
Electrical failure, Boeing 767, June 19, 1996

Micro-summary: Dual generator failure results in a trip back to the gate on this Boeing 767.


Event Date: 1996-06-19 at 2322 MDT

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

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

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.
-

		NTSB ID: SEA96IA131		Aircraft Registration Number: N136DL	
		Occurrence Date: 06/19/1996		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place SALT LAKE CITY		State UT	Zip Code 84116	Local Time 2322	Time Zone MDT
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer Boeing		Model/Series 767-332		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:					
HISTORY OF FLIGHT					
<p>On June 19, 1996, at 2322 hours mountain daylight time, a Boeing 767-332, N136DL, being operated by Delta Airlines as flight 229, sustained minor damage when the number two (right) engine integrated drive generator (IDG) caught fire during a climb, approximately 80 nautical miles northwest of Salt Lake City, Utah. The Captain, First Officer, six cabin crew, and 178 passengers were uninjured. Visual meteorological conditions prevailed and an IFR flight plan was in effect. The flight, which was a regularly scheduled passenger flight operated under 14CFR121, departed Salt Lake City International airport at 2308 destined for Portland, Oregon.</p>					
<p>During taxi for takeoff the crew observed both the "R GEN OFF" and "R GEN DRIVE" EICAS (engine indication and crew alerting system) messages and returned to the gate for corrective action. The captain reported that he "notified maintenance control and informed them that the aircraft was returning to the gate and informed them of the EICAS messages" and that the "after landing checklist was completed as well as the "generator off" abnormal procedure" (refer to ATTACHMENT I). He further reported that he "was turning the aircraft into the gate area, therefore further checklist procedures were discontinued pending examination of the aircraft by maintenance personnel." The aircraft's engines were then shut down.</p>					
<p>According to the Captain, a mechanic was briefed on the problem and departed the flight deck with the aircraft log and minimum equipment list (MEL). Shortly thereafter, the mechanic returned with the aircraft log showing the discrepancy as having been signed off. The captain reported that he discussed the maintenance actions taken and was told by the mechanic that "the IDG is disconnected." The crew anticipated observing the generator drive light and right generator off light for the duration of the flight to Portland, and would be using the auxiliary power unit (APU) generator as a replacement for the right generator.</p>					
<p>The mechanic reported that upon entering the cockpit he "found the right generator field light ON with (the) associated IDG drive light illuminated." He further reported that he "found the right generator drive disconnect switch released (and) assumed (the) crew had disconnected (the) IDG." The aircraft was subsequently dispatched in accordance with the MEL (refer to attached statement and ATTACHMENT II).</p>					
<p>After an uneventful taxi, takeoff and departure, and while crossing flight level (FL) 250, the crew observed a "R STARTER CUTOUT" EICAS message and the overhead right starter valve light illuminated intermittently. The "Starter Cutout" procedure was accomplished following which a flight attendant reported that a passenger in the aft cabin, right side, had observed sparks coming from the right engine. This was confirmed by the First Officer's visual inspection.</p>					
<p>The First Officer then returned to the flight deck and the crew initiated a return to Salt Lake</p>					
FACTUAL REPORT - AVIATION					

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: SEA96IA131

Occurrence Date: 06/19/1996

Occurrence Type: Incident

Narrative (Continued)

City during which the right engine fire warning light illuminated. The right engine was shut down and both fuselage mounted fire bottles were exhausted into the right engine with the fire warning light ceasing shortly after the second bottle was fired. An uneventful single engine emergency landing was accomplished at 2343 on runway 16L at Salt Lake City, and the aircraft rolled to a stop in the vicinity of the taxiway H-3 exit (refer to DIAGRAM I). The Captain established radio communications with the aircraft rescue and fire fighting (ARFF) team. The left engine was shut down shortly after landing with the aircraft remaining on APU power. According to ARFF records maintained by Salt Lake City airport, the fire was contained approximately 7 minutes after the landing. The left engine was subsequently restarted and the aircraft was taxied to gate D-3 under ARFF escort after which the passengers were deplaned via the jetramp.

POST INCIDENT EXAMINATION AND INFORMATION

Onsite examination of the right engine by Federal Aviation Administration (FAA) inspectors from the Salt Lake City Flight Standards District Office revealed that the IDG had separated from the accessory section of the right engine. The remnants of the IDG, including what remained of its magnesium housing were removed. There was evidence of fire damage within the accessory section of the engine concentrated in the vicinity of the IDG and hydro-mechanical fuel control unit. A hole was observed burned through the starter gearcase adjacent to the IDG and the start valve actuator was burned away (refer to DIAGRAM II). No significant damage was noted within the engine core area and the titanium heat shield which separates the accessory section from the core had only a single hole burned through the aft vertical face aft of the IDG location. A single hole was observed burned through the engine core cowling and in alignment with the previously described heat shield hole.

Additionally, FAA inspectors confirmed that the shear wire on the cockpit stationed IDG disconnect switch was intact.

AIRCRAFT INFORMATION

The fire detection element which activates the cockpit fire warning annunciator does not pass near the IDG but is situated near the hydro-mechanical fuel control unit. The aircraft's General Electric CF6-80A engines are equipped with a titanium heat shield which separates the accessory section from the engine core. Engines not equipped with this heat shield (Pratt & Whitney and Rolls Royce) are equipped with a second fire detection element within the accessory section.

