
Clogged fuel filter, Airbus A320, February 16, 1998

Micro-summary: This Airbus A320 diverted after the ECAM indicated there was a clogged #1 fuel filter.


Event Date: 1998-02-16 at 1240 CST

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

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

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 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: CHI98IA095		Aircraft Registration Number: N341NW	
		Occurrence Date: 02/16/1998		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place MEMPHIS		State TN	Zip Code 38101	Local Time 1240	Time Zone CST
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer Airbus Industrie		Model/Series A-320-212		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 February 16, 1998, at 1240 central standard time, an Airbus A-320-212, N341NW, operated by Northwest Airlines, had an Engine Condition and Monitoring System (ECAMS) No. 1 fuel filter clog warning message about 200 miles from Memphis, Tennessee. The flight crew decided to divert the aircraft to Memphis, Tennessee. While turning inbound on the first turn in holding at 10,000 feet msl to burn off fuel to get down to the maximum landing weight, the No. 1 CFM56-5A3 turbofan engine experienced an uncommanded in-flight shutdown. The attempt to restart the engine was unsuccessful. An uneventful single-engine landing was made. There were no injuries to the captain or first officer, the five flight attendants, or the 110 passengers. The 14 CFR Part 121, Flight 1821, had departed Detroit Metropolitan Airport, Detroit, Michigan, en route to Mexico City, Mexico. Visual meteorological conditions prevailed and the flight was on an instrument flight plan.</p> <p>The examination of the engine revealed a 4-inch long (circumferential) by 1-inch wide (axial) burn-through in the low pressure turbine case in the plane of the 2nd stage turbine stators at the 11 o'clock location. There was reported heat distress to the left engine pylon. The examination of the fuel pump filter revealed the presence of a bronze-colored material. The fuel nozzles were partially blocked by bronze-colored material in the nozzle jets.</p> <p>The engine was removed from the airplane and shipped to SNECMA, where it was disassembled under the direction of the Bureau Enquetes Accidents. The engine was equipped with an Argo-Tech fuel pump, part number (PN) 714900-2. The fuel pump was removed from the engine and returned to Argo-Tech Corporation, Cleveland, Ohio, for disassembly and examination.</p> <p>Northwest Airlines records show that the fuel pump, PN 714900-2, serial number (SN) 37001, had operated 17,208 hours time since new (TSN) and 6,972 cycles since new (CSN). The records show that the fuel pump had not been removed from the engine, SN 731-709, since the engine had been received by Northwest Airlines. The engine's records show that it had operated 17,208 hours TSN and 6,972 CSN.</p> <p>The disassembly and examination of the fuel pump revealed the pump housing had gear pocket milling. The fixed and pressurized bearings, which are made of bronze, were worn. The fuel pump's filter bypass valve was found to have bronze-colored particles on both sides of the valve.</p> <p>The drive and driven gears were both intact. The teeth of the driven gear were worn approximately 0.017 inches diametrically. The drive and driven gear were measured and compared to new parts as follows:</p>					
Feature		New part dimension		Actual dimension	
Drive gear OD		3.2474-3.2480 inches		3.248 inches	
FACTUAL REPORT - AVIATION					

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: CHI98IA095

Occurrence Date: 02/16/1998

Occurrence Type: Incident

Narrative (Continued)

Driven gear OD 3.2474-3.2480 3.231

The pump gear housing had gear pocket milling on the driven gear side. The housing was sectioned at the milled area and a measurement of the remaining wall thickness showed that it was 0.240-inches thick. The driven gear had wear that corresponded to wear on the quad-ring bolt bosses inside the housing. The remaining wall thickness at the quad-ring bolt boss was found to be 0.450 inches.

The fuel pump has four bearings: the fixed drive bearing, fixed driven bearing, pressurized drive bearing, and pressurized driven bearing, which are made of bronze. The fixed bearings did not move freely and were slightly recessed below the split line. All four bearings exhibited wear and material loss. The bearings from the pump were weighed for comparison to new bearings.

