states:

> Findings: By reviewing the A/C log book sheets found that, some sheets not filled out and other some have missed data
> Actions Taken: The airline issued circular for all cockpit crews and maintenance staff to strictly comply with log book sheets filling out instructions

Because of other similar findings during the accident investigation, it is suggested that further detail about the circular and any additional action by the airline or the ECAA be provided.

U.S. Comment:

Page 313, Section 1.17.3.1, Flash Airlines procedures regarding use of autopilot when recovering from unusual attitudes

This section states:

> Refer to Flash Airline FOM (Ops Group)

Relevant information from the Flash Airlines FOM should be summarized and included in this section.

U.S. Comment:

Pages 320-323, Section 1.17.3.8 Egyptian requirements for the training of pilots at an airline such as Flash Airlines

This section contains excerpts from the Egyptian Ministry of Civil Aviation Training Standards Handbook.

Information relevant to the flight crew and the type of operation involved in the accident should be extracted from these materials and summarized in the report.

The report should also state whether the captain met the ECAR airplane group experience requirements of 2500 hours on turbo-jet powered aircraft > 5,700 kg (as stipulated in the report on p. 323) prior to being initially certified as PIC for Part 121 Air Taxi flights utilizing Group IILJ aircraft. Information contained in the draft final report indicates that the captain may have only acquired 1,009 hours of jet experience (on L-29, Mig 17, and Mig 21 airplanes) by the time he was hired by Flash Airlines.

U.S. Comment:

Page 326, Section 1.17.3.11 Flash Airlines program for training and checking pilots in the field of CRM and human factors (as contained in the company training manual)

This section states:

> No mandatory training was required by ECAR at the time of the accident. However, CRM course is outlined in Flash Airline Training Manual 4.10

Suggest that the report explain whether the presence of an approved training module in the carrier's training manual meant that the company was obligated to provide the training to its pilots. Also suggest that the report explain why the ECAA's January 2003 audit of Flash Airlines would cite a lack of CRM training at Flash Airlines as an operational shortcoming when such training was not required in Egypt.

U.S. Comment:

Page 326, Section 1.17.3.12 Flash Airlines pilots procedures for training and checking pilots on spatial disorientation countermeasures and upset recovery

This section states:

Spatial Disorientation training is not a requirement by Civil Aviation Authorities. However, some literature about this subject is included in Flash Airline Training Manual.

Relevant material contained in the Flash Airlines Manuals should be referenced, summarized, and inserted in this section.

U.S. Comment:

Page 327, Section 1.17.3.20 Previous violations, fines, or bans levied foreign aviation regulatory agencies

This section states:

None identified.

Information should be added to the report acknowledging the Flash Airlines violations documented by the Swiss government. In particular, the following details are known and should be added to the final report.

The Swiss FOCA conducted two Safety Assessment of Foreign Aircraft (SAFA) ramp inspections on Flash Airlines B-737 aircraft in 2002. Aircraft SU-ZCD was inspected on April 27, 2002, and SU-ZCF (the accident aircraft) was inspected on October 11, 2002. Egyptian authorities were informed by FOCA in writing of the results of both inspections. The inspections revealed numerous and significant safety-related deficiencies. According to FOCA, a ban was issued on further Flash Airlines flights to Switzerland effective October 17, 2002, because of the similarities of the inspection findings on the two aircraft and the lack of appropriate response by the airline to the safety issues.

MCA Response:

Reviewing this report indicated that the ban was due to a conflict on financial issues and no relevant safety issues were mentioned.

U.S. Comment:

Page 327-333, Section 1.17.3.22 Airline Simulator program contract with RAM, ECAA letter of approval

This section contains several pages concerning approval of a Royal Air Maroc Boeing 737-500 simulator for use by EgyptAir, dated September 2003.

The report should clarify how this approval applied to Flash Airlines' training program and address the basis for the captain's apparent training on the simulator in April/May 2003 before the September 2003 approval of the simulator.

U.S. Comment:

Page 334, Section 1.17.3.23 Simulator used by Flash Airlines at RAM

The statement "pending Boeing response" should be deleted. The MCA asked Boeing for help in determining what differences existed between the RAM simulator used for the Flash Airlines training and the accident aircraft. Boeing forwarded a request for information to RAM and relayed their answer to the MCA on 1 Aug 2005.

MCA Response:
Adopted

This section should also include information about differences in the functioning of the Royal Air Maroc simulator and the accident airplane, such as differences in the sensitivity to direction of turn on the MCP heading knob.

U.S. Comment:

Page 334, Section 1.17.3.24 Flash Airlines procedures regarding which pilot (PF or PNF) engages the autopilot, Boeing recommended practice

This section states:

> No written procedure was found in Flash Airline FOM regarding this issue. Boeing procedures and common practices are for PF to connect the autopilot.

This section should note the Flash Air chief pilot's statements that it was company policy for the PNF to engage the autopilot, and information should be provided to explain why the procedure is contrary to Boeing procedures. This section should also note that the page of the Flash Airlines Flight Operations Manual dealing with this subject was missing.

U.S. Comment:

Page 335, Section 1.17.3.25 Additional information regarding dispatch from SSH

This section states:

> B- Extension of the outbound legs before beginning the turn
>
> Interviewing Flash Airlines chief pilot: Flash Airlines chief pilot stated that during the departure from SSH, Flash Airline pilots might extend the circuit as the situations need whether day or night departures (departure over water is mandatory)
>
> Actual pattern flown depends on airplane performance (weight, OAT, etc). Most airplanes widen the pattern to gain additional altitude as a pilot technique. VOR crossing altitude restriction is shown on charts. This information should be added to Operations Group Notes.

It is suggested that the report identify the crossing altitude and the charts that display the altitude crossing restriction for the SHM VOR that is referenced here.

The report should also note conflicting evidence on the prescribed crossing altitude. The Director of Radar Airports, National Air Navigation Service Company, told investigators that the minimum SHM VOR crossing altitude for ATC purposes was 4,000 feet, but pilots prefer to cross it above 10,000 feet. FDR data from previous flights of the accident airplane showed a departure from SSH requiring a turn to cross back over the VOR where no widening of the turn was evident, and the VOR was crossed below 7,000 feet MSL.

U.S. Comment:

Page 338,1.18. Additional Information

The section on this page titled, "Meeting with Captain Khedr's wife 24/10/2004" states, in part:

> In the year 1999 he was awarded a prize when he landed in a difficult weather in Sarayevo.

Suggest that this information be clarified. It appears to conflict with the footnote on Page 142, Section 1.13.1, Egyptian Air Force - Medical Board Report, which states:

> During the time from 1997 to 1999 the Captain held an administnve [sic] post (Chief of Staff of an Air force base) with no flying duties.

MCA Response:

Corrected

U.S. Comment:

Page 354, Section 7.3 Last PDC Carried out for the Accident Flight
See comments provided for p. 120, Section 1.6.6.3

U.S. Comment:
Page 356:

This table of information should be titled, since it is unclear what it refers to.

MCA Response:

Adopted

U.S. Comment:

Page 621, Exhibit C, Cockpit Voice Recorder (CVR), Group Factual Report

The "tsk tsk" vocalization attributed to the first officer (just before his statement "Overbank overbank overbank" that began at 02:44:48) should be added to the transcript and also evaluated in the analysis section of the report. The "tsk tsk" was confirmed and discussed during a meeting on August 22, 2005 held at MCA headquarters.

MCA Response:

Adopted

ANALYSIS

U.S. Comment:

Page 698, Section 2.1 Analysis Overview

It is suggested that this section begin with a discussion of the analysis methodology and proceed to explain how the various group activities supported that methodology.

MCA Response:

Adopted

Page 699, Section 2.1, Analysis of Airplane systems behavior:

This section states that "several parameters had invalid data."

Control wheel position data was one of the anomalous parameters; however, these data were available from the M-cab data (see comment for p. 701). The remaining invalid data did not inhibit the investigation. The report should be modified to reflect both of these points.

MCA Response:

Adopted

U.S. Comment:

Page 699, Section 2.1 Analysis Overview

Under the bulleted item titled "Anaysis [sic] of the Main Events," the draft final report states that the investigative team categorized the main events as being directly related to the accident, not directly related to the accident, or those that might be considered as normal during flight. The U.S. and French teams did not participate in such an effort, nor does it appear that the draft final report includes any such reference.

MCA Response:

Adopted

U.S. Comment:

Page 700, Section 2.1 Analysis Overview

This section states, in part:

> Two studies have been developed by the whole investigation tean [sic] jointly addressing both the:
> - Systems analysis (fault tree)
> - Crew behavior

The report should make clear that some of the material dealing with crew behavior in the analysis section was independently developed by the MCA and was not endorsed by the multi-national team.

MCA Response:

MCA was not able to identify any material independently developed and no such comment was presented by the French BEA

U.S. Comment:

Page 700, Section 2.1 Analysis Overview

This section states, in part:

> See section "2.6 Crew Behavior", Thread Overview Updates Cairo 26-Aug-05, Flash Air CBS Sub-group Comments (24 August 2005)"

If the CBS working group comments are to be included directly in the report, the final version of these comments, dated August 25, 2005 should be included, rather than the preliminary, incomplete August 24, 2005, version that is included here.

MCA Response:

Adopted

U.S. Comment:

Page 701, Section 2.2.1 General

This section states:

> Several parameters were recorded in the FDR (related to the aircraft performance including):
>
> - The movements of the pilot's controls:
>   - • Control column
>   - • Control wheel position (FDR data is not reliable)

While it is true that the control wheel data are not accurate as recorded on the FDR, the report should note that accurate control wheel data for the accident flight were available from the M-cab data and also from an NTSB study that involved application of corrections to match control wheel and aileron data. The M-cab data were the wheel positions required to match the roll angles and roll rates recorded on the FDR. As such, it is a match that includes the control system model and the airplane aerodynamic model. Control wheel values developed by the NTSB study show good correlation with the M-cab data; the study also provides a likely explanation for the control wheel sensor fault.

Based on this information, the report should reflect the availability of the control wheel data.

U.S. Comment:

Page 710, Section 2.2.3, Conclusion (Sensitivity analysis):

Altitude was not one of the primary parameters matched for the M-cab simulations; rather, it is the result of the simulation attempting to match pitch attitude and vertical acceleration. Very small differences in column command would result in a more exact match of altitude, at the expense of matching pitch attitude.

MCA Response:

Adopted

U.S. Comment:

Page 716, Section 2.3.3 Flight Controls:

The first bulleted item states that the parameter for slat #1 was unreliable (showed mid extend position).

The FDR data indicate that one of the slat indication lights was illuminated for the entire 25 hours of the FDR recording, and this light may have been the subject of the discussion on the CVR at 02:30:21. However, there is no record that this fault was documented in the airplane technical log. Although minimum equipment list (MEL) restrictions permit operation of the airplane with this fault present, there are operational restrictions on airspeed. These restrictions were violated on all 13 flights recorded on the FDR.

MCA Response:

No factual data about the slat indication lights is available

U.S. Comment:

Page 716, Section 2.3.3 Flight Controls:

The fourth bulleted item states:

> Because the spoiler surface positions are not recorded in the FDR, any possible abnormality with the spoiler surfaces data can not be shown by the FDR.

Although flight and ground spoiler positions are not recorded on the FDR, the flight path of the airplane is recorded. As the report correctly concludes, the motion of the airplane is consistent with the motion of the recorded control surfaces. Therefore, it can be concluded that no additional anomalous aerodynamic influences (e.g., spoiler abnormality) existed.

MCA Response:

See Analysis chapter, section 6.3.5 Spoiler Fault

U.S. Comment:

Page 716, Section 2.3.3 Flight Controls:

The last bulleted item states:

> A full analysis of the aircraft lateral control system has been done (refer to appendix 2-1 lateral control analysis). All the hypothetical failures in the

> system have been comprehensively studied. All the scenarios resulting from each individual failure (or combination of particular failures) were checked against the accident scenario. Most of the hypothetical failures scenarios were ruled out because of there inconsistency with the accident scenario. The remaining hypothetical failures scenarios showed consistency with the accident scenario. These hypothetical failures scenarios are as follows:

The remaining hypothetical scenarios were further examined because they could not be fully excluded based on a review of FDR data. There is no evidence to support a statement that the remaining hypothetical scenarios "showed consistency with the accident scenario." Consideration of the full investigative data did not support these scenarios.

As these statements highlight, the draft final report appears to have applied different standards to airplane issues versus operational issues. In most cases, the report considers airplane issues as possibly causal unless conclusive opposing evidence exists. Contrarily, operational issues are not considered causal (and in some cases not at all) unless proven to exist and influence the outcome of the accident.

U.S. Comment:

Page 753, 2.5.5.1 Conditions which could lead to this event

This section states:

> Although the rudder surface movement can contribute to this event, the rudder position as shown by the FDR at this interval of time was very small. The finding of having the rudder related to this event can only be accepted if consideration is given to the data received from Boeing in response to operator reports of abnormal flight control behavior related to rudder trim position and Boeing's interpretation of rudder trim effect on lateral control as being a possible cause of airplane rolling back to wings level and slow turn towards right due to the out of trim condition See Appendix 2-2 Studies of other airplane incidents relevant to autoflight systems. Case II "Autopilot Overbank

During the investigation by the multinational investigation, the rudder was ruled out as a possible contributor to the accident. In fact, the draft final report includes scenario tree pages showing the rudder ruled out (e.g., page 759 of draft final report). The rationale provided here and attributed to Boeing is misleading.

The event referred to in this section occurred on a different 737. The operator reported an autopilot overbank and provided the FDR data to Boeing for analysis. The FDR data indicate that the airplane experienced an overbank while attempting to engage the autopilot in an out-of-trim condition due to a rudder deflection of approximately 3 degrees. For more information on this event, see comments regarding page 980 of the draft final report.

In the Flash Airlines case, the FDR data shows that both the rudder and rudder pedals were very nearly zero, a fact that is confirmed by the simulation analysis, which shows that the airplane's path is consistent with the recorded position of the control surfaces (including the rudder). This event is not relevant to the Flash Airlines accident.

The earlier conclusion that the rudder can be ruled out is correct and should be reflected in the final report.

MCA Response:
Adopted

U.S. Comment:

Page 756, Section 2.5.5.3 Roll Left and beginning of Left Turn possible causes

This section states, in part:

> The aircraft remained near heading 140 for 9 seconds. Roll rate decreases as aircraft nears 140.

This section should make it clear that the trend in roll rate continued, with some brief oscillations, as the airplane slowly rolled from left to right. Although the airplane's heading briefly remained near 140 degrees as the airplane passed through a wings-level flight attitude, the airplane's bank angle did not stabilize.

Page 772, Section 2.5.6 Pitch up and airspeed decay

This page states:

> The possible conditions which might lead to this event are shown in the following:
>
> 1. Pilot Wanted to Gain Altitude Quicker (Intended Maneuver)
>   This probability may be supported by the fact that the airplane should intercept the VOR radial at a minimum of 11,000 ft
> 2. Pilot Following Erroneous FD (intended)
>   There are not enough data to rule in or rule out this probability
> 3. Relaxation of Control in Out of Trim Condition (Unintended Maneuver)
>   The results from the M-CAB tests match with FDR
> 4. Autopilot Fault (Unintended Maneuver)
>   This condition might be ruled out. This event started prior to AP Engagement (based on FDR data)
> 5. Stab Trim Fault (Unintended Maneuver)
>   This condition might be ruled out. Based on FDR data, the stabilizer did not show abnormal behavior throughout the flight.
> 6. Pilot pulling on the control column (unintentional)
>
> Conclusion:
> With the exclusion of the ruled out (conditions 4 and 5), the investigation could

not determine a higher possibility to any of the remaining conditions (conditions 1, 2, 3 and 6) based on the given data.

In all cases, this event does not have direct relation to the accident

The following information and suggested changes are provided:

For condition 1, it is suggested that the word "probability" be changed to "possibility." It is not reasonable to intentionally pitch up the airplane and allow airspeed to decay below flaps-up maneuvering speed to gain altitude. In addition, the right bank began at about the same time as pitch reached its maximum value. The right bank was clearly inconsistent with the flight crew's departure clearance. This suggests that the captain was not adequately monitoring pitch or bank indications. In addition, the existence of a published altitude crossing restriction over the SHM VOR has not been well documented in the report.

For condition 2, the evidence indicates that the autopilot's automatic transition from command mode to CWS/R, which occurred during the time of pitch up and airspeed decay, happened because the captain was not closely following roll commands on the flight director. This conflicts with the possibility that the captain was closely following an erroneous flight director.

A seventh possible explanation for the pitch up and airspeed decay should be added in this section. This possibility, discussed during the August 2005 meeting of operational factors investigators and crew behavior subcommittee members and included in the August 25, 2005 CBS group comments, was that the captain may have become distracted from his primary flight control task. This bullet should be combined with bullets 3 and 6, which would both be consistent with the captain's distraction.

With respect to the concluding statements, it should be acknowledged that the conclusion stated here was not agreed to by the multinational team. The available evidence best supports a conclusion that the pilot became distracted from monitoring aircraft attitude information.

U.S. Comment:

Page 782, 2.5.7.2.2, The conditions leading to the event of engaging the autopilot are presented in the following:

The statements under bullets 1, 2, and 3 should state that the Boeing procedure is for the "pilot flying" to push the CMD button, not the "captain."

MCA Response:
Corrected

Page 785, Figure 2.5.7.4 Autopilot Engage Attempt with Time CVR Data

This figure contains a notation attributing the CVR statement "Not yet" to the observer. However, this statement was attributed to the captain in the final version of the CVR transcript

The attribution of this statement in the figure should be made consistent with the final version of the CVR transcript.

MCA Response:

Corrected

U.S. Comment:

Page 794, 2.5.9 Aileron move in direction of right roll

A. Rudder surface movement:

This portion of the scenario tree is examining possibilities for aileron motion. Rudder motion does not cause aileron motion. The investigation previously ruled out the rudder (ref page 796 of draft final report), and the final report should reflect so.

MCA Response:
Adopted

U.S. Comment:

Page 794, 2.5.9 Aileron move in direction of right roll

The draft final report indicates that a slat asymmetry was evaluated in the M-cab.

Slat failure analysis was not done in the M-cab. The final report should note instead that the simulations were conducted on computer workstations.

MCA Response:
Adopted

U.S. Comment:

p. 795, Conclusion

The conclusion at the bottom of the page states:

> The investigation could not determine a higher possibility to any of the above findings (lateral system fault, pilot input) based on the given data.

There is no evidence of a lateral system fault, and it is suggested that the conclusion on this page can only be attributed to pilot input.

Page 803, Section 2.5.10 Autopilot Disengagement indications on the FDR and CVR

The sixth bullet on this page should note that the increase in pitch and the decay in airspeed began prior to autopilot engagement.

Page 811, Section 2.5.10 Autopilot Disengagement indications on the FDR and CVR

The statement that "the sensed pressure is not recorded on the FDR" should be rephrased to avoid misperceptions that it erroneously did not record the data. It is suggested that the sentence read, "the FDR does not record data regarding the hydraulic pressure at the autopilot aileron hydraulic switch."

MCA Response:
Adopted

U.S. Comment:

Page 814, Section 2.5.10.2 Autopilot Disconnect Analysis (based on FDR and CVR available data):

see same comment as provided for p. 785

MCA Response:
Adopted

U.S. Comment:

Page 815, Section 2.5.10.3 Probable conditions for autopilot disconnect:
1.1 Manual Disconnect

This section states:

Warning length is consistent with "double click" typical of manual disconnects (within allowable warning duration tolerance)3. However, there is no disengagement callout by crew on CVR. In addition, the autopilot disconnect switches status on the control wheels horns are not recorded in the FDR.

This section should acknowledge the following information. The minimum time that the Mode Control Panel (MCP) will sound the autopilot disconnect warning when the autopilot disconnect button is pressed twice (i.e., "double click") is 1.5 seconds; the maximum time is 3.0 seconds, as provided in Honeywell's MCP Component Maintenance Manual document 22-11-84. Based on the CVR data, the autopilot disconnect warning lasted 2.136 seconds, which is within the allowable warning duration of 1.5 seconds (lower limit) and 3.0 seconds (upper limit).

Lack of conversation about autopilot disconnect on CVR could also suggest that the disconnect was expected and therefore a manual disconnect.

The statement at the end of the paragraph that "the autopilot disconnect switches status oh the control wheels horns are not recorded in the FDR" should be rephrased to avoid misperceptions that it erroneously did not record the data. It is suggested that the statement read "The FDR does not record data regarding the autopilot disconnect switch on the control columns."

MCA Response:

- Boeing presentation (see 2.5.10.2) regarding autopilot function states that the duration of autopilot manual disconnect warning is less than 2 seconds

- Honeywell verbal information, states the duration of autopilot manual disconnect warning is max of 3 seconds

- Actual time of warning based on CVR is 2.136 seconds

Although requested, Honeywell did not supply the investigation team with any supporting evidence.

U.S. Comment:

Page 815, Section 2.5.10.3 Probable conditions for autopilot disconnect:
2. Case of Autopilot Does Not Engage

This case can be ruled out because the FDR shows that the autopilot did engage and the disconnect warning can be heard on the CVR.

MCA Response:
Adopted

U.S. Comment:

U.S. Comment:

Page 815, Section 2.5.10.3 Probable conditions for autopilot disconnect:

The conclusion states:

> The investigation could not determine a higher possibility to any of the above findings (Autopilot automatically disengaged or manually disengaged), based on the given data.

The data indicate that the autopilot disconnect was a manual disconnect initiated by the crew. From this point until the end of the flight, the FDR records that the autopilot remained disengaged.

MCA Response:

This is not consistent with the outcome of the fault tree and the CVR information

U.S. Comment:

Page 815, Section 2.5.10.3 Probable conditions for autopilot disconnect:

Footnote 3 on this page states "Verbal information from Honeywell but not documented"

The report should reflect that this information is provided in Honeywell's MCP Component Maintenance Manual document 22-11-84, revision 11, dated 15Jan2005, page 198.209

U.S. Comment:

Page 820, Section 2.5.11.1 Conditions which could lead to this event
A. Rudder surface position"

This portion of the scenario tree is examining possibilities for aileron motion. Rudder motion does not cause aileron motion. The investigation previously ruled out the rudder (ref page 796 of draft final report).

MCA Response:
Adopted

U.S. Comment:

Page 821, Section 2.5.11 Airplane begins roll to right, Subsection 2.5.11.1 Conditions which could lead to this event

Section F on this page states:

F- Flight Crew Believes Autopilot is Engaged When it is not
> Reference to FDR, CVR data and Crew Behavior studies, this condition could not be ruled out

It is suggested that this section be revised, since no evidence is provided to support this possibility. The CVR records that the autopilot disconnect warning sounded prior to the beginning of the right bank. On several later occasions, the captain requested that the autopilot be engaged.

MCA Response:

CVR clearly records F/O announcement “Autopilot in command” and later “No autopilot commander”. This strongly supports the above statement “F”

U.S. Comment:

Page 822, Section 2.2 Uncommanded (actuator faults only)

An uncommanded aileron control system input from an aileron autopilot flight control actuator requires three separate faults to be present simultaneously within the actuator:
the arm solenoid commanded open, the detent solenoid commanded open, and the transfer valve spool jammed off center. Had any one of these three faults been present during the autopilot engage sequence, the autopilot would not have engaged. All three faults result in force applied to the wheel. This will only lead to airplane roll if the crew does not oppose the motion of the wheel. The FDR show aileron motion in both directions, which indicate that the crew was actively controlling the airplane. Therefore this condition can be ruled out.

MCA Response:

Not adopted. See section 2.5.13

U.S. Comment:

Page 823, Section 3.4 Trim/Feel Unit Fault

This fault results in force being applied to the aileron control system, resulting in both of the control wheels and the ailerons moving to a uncommanded position corresponding to the force applied to the system. This will only lead to airplane roll if the crew does not oppose the motion of the control wheel.

Following the disengagement, and as the airplane continued to roll to the right, the FDR data indicates aileron deflection rates well in excess of the rates 0.6 degrees per second that the aileron trim actuator can command. The aileron deflection rates indicated on the FDR can only be achieved through manual aileron control wheel inputs.

Furthermore, the investigation group evaluated the aileron trim runaway failure scenario in the Boeing Multipurpose Engineering Cab (M-cab) simulator. This scenario was demonstrated by investigators to be easily identified and controllable during the flight simulations, with only 15 pounds of control wheel force required to return and maintain the aileron control surfaces at the neutral position. Aileron motion in both directions indicates that the crew was actively controlling the airplane.

Based on this evidence, this condition can be ruled out.

MCA Response:

Not adopted. See section 2.5.13

U.S. Comment:

Page 848, Section 3.0 Rudder Surface Deflection

During the investigation by the multinational team, the rudder was ruled out as a possible contributor to the accident. The draft final report includes scenario tree pages showing the rudder ruled out (e.g., page 759). The rationale provided on p. 848 and attributed to Boeing is misleading.

The event referred to by this paragraph occurred on a different 737. The operator reported an autopilot overbank and provided the FDR data to Boeing for analysis. The FDR data indicate that the airplane experienced an overbank while attempting to engage the autopilot in an out-of-trim condition due to a rudder deflection of approximately 3 degrees. For more information on this event, see comments regarding page 980 of the draft final report.

In the Flash Airlines case, the FDR data shows that both the rudder and rudder pedals were very nearly zero, a fact that is confirmed by the simulation analysis, which shows that the airplane's path is consistent with the recorded position of the control surfaces (including the rudder). This event is not relevant to the Flash Airlines accident.

The earlier conclusion that the rudder can be ruled out is correct and should be reflected in the final report.

MCA Response:
Adopted

U.S. Comment:

Page 850, Section 6.1.1.2 Following Erroneous EADI

The section on this page titled "6.1.1.2.2 Alternate Instruments Not Cross-Checked" section states:

> From the Crew Behavior Subcommittee study, this condition could be ruled out.

This section should be revised. There was no joint CBS study conclusion that the flight crew cross-checked their instruments.

MCA Response:
Adopted

U.S. Comment:

Page 850, Section 6.1.1.4 Pilot Loses Situational Awareness

The subsection on this page tilled "6.1.1.4.1 Captain experiences SD Type II" states:

> See Section 2.6.1 Crew Behavior Subcommittee, this condition could not be ruled out

It should be further stated here that loss of situational awareness and spatial disorientation for the captain is consistent with available data and with CBS group comments from 25 August 2005.

U.S. Comment:

Page 852, Section 6.2.2.3.1.1
Both Solenoids and Transfer Valve Jammed (Autopilot actuator, both Solenoids and Transfer Valve Jammed (Actuator Hardover without Force Limiter 17 to 20 Ib Force)

The report states that "the cause of these failures cannot be conclusively identified."

However, it is known that these faults were not present during the autopilot engage sequence. This hypothetical scenario would require that the faults occur after the time the autopilot was engaged. Furthermore, it would result in relatively small forces applied to the wheel. The M-Cab evaluations found that this condition is easily controllable by a crew aware of their attitude. It would only lead to airplane roll (and overbank) if the crew does not oppose the motion of the wheel. Aileron motions recorded on the FDR indicates the crew was actively controlling the airplane.

Based on this evidence, this condition can be ruled out.

MCA Response:

Refer to the analysis in 6.2.2.3., which shows close consistency with the existing data

U.S. Comment:

Page 854

This page states, in part:

> Therefore, it could be concluded that this hypothetical condition shows close consistency with the event. This condition is also consistent with the possibility of recovering the airplane when appropriate quantity of input is applied timely on the airplane (M- Cab tests).
>
> (See also section 2.6 Crew Behavior)
> This condition could not be ruled out

These conclusions should be clarified. It is unclear which parts of section 2.6 support this conclusion. The CBS group concluded that the appropriate action to take at high angles of bank, prior to recovery, was to apply full opposing aileron. The hypothetical fault described in this section would not have prevented the crew from doing this. This scenario was demonstrated to be easily controllable in the M-Cab by pilots who were aware of their attitude. This hypothetical fault by itself cannot explain the continued right roll to overbank.

MCA Response:

This scenario was demonstrated to be easily controllable by pilots who were aware of the hypothetical fault and identified the required corrective action.

U.S. Comment:

Page 863, Section 6.3.4 .2 Aileron Trim Runaway to 60 deg.

A bullet under the heading of this section titled, "This condition could not be ruled out based on the following" states:

- Consistent with Crew Behavior study

This statement should be clarified or further supported. This fault was not explicitly addressed in any of the crew behavior subcommittee documentation.

In addition, it should be noted that all pilots were able to easily control this fault in the M-Cab. Assuming this fault existed, the captain would have been able to move the ailerons towards neutral with approx 20 Ibs of force. There is no explanation given here as to why the captain could not have applied the small additional force to roll back to wings level. During the recovery attempt, the FDR data shows the crew was able to achieve high roll rates towards wings level. Even in the presence of this assumed fault, the crew inputs cannot be explained if the captain was aware of the airplane attitude, suggesting the presence of spatial disorientation.

U.S. Comment:

Page 888, Section 6.3.5.3.1 Scenario 10 - Spoiler wing cable jam

This section stales:

> This condition could not be ruled out, based on the following:
>
> The results obtained from the M-Cab test show a very close consistency with the FDR data which may explain this event. The estimated aileron wheel forces needed to move the wheel to correct for the right turn tendency is ~ 50 Ibs. The timing and length of the Captain speeches through this event does not provide sufficient information to verify the effect of this force on the speech tone

This conclusion should be revised.

If this fault had existed, the captain would have been able to move the ailerons towards neutral with approximately 50 Ibs of force. It is reasonable to expect the captain would have been able to apply the additional force necessary to roll back to wings level. The M-Cab work demonstrated that all participants were able to apply in excess of 80 Ibs to the wheel to control the airplane. This scenario is not consistent with the M-Cab results. The M-Cab results demonstrated that participants could apply in excess of 80 Ibs to the wheel to control the airplane.

Furthermore, at the time this fault is postulated, the airplane was already banked in excess of 25 degrees to the right. No explanation is given to explain how the airplane reached 25 degrees right bank.

The last line of this section states:

Crew behavior study shows consistency

This statement should be removed. The CBS group documentation does not address this scenario, and it does not reflect discussions by the CBS group.

MCA Response:

This scenario was demonstrated to be easily controllable by pilots who were aware of the hypothetical fault and identified the required corrective action when the required additional force was 50 lbs and not the case of 80 lbs.

U.S. Comment:

Page 894, 6.3.5.3.2 Scenario lOa - F/0 wheel jam (F/0 wheel jam) offset of the neutral position at time 92450 (maximum wheel deflection).and clears at 92472

The section states, in part:

> - All the parameters obtained from the M-Cab test with the fault inserted show very close consistency with the accident flight FDR data

This conclusion should be revised. This scenario is not consistent with M-Cab results. The M-Cab results demonstrated that participants could apply force in excess of 80 Ibs to the wheel to control the airplane. Furthermore, at the time this fault is postulated to have occurred, the airplane was already banked in excess of 25 degrees to the right. No explanation is given to explain how the airplane reached 25 degrees right bank.

The section states, in part:

> This condition could not be ruled out, based on the following:
>
> The results obtained from the M-Cab test show a very close consistency with the FDR data which may explain this event. The estimated aileron wheel forces needed to move the wheel to correct for the right turn tendency is ~ 50 Ibs or slightly higher. The timing and length of the Captain speeches through this event does not provide sufficient information to verify the effect of this force on the speech tone

This conclusion should be revised. Assuming this fault existed, the implication is that the captain was able to move the ailerons towards neutral with approx 50 Ibs of force. It is therefore reasonable to expect the captain would have applied the additional force necessary to roll the airplane back to wings level. The M-Cab work demonstrated that all participants were able to apply in excess of 80 Ibs to the wheel to control the airplane.

The last line of this section states:

> Crew behavior study shows consistency

This statement should be deleted. The CBS group documentation does not address this scenario, and it does not reflect discussions by the CBS group.

MCA Response:

This scenario was demonstrated to be easily controllable by pilots who were aware of the hypothetical fault and identified the required corrective action when the required additional force was 50 lbs and not the case of 80 lbs.

U.S. Comment:

Page 894, 2.5.13 Right roll continues to overbank with ailerons activities

A conclusion section should be added to summarize the information regarding the right bank continuing to overbank. The evidence suggests that captain's spatial disorientation was the most likely cause for the overbank.

U.S. Comment:

Page 901, Figure, 13.0 Right Roll Continues to Overbank with Aileron Activity

According to Rockwell Collins, the EFIS Failure Mode Effect Analysis (FMEA) does not list any potential failure modes which would result in the failure indication of "Offset Airplane Reference." This failure mode has never been reported in the operational history of EFIS-equipped Boeing 737, 757 and 767 aircraft.

The report should be amended to account for this information, and the report should delete the statement, "Boeing to ask Rockwell Collins if this fault can actually occur."

MCA Response:
No official information from Boeing or Rockwell Collins has been received (fault tree page 7 of 22)

U.S. Comment:

Page 919, 2.5.14 Flight crew CVR autopilot announcements

This section states, in part:

> Flight crew CVR autopilot announcements might be explained by the following:
>
> 1. Requests for Autopilot Engagement
>   This scenario is consistent with expected normal airplane operation. If the Captain asked for autopilot and the F/0 pressed the CMD button, the interlocks would not be satisfied because of forces on the control wheel. In this case, the button push is not recorded as an autopilot engagement on the FDR.
>   (Done on M-Cab)

It is suggested that this section further note that the command "Autopilot" is not only standard terminology used to request the autopilot, but was used by the captain earlier in the flight to request the autopilot. Furthermore, according to the FDR, there were no indications on the flight deck that the autopilot was already engaged when the captain began calling for the autopilot during this period in the flight.

Engaging the autopilot may be an appropriate response if the pilot was not aware of the true attitude of the airplane.

MCA Response:

No evidence supporting this statement.

This section also states, in part:

4. Announcement of Perceived Autopilot Behavior

The report should specify which flight crew statements could be explained by this item. There is no reason to believe the captain and the first officer's statements during this period were announcements of perceived autopilot behavior. Indications on the flight deck were that the autopilot was off at this time. Flight crew statements are consistent with attempts to engage the autopilot. The data do not support this explanation of the flight crew's autopilot announcements.

hMCA Response:

CVR clearly records F/O announcement “Autopilot in command” and later “No autopilot commander”.

This section also states, in part:

> 5. Requests for Autopilot Disengagement
>
> This condition requires perception on the part of the Captain that the autopilot is engaged

It is suggested that evidence conflicting with this explanation be included here. This explanation is highly unlikely because "Autopilot" is the standard terminology used to request that the autopilot be engaged, and was used by the captain earlier in the flight to request the autopilot. In addition, it is unlikely that the PF would repeatedly request that the PNF disconnect the autopilot, as each pilot has a disconnect button on their own control wheel. Furthermore, FDR data indicate that there were no indications in the cockpit during this time that the autopilot was engaged.

MCA Response:

CVR clearly records F/O announcement “Autopilot in command” and later “No autopilot commander”.

This section also states, in part:

> The investigation could not determine a higher possibility to any of the above conditions based on the given data.

It is suggested that this conclusion be revised. It pre-supposes that items 1-5 are mutually exclusive, and they are not. Items 1, 4, and 5 all refer to the captain's pronouncements of "Autopilot" and they are mutually exclusive explanations for these announcements. Items 2 and 3 refer to different announcements.

The meaning of the flight crew's statements regarding the autopilot during this period are unambiguous. The captain's "autopilot" statements are consistent with requests for autopilot engagement. The first officer's statement, "Autopilot in command" is consistent with a rote response following a press of the command button. The first officer's statement, "No autopilot commander" is consistent with an attempt to communicate to the captain that the attempt to engage the autopilot was unsuccessful.

MCA Response:

MCA does not agree with this statement as it is highly speculative and not supported by factual information.

p. 962,1- CASE of "AUTOPILOT REPORT OF EXCESSIVE RATE OF DESCENT"
1 - BOEING REPLY, EXCESSIVE RATE OF DESCENT

Discussion of this case includes correspondence between Boeing and a different operator concerning a report of excessive rate of descent while using autopilot A. The fault was the result of an intermittent column cutout switch that prevented the autopilot from commanding the required stabilizer trim. The autopilot lacked sufficient authority to overcome the out-of-trim condition.

In the Flash Airlines case, the FDR data shows that the autopilot was engaged for only one interval of 3-4 seconds. There is no evidence of an excessive descent rate during those 3-4 seconds, nor is there any evidence of insufficient autopilot authority. Therefore, this event is not relevant to the Flash Airlines accident.

The details and correspondence of the event involving the excessive rate of descent have been previously provided but are provided again for the MCA's reference.

-Event Summary-

On 21 Oct 04, the operator reported that one of their 737-500 airplanes had experienced an autopilot anomaly described as follows:

Pilot Report - After airborne and approaching flight level 120, "ALT ACQUIRE" comes on the FMA then the A/C descended with V/S }800ft/min to flight level 116 (with A/P A engaged only).

The operator further reported that the fault had repeated on a number of occasions (always with autopilot A) and maintenance actions that had been taken in an attempt to correct the fault and requested assistance from Boeing.

From 21 Oct to 6 Dec, Boeing and the operator exchanged troubleshooting recommendations and test results. On 1 Dec, the operator requested on-site engineering support to result the recurring fault. A Boeing engineer traveled to Cairo to assist the operator. During the on-site work, an intermittent fault was found in the column cutout switch for autopilot A. It is suspected, that the high resistance of the Sl closed contacts resulted in the FCC intermittently detecting the Sl as open when the contacts were actually closed. This condition would inhibit the trim up command output from the A channel autopilot. This fault condition correlates to the FDR data that showed the A channel would not trim up when expected resulting in a loss of elevator authority and subsequent increase in descent speed. This fault condition also correlates to the report that proper trim up returned once the B channel Autopilot was engaged.

The operator replaced the faulty switch. Booing has received no further reports of this condition.

U.S. Comment:

p. 980, II- CASE of AUTOPILOT OVERBANK
1- Case of Overbank Follow up:

Discussion of this case includes correspondence between Boeing and a different operator concerning a reported autopilot overbank event that resulted from attempting to engage the autopilot with the airplane out-of-trim due to non-zero rudder deflection.

In the Flash Airlines case, the FDR data shows that both the rudder and rudder pedals were very nearly zero, a fact that is confirmed by the simulation analysis that shows that the airplane's path is consistent with the recorded position of the control surfaces (including the rudder). This event is not relevant to the Flash Airlines accident.

The details and correspondence of this event have been previously provided but are provided again for the MCA's reference.

-Event Summary-

On 27 Mar 2005, the operator reported that one of their 737-500 airplanes had experienced an autopilot anomaly described as follows:

During departure with LNAV engaged, AP "B" selected, the AP "B" engaged then disengaged. After satisfying F/D, again AP selected. At UTC 20:14 the autopilot gave more than 35 degree bank angle and increased. A/P disconnected followed by F/D pitch bar out of view, F/D switches recycled. Flap retraction and leveled, AP selected and operation normal.
The operator provided the FDR data for analysis.

On 28 Mar 2005, Boeing provided the following analysis to the operator.

The FDR data indicate that the airplane experienced an overbank during an attempted autopilot engage because the airplane was in a small nose-left sideslip as the result of rudder pedal being deflected to approximately 1.5 degrees nose left. The reasons for this are unknown and cannot be determined from the FDR data, but the trim likely arose either from crew trim inputs during the takeoff roll (possibly inadvertent) or from something sticking in the rudder feel and centering unit. The simulation confirms that the sideslip resulting from the pedal input would have required approximately 25 degrees of right control wheel deflection to maintain wings level flight, as indicated by the FDR data. During each attempt to engage the "B" autopilot, the wheel was released to neutral and the airplane rolled at between 2 and 2.5 deg/sec as a result of the sideslip-induced roll.

Boeing has received no further reports of this condition.

U.S. Comment:

Page 992, 2.6.1 Flash Airlines Flight 604 Investigation Crew Behavior Subcommittee

This section of the report states, in part:

> Examination of evidence pertaining to specific phases of the accident
> 1. From the roll input that initiated a right roll from wings level (from around time 104) through the statement by the Capt, "how turning right", (around time 02:44:37), the committee agrees that the above three conditions are met, and it is therefore possible that the Capt was experiencing type I Spatial Disorientation.
> 2. From the statement by the Capt, "How turning right", to the beginning of sustained left roll (around time 158), evidence for orientation or disorientation is inconclusive given currently available data.

3. After the first officer says "no autopilot commander" and sustained left control inputs begin the committee agrees that there is evidence that someone was properly oriented and manual recovery of the aircraft was initiated.
4. The committee agrees that there is no evidence suggesting spatial disorientation on the part of the first officer.
5. The committee agrees that the flight crew exhibited some positive CRM-related behaviors during the flight; however, further analysis in this area is required.

Closing Comments

This is a preliminary report. More work is needed to comprehensively address all human factors issues relevant to this accident, as needed.

This page contains an excerpt of the minutes of the first meeting of the Crew Behavior Subcommittee, held in August 2004. These preliminary investigative materials should not be included in the report. The crew behavior subcommittee did not adopt these points as its final conclusions during the final meeting of the group in August 2005. In fact, the full range of investigative evidence available by August 2005 did not support preliminary conclusions 2 and 5.

Point 2, which states that evidence for spatial disorientation after the captain's statement "how turning right" was inconclusive, was a preliminary conclusion pending simulation work and the development of systems group conclusions about the functioning of aircraft systems. Evidence for the captain's spatial disorientation was considered inconclusive in August 2004, because Egyptian officials insisted that there had been a systems malfunction that would account for control surface movements after the captain's statement, "how turning right." However, subsequent investigative work ruled out the likelihood of a lateral control systems malfunction. Therefore, type II spatial disorientation is the most likely explanation for the captain's continued inappropriate manual control inputs, and the evidence indicates that the captain's spatial disorientation persisted at least until the beginning of the attempted recovery maneuver.

Point 5 was superseded by later investigative work. During its August 2005 meeting, the crew behavior subcommittee identified a number of deficiencies in the CRM-related behaviors of the flight crew. These deficiencies should be discussed in the report.

MCA Response:

All crew behavior subcommittee work has been included in the report with no differentiation between preliminary and otherwise.

The report reflexes the interpretation of the Egyptian Investigation Team and specialized advisors.

This applies to all U.S. comments regarding Section 2.6

U.S. Comment:

Page 993, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior

Subcommittee August 2004

This section states, in part:

> According to the meeting held on Aug. 23 - 26, 2004 and attended by representatives from NTSB, BEA and Boeing. The committee agreed that the Captain was possibly experiencing "Type I Spatial Disorientation" in the 1st stage of the accident.
> In the 2nd stage the evidence of "Spatial Disorientation Type I" is inconclusive.

In the 3rd stage there is no evidence of this disorder.

The statements above are the MCA's interpretation of the August 2004 preliminary findings of the crew behavior subcommittee, which were developed based on the MCA's assertion that a lateral control system malfunction had occurred. The statements on this page were not jointly developed, nor endorsed by all members of the CBS group. The full range of evidence developed during the course of the investigation points to spatial disorientation as the most likely explanation for the captain's control inputs mid-way through the upset. The evidence suggests that the captain was experiencing type II spatial disorientation during this stage of the event.

It is suggested that the term "disorder" not be used to describe the occurrence of spatial disorientation in the aviation environment. Spatial disorientation is a normal human response to the accelerations of flight when accurate visual information about attitude is either not available or is not adequately monitored.

It is suggested that the remainder of section 2.6.2, pages 993-998, be labeled as work developed independently by the MCA.

MCA Response:

See MCA previous comment

U.S. Comment:

Page 993, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004

This section states, in part:

On 15 February, 2005 a message was received from NTSB including analysis of the Captain Behavior.

The scenarios included the word "Confusion "and not "Spatial disorientation type I"

It is suggested that excerpts from the NTSB message referred to here be included in this section of the report. The purpose of this reference is unclear.

U.S. Comment:

Page 993-994, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004

The discussion of the term "confusion" on p. 993 should acknowledge that spatial disorientation can cause confusion about aircraft attitude.

The table on page 994 should be clearly labeled as work performed independently by the

MCA. The multinational CBS group did not jointly perform or endorse this material. The table should also be revised. It appears to have been developed to provide criteria for distinguishing among four different psychological states or conditions. However, the labels confusion, spatial disorientation type I, distraction, and mistake are not mutually exclusive psychological states or behaviors. They are not adequately defined in this section, and no scientific research is referenced to support the attributes assigned to them.

U.S. Comment:

Page 995, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004

This section states, in part:

> Captain:
> We apply the above table to the circumstances of the accident. The highest probability is that the captain suffered from distraction accuracy during the 1st stage only.

The meaning of "distraction accuracy" should be clarified.

U.S. Comment:

Page 995, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004

The section states, in part:

> The captain was the 1st to attract attention of the rest of the crew that something wrong is happening in the airplane "see what the airplane is doing ".

The quote "See what the airplane is doing" should be modified so that it is consistent with the CVR transcript, which documents the captain's statement as "See what the aircraft did." The interpretation of the captain's statement should be modified as well. The captain's statement suggests surprise at aircraft behavior, but it does not provide evidence determining whether this aircraft behavior was normal or abnormal. This statement occurred soon after the flight crew attempted to engage the autopilot, and the autopilot transitioned to CWS-R mode. The transition to CWS-R mode occurred because the captain was not closely following flight director guidance at the time of autopilot engagement. Although this occurred in accordance with nominal system operation, it was an unusual occurrence that the captain may not have expected or understood, and it likely explains the captain's statement, "See what the airplane did."

MCA Response:

Corrected

U.S. Comment:

Page 995, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004

The section states, in part:

This was shared by other crewmembers, as they assisted the captain in the same direction. Their observation and responses were centered on "right bank" and "autopilot".

The first sentence should be revised. The meaning of the statement "This was shared by other crewmembers" is unclear.

U.S. Comment:

Page 995, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004

The section states, in part:

> Captain was alert with good concentration in the 2nd and 3rd stage as shown by his orders, responses and 3 appropriate actions taken (to the left):
> - 1st action Lt input after words "How Right"
> - 2nd action Lt input "OK come out"
> - 3rd action Lt input "OK come out"

It should be acknowledged that captain could have been alert and concentrating but remained affected by type II spatial disorientation. Lack of alertness is not a prerequisite for spatial disorientation.

The statement, "3 appropriate actions taken (to the left)" should be revised to acknowledge that during the 24 seconds between the captain's response, "What" and the beginning of appropriate control inputs consistent with an attempted recovery maneuver, only two control wheel inputs left of neutral were recorded, and these inputs lasted less than two seconds each. All other recorded inputs were right of neutral. Taken together, this evidence indicates that the captain's control wheel inputs during this period were predominantly to the right.

U.S. Comment:

Page 995, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004

The section states, in part:

> During 1st stage (critical stage) there was signs indicating astonishment (How Right) also signs of Hesitation (turning right sir).

This statement should be revised so that the statements match the CVR transcript and that the person making each statement is clearly identified. Also, the statement that there were signs of "hesitation" with respect to the first officer's statement "turning right sir," should be better explained.

U.S. Comment:

Page 995, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004

This section states, in part:

> 1st period (Pre-critical)
> There were talks in between all crew members and between crew members and A.T.C. and attendant. Answers and comments are immediate and correct pointing

to normal orientation and concentration. The mode and content of sentence show no evidence of disturbance of mood or intellectual functions. The conversations were calm and decisive with no evidence of anxiety or tension. There is no evidence of Euphoria or depressed mood.

This summary of flight crew communications should include information about CRM deficiencies discussed during the August 25, 2005, meeting of the crew behavior subcommittee.

U.S. Comment:

Page 995, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004

The section states, in part:

> 2nd period (Critical)
>
> Starting by the phrase "Eddilo" (time 2:44:1) this was followed in few seconds by an important observation of the captain indicating that something is going wrong with the airplane.
>
> This was followed by a 1-— period of hesitation, astonishment lasting for less than ten seconds.

This section should be revised. The "important observation of the captain indicating that something is going wrong with the airplane" referred to here appears to be the captain's statement "See what the aircraft did." As discussed earlier, this does not indicate that something was wrong with the airplane, as is implied here.

The captain's lack of speech for a number of seconds after his statement "See what the aircraft did" does not indicate that the captain was hesitating or was astonished. It simply indicates that he was not engaged in communication with the first officer. It is not possible to determine where his attention was focused during this time. However, the lack of control inputs that were needed to counteract the developing right bank suggests that the captain was distracted from monitoring attitude information during this time.

U.S. Comment:

Page 995, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004

The section states, in part:

> All crewmembers are anxious during this period of hesitation and astonishment ended by the captain saying "how turning right ".

This statement should be deleted. There is insufficient evidence to document the mood of the two pilots and the observer during the ten seconds preceding the captain's statement "how turning right."

U.S. Comment:

Page 996, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior

The section states, in part:

> Both F.O. and extra crew 1 did not contradict the captain's orders or actions until the end of accident. This shows that in their estimation the captain was acting in the proper way.

The failure of the first officer to take more assertive action to reverse the direction of roll does not provide evidence that he believed the captain was acting properly. Rather, it indicates that he did not have the skills or did not feel adequately empowered to take assertive action. In fact, the first officer's "tsk, tsk" vocalization, confirmed during the August 2005 meeting of the crew behavior subcommittee meeting, was interpreted by some group members as a sign of frustration with the captain. This contradicts the assertion that the first officer believed the captain was acting in a proper way as he rolled the airplane into the overbank.

U.S. Comment:

Page 996, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004

The section states, in part:

> If they felt he is wrong they would have (at least) suggest any other action.
> As the crew were in stress this logically abolishes the respect of seniority.

This statement is unsupported. Numerous accident investigations have documented the failure of junior crew members to challenge a captain's inappropriate actions. Moreover, past accidents have demonstrated that stress does not necessarily abolish deference to authority among junior flight crew members.

Page 996, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004

The section states, in part:

> If captain is acting wrongly they would have screamed loudly and aggressively there is no evidence of this (C.V.R.).

This statement should be revised because it is contradicted by evidence on the CVR. The first officer's voice became noticeably louder as the overbank grew more severe and the captain failed to correct it. However, the first officer did not escalate his assertiveness by providing direction, issuing commands, or taking timely control of the airplane. The investigation revealed that he had not been provided with CRM training, which could have provided him with better skills for intervening in this kind of situation.

Pages 997-998, Section 2.6.2 Flash Airlines Flight 604 Investigation, Crew Behavior Subcommittee August 2004

The report should acknowledge that the fault tree diagrams on these pages were modified independently of the full investigative team.

MCA Response:

All fault tree diagrams included in this report have been the outcome of work processed by Boeing through meeting in Cairo and email communication with no changes affected to it by any single party.

U.S. Comment:

Pages 1000-1006, Section 2.6.3 Flash air CBS Sub-group comments (24 August 2005)

These pages of the report should be removed and replaced with the final version of the CBS Sub-group comments completed on August 25, 2005. The version contained in this draft of the report was a preliminary document.

MCA Response:

Adopted

U.S. Comment:

p. 1035, Flash Airlines 737 SU-ZCF Thread Diagram

The note at the bottom of the page states, "All possible scenarios being considered to explain the accident can be represented as a path from left to right through this diagram."

This comment highlights the need for a chronologically complete explanation for the accident flight, as agreed to by the investigative team. The possible causes by the draft final report do not satisfy this methodology.

U.S. Comment:

p. 1038, 9.0 Aileron Motion (Right Roll)

The statement "Need to Revisit" under the title on this page should be resolved.