There is only one procedure (exclusive of removal) for physically disconnecting an IDG from its associated engine. The procedure entails breaking the shear wire which holds the clear plastic guard over the disconnect switch. This allows the hinged plastic guard to be rotated away from the square, push-button disconnect switch. The switch can then be depressed (refer to DIAGRAM III). When the switch is depressed it initiates the physical disconnection of the IDG from the engine, thus preventing rotation of the IDG armature. This procedure may be accomplished by the flight crew during flight or ground taxi operations by executing the "GENERATOR DRIVE" abnormal checklist with the engines running (ATTACHMENT I), or by maintenance as part of the MEL dispatch procedure for an inoperative left or right IDG (refer to ATTACHMENT II, pages one and two). This latter procedure (ATTACHMENT II) was a procedure developed by Delta Airlines from the Boeing 767 Dispatch Deviations Guide. In order for an IDG to be properly disconnected during this maintenance procedure without damaging the IDG's "disconnect dog teeth," it is necessary to start and run the associated engine at or above idle power before carrying out the disconnect procedure (item "C" of ATTACHMENT II, page one).

TESTS AND RESEARCH

A readout of digital data downloaded from the aircraft revealed that original IDG light and EICAS messages observed by the flight crew on initial taxi were related to low oil pressure within the

National Transportation Safety Board

FACTUAL REPORT

AVIATION




NTSB ID: SEA96IA131


Occurrence Date: 06/19/1996

Occurrence Type: Incident

Narrative (Continued)

IDG, and that the fire warning light observed by the crew during climbout extinguished shortly after the second fire bottle was exhausted into the right engine.

		NTSB ID: SEA96IA131			
		Occurrence Date: 06/19/1996			
		Occurrence Type: Incident			
Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
SALT LAKE CITY INTL	SLC	4227 Ft. MSL	16L	12003	150
Runway Surface Type: Asphalt					
Runway Surface Condition: Dry					
Type Instrument Approach:					
VFR Approach/Landing: Straight-in					
Aircraft Information					
Aircraft Manufacturer		Model/Series		Serial Number	
Boeing		767-332		25146	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 264	Certified Max Gross Wt.	345000 LBS	Number of Engines: 2	
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:		
Turbo Fan	GE	CF6-80A2	48670 LBS		
- Aircraft Inspection Information					
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time		
Continuous Airworthiness	06/1996	45 Hours	Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? Yes	ELT Operated? No	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner		Street Address			
WILMINGTON TRUST COMPANY		RODNEY SQUARE NORTH			
		City	State	Zip Code	
		WILMINGTON	DE	19890	
Operator of Aircraft		Street Address			
DELTA AIR LINES		HARTSFIELD-ATLANTA INTNL ARPT			
		City	State	Zip Code	
		ATLANTA	GA	30320	
Operator Does Business As:			Operator Designator Code: DALA		
- 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					
FACTUAL REPORT - AVIATION					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: SEA96IA131
	Occurrence Date: 06/19/1996
	Occurrence Type: Incident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 53
-----------------	-----------------	------------------	--------------------------	-----------

Sex: M	Seat Occupied: Left	Principal Profession: Civilian Pilot	Certificate Number: On File
--------	---------------------	--------------------------------------	-----------------------------

Certificate(s): Airline Transport; Commercial; Flight Engineer

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

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): None

Type Rating/Endorsement for Accident/Incident Aircraft? Yes	Current Biennial Flight Review?
---	---------------------------------

Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--w/ waivers/lim.	Date of Last Medical Exam: 03/1996
------------------------	--	------------------------------------

- 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	19500	962								
Pilot In Command(PIC)										
Instructor										
Last 90 Days	166	166								
Last 30 Days										
Last 24 Hours										

Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed? No	Second Pilot? Yes
--------------------	----------------------------	--------------------------	-------------------

Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point Same as Accident/Incident Location	State	Airport Identifier SLC	Departure Time 2255	Time Zone MDT
---	-------	---------------------------	------------------------	------------------

Destination PORTLAND	State OR	Airport Identifier PDX	
-------------------------	-------------	---------------------------	--


Type of Clearance: IFR

Type of Airspace: Class A

Weather Information

Source of Briefing: Company

Method of Briefing:

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: SEA96IA131
	Occurrence Date: 06/19/1996
	Occurrence Type: Incident

Weather Information					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
SLC	2352	MDT	4227 Ft. MSL	0 NM	0 Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			15000 Ft. AGL	Condition of Light: Night/Dark	
Lowest Ceiling: None		0 Ft. AGL	Visibility: 10	SM	Altimeter: 29.00 "Hg
Temperature: 17 °C	Dew Point: 8 °C	Wind Direction: 120		Density Altitude: Ft.	
Wind Speed: 3	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: Minor	Aircraft Fire: In-flight	Aircraft Explosion: None

Classification: U.S. 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				6	6
Other Crew					
Passengers				178	178
- TOTAL ABOARD -				186	186
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	186	186

--	--

National Transportation Safety Board

FACTUAL REPORT

AVIATION



NTSB ID: SEA96IA131

Occurrence Date: 06/19/1996

Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)

STEVEN A. MCCREARY

Additional Persons Participating in This Accident/Incident Investigation: