# Uncontained engine failure, Boeing 727-224, October 7, 1998

Micro-summary: This Boeing 727-224 experienced an uncontained engine failure on takeoff.

# Event Date: 1998-10-07 at 0709 EDT

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

Investigative Body's Web Site: http://www.ntsb.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.

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National Transportation Safety Board	NTSB ID: MIA99FA005 Aircraft Registration Number: N6673					mber: N66734		
FACTUAL REPORT	Occurrence	e Date: 10/07	one					
ÁYIATIQŇ VETYBOR	0	Occurrence	surrence Type: Accident Investigated By: NTSB					
Location/Time								
Nearest City/Place     State     Zip Code     Local Time     Time Zone								
MIAMI	33	159	0709	EDT				
Airport Proximity: On Airport	e From La	nding Facility:		Direction Fro	rection From Airport:			
Aircraft Information Summary								
Aircraft Manufacturer Model/Series Type of Aircraft								
Boeing	727-224 Airplane							
Sightseeing Flight: No		Ai	r Medical Tr	ansport Flight:	No			
Narrative								
Brief narrative statement of facts, conditions and circumstand	ces pertinen	nt to the acci	dent/incident:					

HISTORY OF THE FLIGHT

On October 7, 1998, about 0709 eastern daylight time, a Boeing 727-224, N66734, registered to First Security Bank NA, and operated by Continental Airlines, Inc., as flight 1521, Title 14 CFR Part 121 scheduled domestic passenger service from Miami, Florida, to Houston, Texas, had an uncontained failure of the No. 2 engine during takeoff roll at Miami. Visual meteorological conditions prevailed at the time and an instrument flight rules flight plan was filed. The aircraft received substantial damage. The airline transport-rated captain, first officer, flight engineer, 3 flight attendants, and 75 passengers were not injured. The flight was originating at the time of the accident.

The captain stated he was flying the aircraft and advanced the engine power levers for takeoff. The engines spooled up, and just prior to maximum takeoff power being set, he heard a loud bang noise. He retarded the power levers and aborted the takeoff. He turned off the runway at the next taxiway. The No. 2 engine was identified as having failed and the engine shutdown procedure was accomplished and the fire handle was pulled. The fire bottles were then fired. He made contact with the fire department personnel who arrived shortly after the aborted takeoff and they reported there was no fire. A portable airstair was brought to the aircraft and the crew and passengers deplaned and were taken to the terminal building by bus.

#### PERSONNEL INFORMATION

Information on the flightcrew is contained in this report under First Pilot Information and in the Pilot/Operator Aircraft Accident Report.

#### AIRCRAFT INFORMATION

The No. 2 engine was a Pratt and Whitney model JT8D-9A, serial number 657091. At the time of the accident the engine had accumulated 68,784 total flight hours and 57,530 total cycles. The engine had accumulated 4,846 flight hours since overhaul and 359 flight hours since repair. On March 2, 1998, 359 flight hours before failure, the No. 2 engine was repaired by General Electric Engine Services, Miami, Florida. The N1 and N2 compressors, hot section, N2 turbine and exhaust case were repaired under heavy maintenance criteria. The N1 turbine and main accessory gearbox were repaired under heavy repair criteria. Installed were the C-5, C-6, C-8, C-9, and C-10 disks.

The C-8 or 8th stage high pressure compressor (HPC) disk, which was installed at this time, had been overhauled by General Electric Engine Services (formerly Greenwich Air Services), Miami, Florida, on February 11, 1998. Records showed the disk was received by Greenwich Air Services in March 1996. The disk was sent to Action Plating Corporation, Opa-Locka, Florida, for stripping. The disk was then returned to Greenwich Air Services, where it was inspected. The disk was then sent by

FACTUAL REPORT - AVIATION

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## Narrative (Continued)

Greenwich Air Services to Wings Aviation Services, Miami, Florida, for plating with diffused nickel-cadmium. The disk was then stored until February 1998. (Additional aircraft information is contained in this report under Aircraft Information and in the Powerplants Group Chairman Factual Report).

#### METEOROLOGICAL INFORMATION

Visual meteorological conditions prevailed at the time of the accident. Additional meteorological information is contained in this report under Weather Information.

#### FLIGHT RECORDERS

The cockpit voice recorder from N66734 was not retained by NTSB, for it remained electrically powered after the accident and the event was over written. The digital flight data recorder from N66734 was retained by NTSB after the accident and forwarded to the NTSB Vehicle Reorders Division, Washington, D.C., for readout. The readout showed the aircraft aligned with the takeoff runway and engine power was advanced. The engine pressure ratios increased to 1.44, 1.51, and 1.46, on engines 1, 2, and 3 respectively. The recording on the digital flight data recorder then ends. (See Flight Data Recorder Specialist's Factual Report of Investigation).

### WRECKAGE AND IMPACT INFORMATION

Examination of the aircraft after the accident showed the No. 2 engine had experienced an uncontained failure of the 8th stage HPC disk. The two forward pieces of the No. 2 engine cowling separated and were found on the runway. Damage to the vertical tail had occurred from ejected engine components. Pieces from the 8th stage HPC disk were located inside the vertical tail of the aircraft, about 500 feet to the right of the aircraft, and about 500 feet to the left of the aircraft. (Additional Wreckage and Impact information is contained in the Powerplants Group Chairman Factual Report)

#### MEDICAL AND PATHOLOGICAL INFORMATION

There were no reported injuries from the three flightcrew members, 3 flight attendants, and 75 passengers. The flightcrew members did not submit to toxicology testing after the accident.

## TESTS AND RESEARCH

Metallurgical examination of the 8th stage HPC hub fracture surfaces revealed the presence of a crack extending inboard from the rim radius, intersecting a shielding hole, and continuing partially into the bore. Elemental analysis of the fracture surface revealed a significant amount of cadmium in contact with the steel base material. The hub was nickel-cadmium (NiCd) plated during its last overhaul in March-April 1996, by Wings Aviation Services Inc. (Wings) in Miami. The NiCd plating operation requires applying a base layer of nickel followed by a top layer of cadmium and then baking to diffuse the two elements together. The nickel acts as a barrier coating between the cadmium and the base material (steel) to prevent the cadmium from contacting the steel base material, which may cause cadmium embrittlement.

The remaining Wings plated HPC disks from the accident engine were metallurgically examined and found to have inadequate Ni coating. The Federal Aviation Administration (FAA) issued an Airworthiness Directive (AD) to require the removal of JT8D and JT3D HPC disk that had been NiCd plated by Wings based on the number of hours in service that the disk had accumulated since being NiCd plated. (See Powerplants Group Chairman Factual Report and NTSB Materials Laboratory Factual Report).

ADDITIONAL INFORMATION

FACTUAL REPORT - AVIATION

National Transportation Safety Board	NTSB ID: MIA99FA005	
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<b>ÁVIATIQŇ</b>	Occurrence Type: Accident	
Narrative (Continued)	· · ·	
Continental Airlines, Inc., o flight data recorder, which Director Safety Investigations,	leased by NTSB to Guy Puglia, Senior Manager is on October 10, 1998. The No. 2 engine and access were retained by NTSB, were released by NTS , Continental Airlines, Inc., on December 16, 1 the NTSB investigation were:	sories, and the digital B to Eugene A. Carroll,
Avi Swartzon		Miami Florida
William F. Ba Florida		
Mike Careccia ••Houston, Texas	Independent Association of Conti	nental Pilots
John Martens Ohio	General Electric Engines Services	Cincinnati,
Additional NTSB personm	nel assigned to this investigation were:	

National Transportation Safety Board	NTS	BID: M	/IA99	FA005							
FACTUAL REPORT	Occ	urrence	Date:	10/07/1998							
AVIATION	Occ	urrence	Type:	Accident							
Landing Facility/Approach Information											
Airport Name		Airport	ID:	Airport Elevat	tion	Run	way Used	Runwa	ay Lengt	h Rur	way Width
MIAMI INTERNATIONAL		MIA		11 Ft.		9L	-	10502	-	20	0
Runway Surface Type: Asphalt		<u> </u>	1		I	·				I	
Runway Surface Condition: Wet											
Type Instrument Approach:											
VFR Approach/Landing:											
Aircraft Information											
Aircraft Manufacturer Boeing		Vodel/9 727-2						Serial   2066;	Number 3		
Airworthiness Certificate(s): Transport											
Landing Gear Type: Retractable - Tricycle											
				I Max Gross W	t.		169200	LBS	Numbe	r of Engine	s: 3
Engine Type: Turbo Fan		Engin P&W		nufacturer:			Model/Se JT8D-9A				ted Power: 500 LBS
- Aircraft Inspection Information											
Type of Last Inspection				Inspection	Tim	ne Sir	nce Last Inspe			Airframe T	
Continuous Airworthiness	998					312 Ho		3503 Hours			
- Emergency Locator Transmitter (ELT) Information											
	ELT Operated? ELT Aided in Locating Accident Site?										
Owner/Operator Information											
Registered Aircraft Owner		Str	ireet A	ddress 79 SOUT		I STI	REET				
FIRST SECURITY BANK NA TRUSTEE	Cit	City State Zip						Zip Code			
SALT LAKE CITY UT 84111							84111				
Operator of Aircraft 2929 ALLEN PARKWAY											
CONTINENTAL AIRLINES, INC.							Zip Code 77019				
Operator Does Business As:						Or	perator Design	nator Co	ode: CA	LA	•
- Type of U.S. Certificate(s) Held:											
Air Carrier Operating Certificate(s): Flag Carrie	ər/Domestic										
Operating Certificate:				Operator C	ertificate	»:					
Regulation Flight Conducted Under: Part 121:	Air Carrier										
Type of Flight Operation Conducted: Schedule	ed; Domestic	;; Passe	enger	Only							
	FACT	UAL R	REPOI	RT - AVIATI	ON						Page 2

Natio	TRANS, nal Transportation	Safety Board	1	NTSB ID:	MIA99FA	005							
	ACTUAL RI		-	Occurren	ce Date: 10	)/07/19	98		1				
	AVIATI	1 2			ce Type: A				-				
				Coouncil		colucin							
First Pilo	ot Information					City					State	Date of Birth	Age
						-	1				On File		
On File	T					On Fi	le				On File	On File	44
Sex: M	Seat Occupied:	Left	Pr	incipal Profes	sion: Civilia	an Pilot				Cert	ificate Nun	nber: On File	
Certificate	(s): Airlin	ne Transpor	t										
Airplane R	Rating(s): Multi	i-engine Lai	nd; Single-e	engine Land	1								
Rotorcraft/	/Glider/LTA: None	9	-	-									
Instrument	t Rating(s): Airpl	ane											
Instructor Rating(s): None													
Type Rating/Endorsement for Accident/Incident Aircraft? Yes Current Biennial Flight Review?													
Medical Cert.: Class 1     Medical Cert. Status: Valid Medicalno waivers/lim.     Date of Last Medical Exam: 05/1998													
- Flight Tir	me Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Mult-Engine	Ni	ght	Actual	Instrument Simu	ulated	Rotorcraft	Glider	Lighter Than Air
Total Time	e	14900	4500										
Pilot In Co	ommand(PIC)	7500	1800			_					_		
Instructor						_							
Last 90 Da		226	226										
Last 30 Da		53	53 1										
					I		Toxic		rformod2			Second Bilot? V	
Seatbelt Used? Yes   Shoulder Harness Used? Yes   Toxicology Performed? No   Second Pilot? Yes													
	an/Itinerary												
	ight Plan Filed: IF	R									1_		
Departure Point State Airport Identifier Departure Time Time Zor													
Same as	Accident/Incide	nt Location							MIA		0709	9	EDT
Destinatio	n						State		Airport Ide	ntifier			•
HOUSTO	NC						тх		IAH				
Type of C	learance: IFR												
Type of Ai	irspace: Class	D											
Weather	r Information												
Source of	Briefing: Compa	any											
Motheral	f Driefing:												
Method of	i bilelilig:												
				FACTUAI	LREPORT	- AVL		N					Page 3

PACCIVAL REPORT     Occurrence Date: 10/07/1998       Occurrence Type: Accident       Weether Internation       Weether Internation     MOF ID Observation Time     Imme Zone     WOF Elevation     Orcurence Type: Accident Site       MIA     O656     EDT     11 FL MSL     Condition of Light: Day       SkyLowest Cloud Condition: Scattere     O FL AGL     Visibility: 10     SM     Attimeter:     30.00     "H9       Temperature:     26 °C     Gusts:     Visibility: 10     SM     Attimeter:     30.00     "H9       Temperature:     26 °C     Gusts:     Weet=Conditions at Accident Site:     Usal Conditions     The     Site:     Site: <t< th=""><th>Nationa</th><th>al Transportation Safety</th><th>Board</th><th>NTSB ID:</th><th>MIA99</th><th>FA005</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>	Nationa	al Transportation Safety	Board	NTSB ID:	MIA99	FA005							
Occurrence Type: Accident       Work Elevation Time     Time Zone     WOF Elevation     WOF Distance From Accident Site     Direction From Accident Site       MIA     0656     EDT     11 FL MSL     Direction From Accident Site       MIA     0656     EDT     11 FL MSL     Ondition of Light: Day       Skylcowest Cloud Condition: Scatter to 1     OFL AGL     Visibility: 10     SM     Attrenter: 30.00     'Hg       Condition of Light: Day       Lowest Colud Condition: Scatter to: 40     Density Altitude: 1100     FL       Work Site: Yisual Conditions of Light: Day       Visibility (RVR): 0     SM     Intensity of Precipitation: Unknown       Type of Precipitation:     Nore     Intensity of Precipitation: Unknown       Classification: U.S. Registered/U.S. Soit       Intensity Matrix     Fait     Seriou     Intensity of Precipitation:       Seriou     Intensity of Precipita		O V V		Occurrent	ce Date:	10/07/1	998		]				
Weather     Information       WOF ID     Observation Time     Time Zone     WOF Elevation     WOF Distance From Accident Site     Direction From Accident Site       MIA     0656     EDT     11 Ft. MSL     INM     90 Deg. Mag.       Sky/Lowest Cloud Condition:     Scattered     1900 Ft. AGL     Condition of Light: Day       Lowest Cloud Condition:     Scattered     0 Ft. AGL     Visibility:     10     SM     Attimeter:     30.00     "Hg       Temperature:     26 °C     Dew Point:     24 °C     Wind Direction: 40     Density Allitude:     1100     Ft.       Wind Speed:     3     Gusts:     Weather Conditions at Accident Site:     Visual Conditions       Visibility (RVR):     0     Ft.     Visibility (RVV)     0     SM     Intensity of Precipitation:     Intensity       Type of Precipitation:     None     Atricraft Fire: Ground     Atricraft Site:     Site     Site													
WOF ID     Observation Time     Time Zone     WOF Elevation     WOF Distance From Accident Site     Direction From Accident Site       MIA     0656     EDT     11 Ft. MSL     1 NM     90 Deg. Mag.       SkylLowest Cloud Condition: Scattered     0 Ft. AGL     Condition of Light: Day     Image: State	Weather				71		-						
MIA   0656   EDT   11 FL MSL   INM   90 Deg. Mag.     SkyLowest Cloud Condition: Scatteret $11 \text{ FL}$ MSL   Condition - Light: Day     Lowest Ceiling: None $0 \text{ FL}$ Visibility: 10   SM   Attimeter:   30.00   "Hg     Temperature:   26 °C   Dew Point:   24 °C   Wind Direction: 40   Density Altitude:   1100   FL     Wind Speed:   3   Gusts:   Weattereton: 40   Density Altitude:   1100   FL     Wind Speed:   3   Gusts:   Weattereton: 40   Density Altitude:   1100   FL     Wind Speed:   3   Gusts:   Weattereton: 40   Density Altitude:   1100   FL     Yisibility (RVR):   0   FL   Visibility (RVV)   SM   Intensity of Precipitation: Unknown   Intensity of Precipitation: Unknown     Accident Information   Aircraft Fire: Groupd   Aircraft Fire: Toro   Aircraft Explores of Ground   Intensity of Precipitation: U.S. Registeret/U.S. Soil   Intensity of Precipitation: U.S. Registeret/U.S. Soil   Intensity of Precipitation: U.S. Registeret/U.S. Soil   Intensity of Precipitation: I.S. Registeret/U.S. Soil   Intensity of Precipitation: I.S. Registeret/U.S. Soil   Intensity of P			Time Zone	WOF Elevat	on	WOF Di	stance From	n Accio	dent Site		Direction From	m Accident Site	
SkyLowest Cloud Condition: Scattered     1900 Ft. AGL     Condition of Light: Day       Lowest Ceiling: None     0 Ft. AGL     Visibility:     10     SM     Attimeter:     30,00     "Hg       Temperature:     26 °C     Dew Point:     24 °C     Wind Direction: 40     Density Altitude:     1100     Ft.       Wind Speed:     3     Gusts:     Weather Conditions at Accident Site: Visual Conditions     Density Altitude:     1100     Ft.       Wind Speed:     0     Ft.     Visibility (RVV)     0     SM     Intensity of Precipitation: Unknown       Restrictions to Visibility:     None     Aircraft Fire: Ground     Aircraft Explosion Ground       Classification:     U.S. Registered/U.S. Soil     Minor     None     TOTAL       Fire Plot     1     1     1     Sudem Plot     1     1       Studem Plot     1     1     1     1     1     1     1       Sudem Plot     1     1     1     1     1     1     1     1     1     1     1     1													
Lowest Ceiling: None     0 Ft. AGL     Visibility:     10     SM     Attimeter:     30.00     "Hg       Temperature:     26 °C     Dew Point:     24 °C     Wind Direction: 40     Density Altitude:     1100     Ft.       Wind Speed: 3     Gusts:     Weather Conditions at Accident Site: Visual Conditions     1100     Ft.       Visibility (RVR):     0     Ft.     Visibility (RVV)     0     SM     Intensity of Precipitation: Unknown       Restrictions to Visibility: None      Aircraft Fire: Ground     Aircraft Explosion Ground     Aircraft Explosion Ground       Classification: U.S. Registered/U.S. Soil      1     1     1       - Injury Summary Matrix     Fatal     Serious     Minor     None     TOTAL       Flight Engineer        1     1     1       Clask Altendants        1     1     1       Flight Engineer        3     3     3     0       Passengers        1     1	MIA	0656	EDT	11 Ft	MSL				1 NM			90 Deg.	Mag.
Temperature:     26 °C     Dew Point:     24 °C     Wind Direction: 40     Density Altitude:     1100     Ft.       Wind Speed:     3     Gusts:     Weather Conditions at Accident Site: Visual Conditions     1100     Ft.       Visibility (RVR):     0     Ft.     Visibility (RVV)     0     SM     Intensity of Precipitation: Unknown       Restrictions to Visibility:     None      SM     Intensity of Precipitation: Unknown       Accident Information     Aircraft Fire: Ground     Aircraft Explosion Ground     Aircraft Explosion Ground       Classification:     U.S. Registered/U.S. Soil     -     1     1       - Injury Summary Matrix     Fatal     Serious     Minor     ToTAL       First Nick     -     -     1     1       Second Plot     -     -     -     -       Flight Engineer     -     -     1     1       Clash Attendents     -     -     -     -       Passengers     -     -     1     1       Passengers     -     -     -<	Sky/Lowes	t Cloud Condition: Scat	ttered				1900 Ft. AG	L	Condition of	of Ligł	nt: Day		
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    Smith Speed: 3   Unitary of Precipitation: Unknown     Type of Precipitation:   None    Aircraft Explosion Ground     Accident Information   Aircraft Fire: Ground   Aircraft Explosion Ground     Classification:   U.S. Registered/U.S. Soil   -   1   1     - Injury Summary Matrix   Fatal   Serious   Minor   TOTAL   First Pilot   1   1     Second Pilot      1 </td <td>Lowest Ce</td> <td>iling: None</td> <td></td> <td>0 Ft.</td> <td>AGL</td> <td>Visibi</td> <td>lity:</td> <td>10</td> <td>SM</td> <td>Alti</td> <td>meter:</td> <td>30.00</td> <td>"Hg</td>	Lowest Ce	iling: None		0 Ft.	AGL	Visibi	lity:	10	SM	Alti	meter:	30.00	"Hg
Visibility (RVR):   0   Ft.   Visibility (RVV)   0   SM   Intensity of Precipitation: Unknown     Restrictions to Visibility:   None   Intensity of Precipitation:   Unknown     Type of Precipitation:   None   Aircraft   Serious   Aircraft Explosion Ground     Accident Information   Aircraft Fire: Ground   Aircraft Explosion Ground   Aircraft Explosion Ground     Classification:   U.S. Registered/U.S. Soil   Intensity of Precipitation:   Aircraft Explosion Ground     Injury Summary Matrix   Fatal   Serious   Minor   None   TOTAL     First Plot   1   1   1   1   1     Second Plot   1   1   1   1     Flight Instructor   1   1   1   1     Check Pliot   1   1   1   1     Check Pliot   1   1   1   1     Check Pliot   1   1   1   1     Passengers   1   1   1   1     Passengers   1   1   1   1     Other Ground   0   0	Temperatu	ire: 26 °C	Dew Point:	24 °C	Wind	Direction:	40			De	nsity Altitude:	1100	Ft.
Restrictions to Visibility:   None     Type of Precipitation:   None     Accident Information   Aircraft Fire: Ground   Aircraft Explosion Ground     Aircraft Damage:   Substantial   Aircraft Fire: Ground   Aircraft Explosion Ground     Classification:   U.S. Registered/U.S. Soil   Aircraft Explosion Ground   Image: Substantial     - Injury Summary Matrix   Fatal   Serious   Minor   None   TOTAL     First Pilot   I   1   1   1   1   1     Student Pilot   I   I   1	Wind Spee	ed: 3	Gusts:		Weath	her Condt	ions at Accid	dent Si	ite: Visual C	Cond	itions		
Type of Precipitation:   None     Aicraft Damage:   Substantial   Aircraft Fire: Ground   Aircraft Explosion Ground     Classification:   U.S. Registered/U.S. Soil   Aircraft Explosion Ground   Aircraft Explosion Ground     - Injury Summary Matrix   Fatal   Serioux   None   TOTAL     - First Piloi   C   -   1   1     Second Pilot   C   -   1   1     Student Pilot   C   -   1   1     Flight Instructor   C   -   1   1     Flight Engineer   Incol   -   Incol   Incol     Check Pilot   Incol   Incol   Incol   Incol     Flight Engineer   Incol   Incol   Incol   Incol     Passengers   Incol   Incol   Incol   Incol     Passengers   Incol   Incol   Incol   Incol     Other Ground   Incol   Incol   Incol   Incol     Other Ground   Incol   Incol   Incol   Incol     Incol   Incol   Incol   Incol   I	Visibility (R	RVR): 0 Ft.	Visibility (F	RVV) 0	SM	Intensity	/ of Precipita	ation: I	Unknown				
Type of Precipitation:   None     Aicraft Damage:   Substantial   Aircraft Fire: Ground   Aircraft Explosion Ground     Classification:   U.S. Registered/U.S. Soil   Aircraft Explosion Ground   Aircraft Explosion Ground     - Injury Summary Matrix   Fatal   Serioux   None   TOTAL     - First Piloi   C   -   1   1     Second Pilot   C   -   1   1     Student Pilot   C   -   1   1     Flight Instructor   C   -   1   1     Flight Engineer   Incol   -   Incol   Incol     Check Pilot   Incol   Incol   Incol   Incol     Flight Engineer   Incol   Incol   Incol   Incol     Passengers   Incol   Incol   Incol   Incol     Passengers   Incol   Incol   Incol   Incol     Other Ground   Incol   Incol   Incol   Incol     Other Ground   Incol   Incol   Incol   Incol     Incol   Incol   Incol   Incol   I													
Aircraft Information     Aircraft Fire: Ground   Aircraft Explosion Ground     Classification: U.S. Registered/U.S. Soil     Injury Summary Matrix   Fatal   Serious   Minor   TOTAL     First Pliot   C   1   1     Second Pliot   C   C   C   C     Flight Instructor   C   C   C   C     Flight Engineer   C   C   1   1     Cabin Attendants   C   C   3   3     Other Crew   C   C   81   81     Other Ground   O   O   O   O   O													
Aircraft Information     Aircraft Fire: Ground   Aircraft Explosion Ground     Classification: U.S. Registered/U.S. Soil     Injury Summary Matrix   Fatal   Serious   Minor   TOTAL     First Pilot   C   1   1     Second Pilot   C   C   C   C     Flight Instructor   C   C   C   C   C     Flight Engineer   C   C   C   C   C   C     Passengers   C   C   C   C   C   C   C     Other Ground   O   O   O   O   O   C   C		acinitation: None											
Aircraft Damage: Substantial   Aircraft Fire: Ground   Aircraft Explosion Ground     Classification: U.S. Registered/U.S. Soil     None   TOTAL     - Injury Summary Matrix   Fatal   Serious   Minor   None   TOTAL     First Pilot     1   1     Second Pilot     1   1     Student Pilot          Flight Instructor          Flight Engineer     1   1     Cabin Attendants      3   3     Other Crew          Passengers     81   81     Other Ground   0   0   0   0   0	Type of the												
Aircraft Damage: Substantial   Aircraft Fire: Ground   Aircraft Explosion Ground     Classification: U.S. Registered/U.S. Soil   Serious   Minor   None   TOTAL     - Injury Summary Matrix   Fatal   Serious   Minor   None   TOTAL     First Pilot   C   1   1   1     Second Pilot   C   1   1     Student Pilot   C   0   0   0     Flight Instructor   C   C   C   C     Flight Engineer   C   C   1   1     Cabin Attendants   C   C   3   3     Other Crew   C   C   75   75     -TOTAL ABOARD-   C   81   81     Other Ground   0   0   0   0	Accident	Information											
Classification: U.S. Registered/U.S. Soil     - Injury Summary Matrix   Fatal   Serious   Minor   None   TOTAL     First Pilot   1   1   1   1     Second Pilot   1   1   1     Student Pilot   1   1   1     Flight Instructor   1   1   1     Check Pilot   1   1   1     Gabin Attendants   1   1   1     Other Crew   1   1   1     Passengers   1   1   1     Other Ground   0   0   0   0				Aircraft Fir	e: Grou	nd			Aircraft Exp	olosio	n <b>Ground</b>		
- Injury Summary MatrixFatalSeriousMinorNoneTOTALFirst Pilot1111Second Pilot111Student Pilot111Flight Instructor111Check Pilot111Tight Engineer111Cabin Attendants33Other Crew175TOTAL ABOARD -8181Other Ground000			J.S. Soil										
First PilotImage: state of the s				Serious Mino	or	None	TOTAL						
Second PilotImage: Constraint of the second point													
Flight InstructorImage: Check PilotImage: Check PilotImage: Check PilotCheck PilotImage: Check PilotImage: Check PilotImage: Check PilotFlight EngineerImage: Check PilotImage: Check PilotImage: Check PilotCabin AttendantsImage: Check PilotImage: Check PilotImage: Check PilotOther CrewImage: Check PilotImage: Check PilotImage: Check PilotPassengersImage: Check PilotImage: Check PilotImage: Check PilotOther GroundImage: Check PilotImage: Check PilotImage: Check PilotOther GroundImage: Check PilotImage: Check PilotImage: Check Pilot							· · ·						
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Flight EngineerImage: Constraint of the second	Flight li	nstructor											
Cabin AttendantsImage: Constraint of the second	Check	Pilot											
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- TOTAL ABOARD -     81     81       Other Ground     0     0     0	Other C	Crew											
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National Transportation Safety Board	NTSB ID: MIA99FA005	
FACTUAL REPORT	Occurrence Date: 10/07/1998	
AVIATION	Occurrence Type: Accident	
Administrative Information		•
Investigator-In-Charge (IIC)		
JEFFREY L. KENNEDY		
Additional Persons Participating in This Accident	/Incident Investigation:	
GARY CRANFORD FAA FSDO MIAMI, FL 33166		
EUGENE A CARROLL CONTINENTAL AIRLINES, INC. HOUSTON, TX 77002		
ROBERT J LARSON BOEING COMMERCIAL AIRPLANE MIAMI, FL 33126		
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