
Hard landing, Boeing 737-4Y0, April 13, 1995

Micro-summary: This Boeing 737-4Y0 experienced structural damage following a hard landing.


Event Date: 1995-04-13 at 2226 MDT

Investigative Body: National Transportation Safety Board (NTSB), USA

Investigative Body's Web Site: <http://www.nts.gov/>

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		NTSB ID: FTW95LA170		Aircraft Registration Number: EICEU	
		Occurrence Date: 04/13/1995		Most Critical Injury: None	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place DENVER		State CO	Zip Code 80249	Local Time 2226	Time Zone MDT
Airport Proximity: On Airport		Distance From Landing Facility: 0		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer BOEING		Model/Series 737-400		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:					
<p>On April 13, 1995, at 2226 mountain daylight time, a Boeing 737-4Y0, EI-CEU, was substantially damaged during landing at Denver, Colorado. There were no injuries to the 141 passengers, 4 cabin attendants, and two cockpit crewmembers aboard. Visual meteorological conditions prevailed.</p> <p>The airplane was being operated by MarkAir, Inc., as flight 523, scheduled domestic passenger service from Kansas City, Missouri, to Denver, Colorado. According to a joint written statement submitted by the captain and the first officer, the flight proceeded uneventfully and the approach briefing, radios, instruments, and speed bugs (Vref, 136 KIAS; target speed, 145 KIAS; Vref+15, 151 KIAS, based on a landing weight of 112,000 pounds) were set up for a planned landing on runway 17R. The first officer was flying the airplane.</p> <p>After the airplane had been positioned on the downwind leg, the crew was offered the option of landing on runway 16. This was accepted but when told they could expect a delay to that runway, they requested and were cleared for a visual approach to, and landing on, runway 17R.</p> <p>ATIS (automatic terminal information service) indicated the winds to be from 190 degrees at 18 knots. A surface weather observation in effect at the time indicated the winds were from 180 degrees at 19 knots. The first officer, who was flying the airplane, lined up with runway 17L and when the mistake was realized, they requested and were cleared to land on runway 17L. This paragraph is based on the crew's enclosed statement. The airport was visible to the crew. The lights for runway 17L were set on high intensity; the lights for runway 17R were not visible. The airplane was aligned with the visible runway lights: PAPI (precision approach path indicator) lights and glideslope indications agreed with each other. When there was no localizer capture, the crew realized they were lined up with runway 17L. The flight was subsequently cleared to land on runway 17L. At 500 feet AGL (above ground level), the glide slope aural warning sounded and was cancelled because the radios had been tuned to the nav aids serving the parallel runway. At 100 feet AGL, the GPWS (ground proximity warning system) sink rate warning sounded, and the first officer added power. At 50 feet AGL and over the runway threshold, airspeed deteriorated. The first officer applied additional power and the captain added maximum thrust and forward control yoke pressure. "A hard landing was made."</p> <p>During its preflight inspection, the relief flight crew noticed damage to the airplane that included a compromised pressure vessel, a crushed tail skid, breaches in the skin with associated stringer damage, and a collapsed right main landing gear strut. The crew flying "did not suspect any external damage to the aircraft until arriving at the gate and being told by ground personnel."</p> <p>The data from the airplane's digital flight data recorder (DFDR) was read out and evaluated. According to the group chairman's factual report, vertical acceleration spiked at 3.64 g's when the airplane contacted the runway. The report added that due to accelerometer characteristics and DFDR</p>					
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National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: FTW95LA170

Occurrence Date: 04/13/1995

Occurrence Type: Accident

Narrative (Continued)

sampling rate, this value could be greater or less than the actual g's incurred. The factual report and the DFDR Data in Graphical Format are attachments to this report. Data supporting these documents are on record with the Safety Board's Office of Research and Engineering.

A review of the control tower audio tapes revealed the following (all times are approximate):

2218:41 Frontier 706, cleared to land, runway 17R. Wind 190 degrees at 16 knots.

2221:50 United 776, cleared to land, runway 16. Wind 190 degrees at 10 knots.

2222:01 MarkAir 523, cleared to land, runway 17R. Wind 200 degrees at 18 knots. Wind check for runway 16 approach end, wind 190 degrees at 25 knots.

2222:36 UPS 841, cleared for takeoff, runway 17R. Wind 200 degrees at 18 knots.

2223:37 Wind check, 190 degrees at 27 knots. Runway 17R, wind 200 degrees at 20 knots.

2224:12 United 358, cleared to land, runway 16. Wind 180 degrees at 25 knots.

2225:06 Cactus 491, cleared to land, runway 16. Wind 180 degrees at 25 knots.

2225:40 MarkAir 523, you're lined up with runway 17L. Cleared to land, runway 17L.

2225:49 United 776 reports a 10 knot loss of airspeed at 100 feet.


2226:23 Cactus 491 advises it will be "real careful."


2226:38 United 242, cleared for takeoff, runway 17R. Wind 200 degrees at 18 knots.

2227:02 MarkAir 523 is given initial taxi instructions.

The following is a portion of the recorded ATIS (automatic terminal information service) in effect at the time of the incident:

Denver International Airport, Automated Weather Arrival, Information Alpha, zero three five five zulu, temperature five five, dew point three zero, wind one eight zero at one niner, altimeter two niner eight five...

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: FTW95LA170			
		Occurrence Date: 04/13/1995			
		Occurrence Type: Accident			
Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
DENVER INTERNATIONAL	DEN	5431 Ft. MSL	17L	12000	150
Runway Surface Type: Concrete					
Runway Surface Condition: Dry					
Type Instrument Approach: Visual					
VFR Approach/Landing: Full Stop					
Aircraft Information					
Aircraft Manufacturer		Model/Series		Serial Number	
BOEING		737-400		24345	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 169	Certified Max Gross Wt.	142500 LBS	Number of Engines: 2	
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:		
Turbo Fan	CFM	CFM-56	23500 LBS		
- Aircraft Inspection Information					
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time		
AAIP	04/1995	133 Hours	14505 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? No	ELT Operated?	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner		Street Address			
		GPA HOUSE, 10 CLARE			
GPA FINANCE, LTD.		City	State	Zip Code	
		SHANNON	OF		
Operator of Aircraft		Street Address			
		4100 W. INT'L AIRPORT RD.			
MARKAIR, INC.		City	State	Zip Code	
		ANCHORAGE	AK	99519	
Operator Does Business As:			Operator Designator Code: MRKA		
- Type of U.S. Certificate(s) Held:					
Air Carrier Operating Certificate(s): Flag Carrier/Domestic					
Operating Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Part 121: Air Carrier					
Type of Flight Operation Conducted: Scheduled; Domestic; Passenger Only					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: FTW95LA170
	Occurrence Date: 04/13/1995
	Occurrence Type: Accident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 39
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Sex: M	Seat Occupied: Left	Principal Profession: Civilian Pilot	Certificate Number: On File
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Certificate(s): Airline Transport; Commercial

Airplane Rating(s): Multi-engine Land; Single-engine Land; Single-engine Sea

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): None

Type Rating/Endorsement for Accident/Incident Aircraft? Yes	Current Biennial Flight Review?
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Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--no waivers/lim.	Date of Last Medical Exam: 11/1994
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- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air
						Actual	Simulated			
Total Time	9800	4500	2500	7300	2000	2000	275			
Pilot In Command(PIC)	7900	2600	2400	5400	2000	2000	275			
Instructor										
Last 90 Days		100								
Last 30 Days		60								
Last 24 Hours		7								

Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed? No	Second Pilot? Yes
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Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point KANSAS CITY	State MO	Airport Identifier MCI	Departure Time 2142	Time Zone CDT
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Destination Same as Accident/Incident Location	State	Airport Identifier	
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Type of Clearance: IFR

Type of Airspace: Class B

Weather Information

Source of Briefing: Company

Method of Briefing:

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Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
DEN	2155	MDT	5431 Ft. MSL	0 NM	0 Deg. Mag.
Sky/Lowest Cloud Condition: Clear			0 Ft. AGL	Condition of Light: Night/Dark	
Lowest Ceiling: None		0 Ft. AGL		Visibility: 7 SM	Altimeter: 29.00 "Hg
Temperature: 13 °C	Dew Point: -1 °C	Wind Direction:		Density Altitude: 6511 Ft.	
Wind Speed:	Gusts:	Weather Conditions at Accident Site: Visual Conditions			
Visibility (RVR): 0 Ft.	Visibility (RVV) 0 SM	Intensity of Precipitation: Unknown			
Restrictions to Visibility: None					
Type of Precipitation: None					

Accident Information

Aircraft Damage: Substantial	Aircraft Fire: None	Aircraft Explosion: None
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Classification: Foreign Registered/U.S. Soil

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot				1	1
Second Pilot				1	1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants				4	4
Other Crew					
Passengers				141	141
- TOTAL ABOARD -				147	147
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	147	147

National Transportation Safety Board

FACTUAL REPORT

AVIATION



NTSB ID: FTW95LA170

Occurrence Date: 04/13/1995

Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

ARNOLD W. SCOTT

Additional Persons Participating in This Accident/Incident Investigation:

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DENVER, CO 80216