The following comments are provided regarding statements under the columns for "Pros" and "Cons" about the possible similarity of the aileron movements recorded on the FDR to that associated with autopilot behavior and also about the statements "(there was no consensus on this point)."

The aileron motions around the FDR time 92414 (while the autopilot was briefly engaged in CWS-R) was specifically examined by the investigative team to determine if the aileron deflection resulted from a manual (pilot) input or was commanded by the aileron autopilot system. The analysis included comparison of the aileron deflection (magnitude and duration) with previous manual and autopilot movements of the ailerons. The results of the analysis indicate that the deflection of the ailerons around the FDR time of 92414 was consistent with manual input.

Furthermore, two computer simulations were conducted to analyze how the autopilot would command the ailerons. Neither of these simulations showed aileron motions that closely matched the aileron deflections at time 92414.

The Egyptian team did not agree with either of these points.

U.S. Comment:

p. 1042, 13.0 Overbank (2 of 2)

The four statements on this page that "MCA requests that simulation be redone at point on maximum wheel deflection" should be deleted. These simulations were performed and the results provided to the MCA.

Furthermore, the results of the simulations for these hypothetical scenarios showed that the ailerons can still be controlled via the captain's control wheel. High control wheel forces would be involved in moving the control wheel, and M-cab simulations for control wheel forces of this level showed that the effects on speech would be noticeable and audible on the CVR. The accident airplane's CVR contained no such effects.

U.S. Comment:

Page 1044, Section 2.6.7 Thread Overview Updates Cairo 26-Aug-OS, Flash Air CBS Sub-group Comments (24 August 2005)

The section states, in part:

> The study performed by a team of qualified Human Performance Specialists have come up with findings summerized [sic] as follows:

This statement needs to be clarified. It should identify which of the preceding pages contain the material referred to as the study performed by the human performance specialists.

The second bullet on this page states:

> - There are conflicting signals in the following period of time (-17 seconds), it is unclear whether the captain remained in SD or was the crew unable to perceive the cause that was creating an upset condition until the time when the F/0 announced that there was no A/P in action.

This bullet should be revised to be consistent with the 25 Aug 2005 CBS comments, which were not included in the draft final report. These comments proposed that the captain was transitioning to type II spatial disorientation after his statement "How turning right." In light of the full range of evidence now available, which does not support the presence of a lateral control system malfunction, spatial disorientation is the most likely explanation for the captain's continued inappropriate control wheel inputs, which persisted for at least 17 seconds after that statement.

U.S. Comment:

Page 1045, Section 3 Conclusion, Summary

The first item under "General Background" states that "the A/C was serviceable at take off and was operated within the approved limitations."

The lack of write-ups on the slat and TOGA anomalies, which resulted in operation of the aircraft outside MEL limitations, makes this statement questionable. However, neither of these two conditions appeared to have any effect on the accident sequence.

U.S. Comment:

Page 1045, Section 3 Conclusion

This section states, in part:

> The crew members held appropriate licenses and were qualified for this flight.

This conclusion should be revised to address questions regarding the crewmembers' training. As stated earlier in these comments, the investigation did not adequately document whether the captain had fulfilled all of the training requirements for his position, as required under Egyptian Civil Aviation Regulations. The MCA was unable to produce documentation verifying the captain's completion of the required number of hours of ground instruction and company indoctrination training. In addition, it is unclear whether the ECAA had approved Flash Airlines' use of the Royal Air Maroc simulator for the captain's flight training. Finally, neither pilot had received CRM training, as stipulated in Flash Airline's ECAA-approved training manual.

MCA Response:

The Egyptian investigation team has reviewed all pertinent documentations with regard to pilot's training and qualification and is satisfied that the ECAA issued licenses are in accordance with local and ICAO requirements and all documents are included in this report.

U.S. Comment:

Page 1045, Section 1.1, Simulation Procedure

Statements in this section improperly cast doubt on the availability of control wheel data. Although the control wheel data recorded on the FDR was erroneous, accurate control wheel data was available from the M-cab. This section should also note that the motion of the airplane is consistent with recorded motion of control surfaces.

This section also appears to cast doubt on the M-Cab tests. As previously commented, the simulations (including M-Cab) were demonstrated to accurately model the behavior of the airplane for the purposes of the investigation.

U.S. Comment:

Page 1047, Section 2.2 Crew behavior

This section states:

> Evidence of distraction possibly becoming spatial disorientation is observed from the time of start of right turn until the announcement of aircraft turning right, after which it is unclear whether the captain recovered or remained in the the [sic] state of spatial disorientation. After the call "No autopilot commander", the crew behavior appears normal.

As stated earlier in these comments, the full range of evidence collected during the investigation indicates that the captain remained spatially disoriented at least until the recovery attempt began. Because there is inadequate evidence to make a definitive conclusion regarding which crewmember initiated the attempted recovery maneuver, it is not possible to determine whether the captain had reacquired an accurate sense of spatial orientation by that time.

U.S. Comment:

Page 1048, Section 3.5 Roll back towards wing level

This section states, in part:

> The following conditions could not be ruled out:

- Rudder surface position6 (Adopted)
- Pilot widening departure pattern (intentional control action)
- To level wings prior to engaging autopilot (intentionally)
- Pilot loses awareness of heading or bank (unintentional)
- Anomalies with the lateral control system

The investigation could not determine a higher possibility to any of the above findings based on the given data

As previously stated, the investigation ruled out any involvement by the rudder in the accident.

Although the second and third bullets could not be ruled out, the mostly likely cause is that the "pilot loses awareness of heading or bank."

It is suggested that a new section for "pitch up and airspeed decay" should follow this one and cite distraction as a likely reason for these deviations from target parameters.

U.S. Comment:

Page 1049, section 3.9 Aileron move in direction of right roll.

This section states:

- Rudder surface position (See footnote # 6) (Adopted)
- Pilot input
- Lateral system fault:

The investigation could not determine a higher possibility to any of the above findings based on the given data.

The rudder and rudder control system can be ruled out. During the multi-national investigative team's work, the rudder was ruled out as a possible contributor to the accident.

There is also no evidence of a lateral control system fault, and it should therefore be ruled out. The only remaining possibility for this section is "pilot input."

U.S. Comment:

Page 1049, section 3.10, Autopilot Disengagement indications on the FDR and CVR.

This section states that the investigation could not determine a higher possibility to whether the autopilot was manually or automatically disengaged.

If the flight control computers (FCCs) detect an invalid input from any autopilot system sensor during the autopilot engagement sequence, the engagement sequence will stop and an automatic disconnect occurs. The minimum time for an automatic autopilot disconnect is 3.695 seconds. It is known from analysis of the accident airplane's FDR data that the autopilot was engaged a maximum of 3.6 seconds, and most likely less than this. Therefore, since the engagement time indicated on the FDR is less than the minimum time required for an automatic autopilot disconnect, it can be concluded that the autopilot was manually disengaged.

U.S. Comment:

Page 1049-1050, Section 3.11 Airplane begins roll to right

The investigative team has already ruled out the rudder and the rudder control system, and the report should reflect this point. There is also no evidence of an autopilot or lateral system fault, and they do not prevent controlling airplane to the desired flight path.

In addition, this section currently contains no conclusion. It should indicate which of the possible explanations is most likely. Manual pilot inputs resulting from the captain's unrecognized spatial disorientation best explain the airplane's entry into a right bank.

U.S. Comment:

Page 1050, Section 3.13 Right roll continues to overbank with ailerons activities

The report states that the conditions listed in this section could not be ruled out and that the investigation could not determine a higher possibility to any of the conditions based on the given data.

The investigative team has already ruled out the rudder and an erroneous EADI, and the report should reflect these points.

Conditions related to an autopilot or lateral control system faults are not supported by the data. There is no evidence that these faults occurred, and they do not prevent controlling airplane to the desired flight path.

The captain's continued spatial disorientation is the most likely explanation for his continued inappropriate control wheel inputs during this period.

U.S. Comment:

Pages 1050-1051, Section 3.14 Flight crew CVR autopilot announcements

This section states, in part:

> The investigation could not determine a higher possibility to any of the above conditions based on the given data.

As previously provided for Section 2.5.14, Flight crew CVR autopilot announcements, the meaning of the flight crew's statements regarding the autopilot during this period are unambiguous. The captain's "autopilot" statements are consistent with requests for autopilot engagement. The first officer's statement, "Autopilot in command" is consistent with a rote response following a press of the command button. The first officer's statement, "No autopilot commander" was an attempt to communicate to the captain that the attempt to engage the autopilot was unsuccessful.

U.S. Comment:

Pages 1051, Section 3.15 Rapid left roll towards wings level

Page 3 8 of 40

This section states, in part:

> From the above, Captain Upset Recovery Attempt seems a higher possibility

This conclusion is unsupported. There is insufficient evidence to conclude which pilot made the recovery attempt.

U.S. Comment:

Page 1051, Section 3.16 Impact with water

This section states, in part:

> Although an attempt to correctly recover was initiated, the gravity of the upset condition with regards to attitude, altitude and speed made this attempt insufficient to achieve a successful recovery.

This section should clearly state that although the airplane remained responsive and controllable through out the entire flight, the overbank recovery attempt was begun too late to prevent impact with the ocean.

p. 1052, Findings, 3.1 Possible Causes

The draft final report provides the following as possible causes:

- Trim/ Feel Unit Fault (Aileron Trim Runaway)
- Temporarily, Spoiler wing cable jam (Spoiler offset of the neutral position)
- Temporarily, F/0 wheel jam (spoilers offset of the neutral position)
- Autopilot Actuator Hardover Fault
- A distraction developing to Spatial Disorientation (SD) until the time the F/0 announced "A/C turning right" with acknowledgement of the captain.

As stated in the U.S. team's cover letter to these comments, the only scenario that satisfies the logic and methodologies adopted by the investigative team is the one involving spatial disorientation. The remaining possible causes are not consistent with and would not lead to the sequence of events identified by the investigation.

Because the draft final report does not provide evidence or justification to conclude that the first four possible causes listed above may have occurred, these "possible causes" should be removed.

U.S. Comment:

Page 1052, Findings

The draft final report properly notes that the path of the airplane was consistent with the recorded motion of the control surfaces. This should be added as a finding in this section.

U.S. Comment:

p. 1053, Conclusion

The evidence and the analysis methodology agreed to and adopted by the full investigative team supports only a conclusion of spatial disorientation by the captain. The first officer's failure to assume timely control of the airplane should also be identified.