Part	New part weight	Actual weight
Fixed drive bearing	623.42 grams	623.7 grams
Fixed driven bearing	622.86	564.4
Pressurized drive bearing	602.13	570.2
Pressurized driven bearing	603.45	493.8

The fixed drive bearing had a dam wipe of 0.041 inches. The bearing face had minor scoring. The bearing bore was in good condition. The rear side of the bearing did not show any wear.


The fixed driven bearing had a severe dam wipe. The face of the bearing was worn. The bearing bore was worn 0.146 inches. The back side of the bearing was not worn.


The pressurized drive bearing had a severe dam wipe. The face of the bearing was worn. The bearing bore was scored.

The pressurized driven bearing had a severe dam wipe. The face of the bearing was worn. The bearing bore was worn 0.146 inches. The "O" ring and backup ring on the pressurized driven bearing were found to be cut and the "O" ring was also nibbled. (See NTSB Powerplants Group Chairman's Factual Report)

The fuel control, or hydro-mechanical unit (HMU), was inspected. The examination revealed no anomalies to the HMU that contributed to the main fuel pump failure. (See Woodward Governor Engineering Analytical Report)

Parties to the investigation included the Federal Aviation Administration, Northwest Airlines, GE Aircraft Engines, CFM International, Argo-Tech, SNECMA, and Woodward Governor Company.

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>		NTSB ID: CHI981A095			
		Occurrence Date: 02/16/1998			
		Occurrence Type: Incident			
Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation Ft. MSL	Runway Used 0	Runway Length	Runway Width
Runway Surface Type:					
Runway Surface Condition:					
Type Instrument Approach:					
VFR Approach/Landing: Precautionary Landing					
Aircraft Information					
Aircraft Manufacturer Airbus Industrie		Model/Series A-320-212		Serial Number 380	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 157	Certified Max Gross Wt.	162000 LBS	Number of Engines: 2	
Engine Type: Turbo Jet	Engine Manufacturer: GE	Model/Series: CFM56-5A3	Rated Power: 25000 LBS		
- Aircraft Inspection Information					
Type of Last Inspection Continuous Airworthiness	Date of Last Inspection	Time Since Last Inspection Hours	Airframe Total Time 17626 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? No	ELT Operated?	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner NORTHWEST AIRLINES		Street Address 5101 NORTHWEST DR.			
		City ST. PAUL	State MN	Zip Code 55111	
Operator of Aircraft Same as Reg'd Aircraft Owner		Street Address Same as Reg'd Aircraft Owner			
		City	State	Zip Code	
Operator Does Business As:			Operator Designator Code: NWAA		
- 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: Non-scheduled; Domestic; Passenger Only					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: CHI98IA095
	Occurrence Date: 02/16/1998
	Occurrence Type: Incident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 42
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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

Airplane Rating(s): Multi-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?
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Medical Cert.: Class 1	Medical Cert. Status: Unknown	Date of Last Medical Exam: 12/1997
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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	5649	195								
Pilot In Command(PIC)										
Instructor										
Last 90 Days										
Last 30 Days										
Last 24 Hours										

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 DETROIT	State MI	Airport Identifier DTW	Departure Time 0916	Time Zone EST
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Destination MEXICO CITY	State	Airport Identifier MEX	
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Type of Clearance: IFR

Type of Airspace: Class E

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
	0000		0 Ft. MSL	0 NM	0 Deg. Mag.
Sky/Lowest Cloud Condition: Clear			0 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: None		0 Ft. AGL	Visibility: 10 SM	Altimeter: 29.00 "Hg	
Temperature: -6 °C	Dew Point: °C	Wind Direction:		Density Altitude: 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: Minor	Aircraft Fire: None	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				5	5
Other Crew					
Passengers				110	110
- TOTAL ABOARD -				117	117
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	117	117

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National Transportation Safety Board

FACTUAL REPORT

AVIATION



NTSB ID: CHI98IA095

Occurrence Date: 02/16/1998

Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)

JIM SILLIMAN

Additional Persons Participating in This Accident/Incident Investigation:

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