U.S. Comment:

p. 1054, Recommendations

Justification for recommendations 1 through 4 is unclear.

Regarding recommendation 3, it should be noted that there was no evidence the crew misunderstood the engagement status.

Regarding recommendation 4, it should be noted that the U.S. Federal Aviation Administration initiated an independent re-examination of the B-737 autopilot system early in the investigation. The FAA's review concluded that no safety action was required on the B-737 autopilot/flight director or attitude display systems. The results of this review were provided to the MCA on 13 December 2004.

Regarding recommendations 6 and 7, Industry developed "Airplane Upset Recovery Training" is currently available. These recommendations should be addressed to either operators for incorporation in training programs or to the CAA for regulatory action.

Regarding recommendation 8, it should be noted that spatial disorientation is a well-documented phenomenon. It would be more appropriate to recommend awareness training for crews. This recommendation should be addressed to a specific organization.

Regarding recommendation 9, it should be noted that the CRM failings in this accident included a lack of assertiveness on the part of the first officer. This aspect should be better addressed in both operating procedures and CRM training. This recommendation should be addressed to either operators for incorporation in training programs or to the CAA for regulatory action.

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
Ministère des Transports,
de l'Equipement,
du Tourisme et de la Mer

BEA
Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile

Le Bourget, 2 January 2006

Captain Shaker Kelada
Commission of Inquiry into accident at
Sharm el-Sheikh
Ministry of Civil Aviation
Airport Road P.O. Box 52
Heliolpolis, Cairo
Egypt

N° 000001 /BEA/D

Subject: Draft Final Report - Comments
Your Ref: Flash airlines flight 604, 3 January 2004
Attachment : -

Dear Captain Kelada,

Thank you for having associated the BEA (Bureau d'Enquêtes et d'Analyses pour la sécurité de l'Aviation Civile) with the investigation into the accident to the Boeing 737-300, registered SU-ZCF, and for the opportunity to make comments on the Draft Final Report. I would also like to reiterate our great appreciation for the spirit of cooperation that has permeated this investigation and for your consideration for the suffering of the families of the victims of the disaster.

It is in this same spirit, and with the interests of civil aviation safety in mind, that we hereby present you with the following observations. I hope that they will appear to you to improve the overall comprehension of the accident and that you will accept that they be included into your report. If this is not the case, I would be obliged if you would append this letter to the report, in accordance with the provisions of Annex 13.

Part 1 (Factual Information)

The factual part of the report contains a certain number of errors and omissions that were identified in the course of the investigation. The BEA draws your attention to these points, and in particular that:

- There are erroneous values in the parameters in section 1.1 (History of Flight);
- Details of Flash Airlines pilots' flying activity were supplied during the investigation. They should be appended to the report. These details modify the information included on page 48-1;

Aéroport du Bourget
Bâtiment 153
93352 Le Bourget Cedex
France
Tél. : +33 1 49 92 72 00
Fax : +33 1 49 92 72 03

www.bea.aero

- The CVR transcript does not take into account the additional information brought to light after further listening last August;
- The reports on the simulations undertaken in Seattle in October 2004 are not appended to the report;
- On several occasions, information supplied by the manufacturer is replaced by a note relating to proprietary information. It appears that the manufacturer does not, however, consider its explanations to be confidential. Consequently, the technical data that had previously been reserved should be included in the report.

Part 2 (Analysis)

- On the basis of the analysis, the report accepts four possible technical failures. It should be noted that the extensive group work made it possible to eliminate the numerous cases examined, with the exception of two (Aileron trim runaway, Autopilot actuator hardover). Concerning these two hypotheses that were not eliminated, simulations undertaken showed that the crew would still have been able to control the airplane's track.

- An additional hypothesis implicating the rudder, which was never discussed during the group work, appears in the analysis. Examination of the factual elements supplied confirms that this hypothesis is not relevant in the context of the accident.

- The operational aspects, including those possibly related to the technical points raised, are not developed. It is, however, internationally recognised that examination of these elements is important and unavoidable in an aircraft accident report. It is necessary to examine why the crew, when confronted with an abnormal and unusual situation, did not seem to have either analyzed this situation or to have mobilized all of its available resources to deal with it. The CVR readout shows an absence of appropriate dialogue aimed at identifying a possible problem or proposing a solution to it.

- Cockpit Resource Management (CRM) training was not mandatory in Egypt at the time of the accident. The operator, in contradiction with the specific part in its Operations Manual and with the response given following the audit performed in January 2003 by the ECAA, had not set up such a training programme. It should also be noted that some other remarks made in the course of the audit were not in effect taken into account (notably in relation to recruitment of additional pilots and to follow-up on daily maintenance).

- In the analysis, it is necessary to examine the knowledge that the Captain possessed to enable him to identify and manage the crisis situation encountered during this flight, which implies studying the successive training programmes that he had followed. His activity for several years showed no evidence of any structured training in this area, nor more generally for the role of Captain. Thus, it seems that his initial conversion on ATR 42, along with the validation by equivalence of his Captain's license, corresponded neither to generally accepted qualification standards nor to Egyptian regulations. On the technical level, his type rating had been carried out on 737-500 and not on 737-300, without any training on the specificities of the fleet's airplane's (variant training) being included in the operator's documentation.

- Study of the « Human Factors », which is included in section 2.6, is based on documents supplied during the first meeting of the sub-group (August 2004).

BEA

Further work, undertaken with the assistance of American and French specialists for a second meeting of the sub-group (August 2005), is appended to the section but not developed. This work brought to light evidence of two probable phenomena, spatial disorientation and fatigue. Examination of these phenomena should be detailed and structured because of their importance both for an understanding of what did, or did not, happen during the flight as well as for safety in air transport. In fact, these physiological phenomena are of a type that may affect any pilot, whatever his or her experience, skills or state of health might be.

- In relation to fatigue in particular, it appears, according to documents supplied by the ECAA (regulations and crew service schedules) that the operator's management of the crew 's periods of activity was not in accordance with the national regulations.

Part 3 (Conclusions)

Bearing in mind the preceding, the BEA proposes the following modifications to the Findings and Conclusion.

- Section 3.1 (Possible causes): eliminate the two causes that were proved not to have contributed to the accident (bullets two and three).

- Section 3.2 (Possible contributing factors): add four factors

  - Resources mobilised by the crew were not appropriate to the emergency situation encountered.
  - Neither pilot had followed Cockpit Resource Management (CRM) training courses, noting that such training was not mandatory in Egypt at the time of the accident.
  - The Captain had not followed a structured training programme for the role of Captain of a civil transport airplane.
  - Taking into account his activity in the previous days, the Captain was very probably suffering from sleep deficit.

- Section 3.3 (Additional findings): add one factor

  - At the time of the accident, the operator had not yet implemented various measures decided on following an audit carried out in January 2003.

- Concluding section: add, to the end of the last sentence of the first section, « while noting that the airplane remained controllable throughout the flight ».

The BEA remains at your disposal for any further information that you may wish to obtain.

Yours sincerely.

Le directeur du BEA

P.L. ARSLANIAN

MCA Response:

Part 1 (Factual Information) adopted

Part 2 (Analysis): Hypothesis implicating the rudder adopted

FLASH AIRLINES

Member of FLASH GROUP

5th January 2006

Dear Captain Shaker

Comments of Flash Airlines upon draft final report into the loss of Flash Airlines Flight 604

Please find attached our comments upon the draft final report into the loss of Flash Airlines Flight 604 on 3 January 2004. We should be grateful if you and your Accident Investigation Team would consider our comments forthwith and let us know whether, in the light of these comments, you are prepared to amend the draft final report to reflect them. In the event that any of the attached comments are not reflected in amendments to the draft final report, we should be grateful if you would append a copy of the relevant comments to the final report.

Kind regards

Yours sincerely

Mohamed Nour
Chairman & CEO

4746661.doc

166- B.El Hegaz St., - Helioplis - Cairo - Egypt
Tel. : (202) 6240643 - 012/3903254 - 012/3947094
Fax : (202) 6240641
E-mail :hpline@internegypt.com
SITA : CAIHPCR

١٦٦ ب ش الحجاز - مصر الجديدة - القاهرة - مصر
تليفون: ٦٢٤٠٦٤٣ (٢٠٢) - ٠١٢/٣٩٠٣٢٥٤ - ٠١٢/٣٩٤٧٠٤٩
فاكس: ٦٢٤٠٦٤١ (٢٠٢)
E-mail :hpline@internegypt.com

Comments of Flash Airlines upon the Draft Final Report into the loss of Flash Airlines Flight 604

Flash Airlines welcomes the opportunity to comment upon the draft Final Report of the Accident Investigation into the loss of Flash Airlines Flight 604 on 3 January 2004. Our comments are set out below. It should be noted that these comments reflect our analysis of the draft report within the limited time (60 days) and with the resources available to us following release of the draft to interested parties. They do not therefore necessarily represent Flash's final view on every issue and Flash's position is reserved generally in that regard.

Spatial Disorientation

1. Flash does not accept the existence of any spatial disorientation ("SD") on the part of the flight crew, or that it is appropriate for the report to make any finding to that effect, in the absence of unequivocal and positive indicators of its presence. It follows from the analysis in 4-6 below that some other explanation must in any event be sought for the behaviour of the aircraft after the limited window referred to in those paragraphs and during the most critical phase of the flight. That being the case, it is inappropriate and unnecessary to speculate as to the existence of SD during any earlier phase of the flight, unless there is clear evidence of its existence.

2. The report's analysis of the possible existence of SD on the part of the Captain is, in any event, confusing. In particular, it is frequently unclear what sections of the report concerning this issue represent the views of the investigation team itself and what represent submissions made to it by others.

3. The key part of any such analysis must be to test the possible existence of SD at various stages of the flight against the CVR transcript evidence of the recorded remarks of the Captain and the information he was being given by the First Officer. The investigation team's views on, and the conclusions they draw (and why) from, each stage of this process should be clearly set out.

4. If one carries out the exercise referred to in 3 above, this supports the view that, even if there was any SD present on the part of the Captain at any stage of the flight, it had ended before the aircraft's roll to the right resulted in an overbank and long before the point at which, if the aircraft had been performing normally, the manoeuvre ceased to be easily recoverable by the flight crew. In particular, at 02:44:31 the First Officer stated "*Aircraft is turning right*". At 02:44:37 the Captain responded to this by saying "*How turning right?*" and at 02:44:41 (when the aircraft's bank angle was approximately 40°) "*OK come out*". At that time the ailerons are returned to beyond neutral, the high right roll rate stops and a momentary left roll rate occurs (quoting from the Factual Report). This demonstrates that, by this time at the latest, the Captain had assimilated the information he had been given by the First Officer and reacted correctly to it. At this stage, therefore, there can be no question that the Captain appreciated the aircraft's rolling movement and furthermore knew his right from his left in terms of inputs to the flight controls. Any SD on his part was, on the available evidence, over by this time.

5. The draft report appears to regard the movement of the ailerons recorded at 92393 (02:43:39) as the beginning of a right roll manoeuvre that continued until the aircraft recovery attempt began (see 2-5-9, page 4). This is incorrect. This was in fact the start of the aircraft rolling out onto the 140°M heading, where it then remained for approximately 9 seconds. This appears to have been a deliberate (and accurately flown) manoeuvre on the part of the Captain. There is no evidence of SD at this point. The critical roll to the right only commenced with the aileron movement seen at 92420 (02:44:06) or 92421 (02:44:07), some 4 or 5 seconds after disengagement of the autopilot.

6. The conclusion to be drawn from 4 and 5 above is that, even if there was any SD on the part of the Captain, it was relatively short lived and in any event ended before the aircraft's attitude became critical. In these circumstances, it is inappropriate for the Report to include SD as a possible cause of the accident (see "FINDINGS" at 3.1). At most (and subject to the comments made in 1 above), SD should be included as a possible contributing factor only.

7. Any analysis of the issue of SD should also consider what event might have triggered it (if it existed at all) and whether a failure or malfunction of any of the aircraft's systems are likely to be implicated in that.

Autopilot disengagement

8. The potential significance of the autopilot disengagement has been obscured within the weight of detail contained within the draft report. This event occurs (at FDR frame 92416 or 02:44:02) only 4 or 5 seconds before the aircraft commences the critical roll to the right. Is this just a coincidence? It is important to bear in mind that Boeing's/Honeywell's analysis of the possible reasons for the disengagement is entirely predicated on the assumption that the unit was in this regard performing as designed: ie that it would only have automatically disengaged for a reason anticipated in its design. (Indeed this assumption effectively underlies all of the aircraft system fault tree analyses included within the draft report.) An alternative approach is to treat the disengagement as an indicator of a possible problem with the aircraft's systems (and potentially one still undiagnosed). If that is the case, then one cannot rule out the possibility that the autopilot disconnected for a reason not yet analysed by Boeing/Honeywell. It also invests the closeness in timing between this event and the start of the right roll with potentially far more significance than presently appears from the draft report.

9. Even on the basis of Boeing's/Honeywell's own analysis, another reason should be added at 3.10 of the Conclusions as a possible reason for the autopilot disengagement: namely failure of the unit to synchronise and pressurise following engagement (see section 2-5-10, page 5, of the draft report).

Flight Director commands to the flight crew

10. The draft report rules out the possibility of erroneous Flight Director ("FD") commands to the flight crew, apparently on the basis of a Honeywell presentation to the effect that it is not possible to have valid FDR data with erroneous commands (see

for instance 2-5-11, page 4, footnote 1). However, the implicit assumption that all FCC FDR data is valid appears to be incorrect.

11. In particular, the FDR records show anomalous readings for the SEL COURSE 1 and SEL HEADING FCC L settings interspersed between what appear to be true readings. On the SEL COURSE 1 parameter, the FDR records show readings of 306.035 (assumed to be a correct reading as a course setting of 306 would coincide with the VOR radial to be flown from Sharm el-Sheikh) interspersed with readings of 359.912. Similarly on the SEL HEADING FCC L parameter, the FDR records show readings of 219.814 (the runway heading) and later 106.875 (again assumed to be valid readings) interspersed again with readings of 359.912.

12. Boeing have described one of the anomalous SEL HEADING FCC L readings as "apparent data drop out" (see the comments on the graph at paragraph 1.16.1.2, page 163-1 of the draft report) and seemingly ignored both the other anomalous SEL HEADING FCC L readings and the anomalous SEL COURSE 1 readings. However, "data drop out" is a very unlikely explanation, given that the anomaly has affected only these parameters. It should be noted that, on a 12 digit binary readout for the range between 0° and 360°, 359.912 corresponds to "111111111111". These anomalous readings are positive evidence of a fault, which is unlikely to have been in the FDR. It is more probable that there was a fault in either the left FCC or in the MCP (Mode Control Panel). It is difficult in these circumstances to understand how the report can rule out the possibility that the FD was issuing erroneous roll commands to the flight crew. An erroneous roll command might well explain the commencement of the roll to the right following autopilot disengagement. Further, even if there was some SD present on the part of the Captain during the early part of that manoeuvre (in which regard see 1-6 above), it might help to explain what triggered this, particularly if the Captain was also receiving confusing displays on his EHSI (Electronic Horizontal Situation Indicator) due to a similar problem with Course Select. The report should analyse this whole issue.

Possible rudder defect

13. There is no real analysis within the draft report of the potential role played by a rudder defect in explaining the accident and this issue deserves more attention in the final report. The draft report expressly does not rule this out as a possible factor. That being the case, and bearing in mind the part played by the B737 rudder in previous similar accidents, it is difficult to understand why a rudder defect is not listed within the possible causes at paragraph 3.1 of the Findings.

Master Caution

14. The significance of the Master Caution being triggered twice during the flight (the first during taxi, the second towards the end of the flight) deserves more attention and analysis. The first occurred during the pre-flight rudder control check. Is this just a coincidence? The second should be analysed as possible evidence of a systems failure on the aircraft.

Autopilot Actuator Fault

15. The draft report analyses at section 2-5-13, paragraph 6.2.2.3.1, a possible autopilot actuator fault, which it concludes shows close consistency with the event. The report states that this condition requires 3 concurrent faults, one of which could have been latent generally and a second of which could have been latent from any time after the last use of the autopilot on a previous flight. It fails however to emphasise sufficiently that they also could all be triggered by an electrical short within the electrical socket on the autopilot actuator and could therefore have a single, common, cause.

Aileron Trim Runaway

16. The draft report also analyses an aileron trim runaway and concludes that it cannot be ruled out as a possible condition and shows close consistency with the event. This systems failure required only two concurrent faults, one of which could have been latent. One feature of such a failure that the report does not draw adequate attention to is the fact that a trim runaway would take some time to produce full aileron deflection and would therefore produce a roll which gradually deteriorated into an overbank (the same situation as occurred in this case).

Recorded aileron movements

17. The report notes that, even during the attempted recovery phase at the end of the flight, aileron action is recorded in both directions. The potential importance of this finding is not explored in the draft report. Yet it would seem to be evidence of the pilot in command fighting some countervailing force during this period. Similar indications can be found earlier at FDR frame 92432 (02:44:18), when the Captain said *"See what the aircraft did"* (aileron movement for one or two seconds asking for left roll, presumably in response to the aircraft movement which provoked the Captain's comment, followed by aileron movements commanding right wing down), and at FDR frame 92453 (02:44:39), just before the Captain said *"OK come out"* (large aileron movement asking for left wing down, producing the momentary left roll noted in the Factual Report, followed by more right wing down aileron movements). These readings suggest deliberate left wing down inputs by the Captain (coinciding with consistent statements on the CVR record), followed by a resumption of right roll commands as soon as he relaxes on the control wheel. This is very significant evidence of the possible existence of some form of systems failure or malfunction.

No reliable control wheel FDR data

18. It seems remarkable that the only parameter on which there is no reliable recorded data on the FDR is the control wheel position. Is it possible that the condition which led to the control wheel sensors producing anomalous results also affected the functioning of the control wheels themselves?

Draft Findings

19. At paragraph 3.2 of the Findings, the first two items (tech log copies left on board; write up of defects) should be removed from the possible contributory factors.

Whatever the position may have been regarding these matters (as to which Flash expressly reserves its position), there is no evidence that these matters had anything whatsoever to do with the accident.

20. Even leaving to one side the point made in 1 above, we do not consider it appropriate for the remaining two items of paragraph 3.2 to be included as possible contributing factors. If they are to appear anywhere, they should appear elsewhere within the report since (as currently drafted) they are simply part of the report's analysis.

General

21. It is inappropriate for the final report to contain blank pages due to Boeing's refusal to release proprietary data. If the information which would have been included there is relevant to the report's findings, it should be set out or summarised and interested parties should be given a further opportunity to comment before a final report containing such data is released.

22. Both paragraphs 1.5.1.6 and 1.5.2.6 of the draft report state that "no official head of operation in Flash Airlines" was (apparently) available for interview during the investigation. On a point of information, the company's Operations Manager on the date of the accident was Ihab El Sonbaty, who was one of the off duty crew members killed in the accident.

In the event that any of the above comments are not reflected in amendments to the draft Final Report, we should be grateful if you would append a copy of the relevant comments to the Final Report.

MCA Response:

Spatial Disorientation comment adopted

Arab Republic Of Egypt
Ministry Of Civil Aviation
Egyptian Civil Aviation Authority

جمهورية مصر العربية
وزارة الطيران المدني
سلطة الطيران المدني المصري

FAX

To. :Captain Shaker Kelada **Investigator In Charge.**	**From:** Pilot/ Samir Abdel-Maboud Abdel-Aziz Head of, Egyptian Civil Aviation Authority Ministry of Civil Aviation
Phone Number.	**Phone Number.** +202-2677617
Fax Number:	**Fax Number:** +202-2688232
	Date: 29 Dec, 2005 **Page :1**

Submission by Egyptain Civil Aviation Authority to the draft report of the Flash Airlines accident investigation

Dear Captain Kelada

The ECAA being a party to this investigation thank the investigation committee for their effort and the chance to give our comments on the draft report.

Having participated in the different groups of the investigation we are comfortable with the findings that have been offered in general, nevertheless we would like to make one comment that has come out of the Crew Behavior Subcommittee.

The ECAA studies are in agreement with the draft report that the Captain was temporary distracted and may have developed to temporary spatial disorientation having said that it is apparent this state is a consequent result of a previous action.

Based on these facts the phase of distraction and spatial disorientation was a reaction to some previous happening and therefore this finding could have only contributed to the accident.

The ECAA requests the finding of the crew behavior's distractions and possible spatial disorientation be considered a possible contribution factor.
We would appreciate the above to either be amended or appended in the final report

Best Regards

Pilot / Samir Abdel-Maboud Abdel-Aziz
Head of,
Egyptian Civil Aviation Authority

MCA Response:

Comment adopted