



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

Location:	GREAT BEND, Kansas	Accident Number:	CHI96FA171
Date & Time:	May 20, 1996, 16:30 Local	Registration:	N701CJ
Aircraft:	Cessna 401	Aircraft Damage:	Substantial
Defining Event:		Injuries:	1 None
Flight Conducted Under:	Part 91: General aviation		

Analysis

The pilot reported that during the third flight of the day, he noticed a 5 to 6 inch drop in manifold pressure on the left engine. He noticed a brownish substance oozing out of the access panels and along the forward rivet line of the left wing. He secured the left engine. Prior to making an emergency landing at Great Bend, Kansas, 12 miles away, he noticed the right tank fuel gauge was indicating a rapid loss of fuel. Examination of the aircraft revealed that the left engine's inboard exhaust header had broken completely where it was covered by a heat shield and behind a canted bulkhead. Exhaust gases caused extensive heat damage to the engine support structure and firewall, and ruptured the right fuel tank crossfeed fuel line behind the left engine firewall. A 100-hour maintenance inspection had been conducted just 17 flight-hours prior to the accident. AD 75-23-08 R5 had been complied with. The AD requires a visual inspection of the exhaust system, but not a detailed inspection requiring disassembly of the system. As designed, it was not possible to visually inspect the exhaust system without disassembly.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the failure of the exhaust header. Additional factors include the visual restrictions which prevented a detailed examination of the exhaust system, and the inadequate inspection procedures required in AD 75-23-08 R5.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION

Phase of Operation: CRUISE

Findings

1. (C) EXHAUST SYSTEM,MANIFOLD/PIPE - FAILURE
2. (F) ACFT/EQUIP INADEQUATE,VISUAL RESTRICTION - MANUFACTURER
3. (F) PROCEDURE INADEQUATE - FAA(OTHER/ORGANIZATION)
4. NACELLE/PYLON,MAIN FRAME - BURNED
5. NACELLE/PYLON,SKIN - BURNED
6. FUSELAGE,FIREWALL - BURNED
7. FUEL SYSTEM,LINE - BURST

Factual Information

History of Flight

On May 20, 1996, at 1630 central daylight time, a Cessna 401, N701CJ, operated by Mac Air, Inc., sustained substantial damage as a result of excessive heat damage in the left nacelle. The 14 CFR 91 flight had departed Garden City, Kansas, en route to McPherson, Kansas, when the pilot observed smoke coming from the wing near the left nacelle. The commercial pilot shut down the engine and made an emergency landing at Great Bend, Kansas. The pilot was not injured. Visual meteorological conditions prevailed and an instrument flight plan was filed.

The pilot reported that he had flown a total of three flight legs in the Cessna 401 on May 21, 1996. The first leg of the flight departed Wichita, Kansas, at 0915 and landed at Stanton, Kansas, about 1.5 hours later. While on the ground at Stanton, the pilot noticed a strange burning smell coming in the airplane's window, but he reported that he could not determine if the smell emanated from the airplane or the surrounding area.

Three hours later the pilot departed Stanton and landed at Garden City, Kansas. The flight took only 30 minutes and was uneventful.

The pilot reported that he made a quick stop over at Garden City prior to departing for Hutchinson, Kansas. He reported that the engines were still hot when he started them. He reported that the engines were hard to start, but that they did not backfire during start. He climbed to 7,500 feet and was proceeding VFR when about 10 minutes after leveling off, he noticed the manifold pressure drop about 5 or 6 inches. He reported that he decided to look for a nearby airport to land in case of an emergency. He descended to 3,500 feet and canceled his flight following with Kansas City Center.

The pilot reported that he noticed a brownish substance oozing out of the access panels and along the forward rivet line along the front of the left wing. He decided to secure the left engine, but before he could do so, the left main and auxiliary fuel tank gauges went to zero and the stall warning horn sounded. He secured the engine by pulling the mixture back on the left engine, feathering the prop, and turning the fuel selector to off. He reported that the fuel selector was stiff and it took some pressure to rotate the selector knob. He pulled the stall warning horn circuit breaker to silence the horn and he noticed that the left auxiliary fuel pump circuit breaker was popped. He reported that after he had secured the engine he did not see any signs of fire so he decided fly to Great Bend, Kansas, which was 12 miles from his position. While en route to Great Bend, he noticed that the fuel gauge for the right tank was decreasing and indicating a rapid loss of fuel.

The pilot landed at Great Bend with only the right engine operating. While taxiing he did not

see any smoke or fire so he continued to taxi toward the ramp. When he opened the left window he smelled fuel so he secured the aircraft and departed the airplane. He reported that fuel was leaking from the left nacelle. After getting help, the pilot and maintenance personnel drained the left fuel tank using buckets in order to stop the leaking.

Damage to Aircraft

An examination of the aircraft revealed that the left engine's inboard exhaust header had broken completely where it was covered by a heat shield and behind the canted bulkhead. Exhaust gases caused extensive heat damage to the engine support structure and firewall, and ruptured a crossfeed fuel line behind the firewall. (See attached photos)

The cracked crossfeed fuel line was the line which came from the right fuel tank and crossed over to the left engine fuel selector. The crack was about 2 inches long and on the underside of the fuel line. The cracked fuel line was located behind the left engine fire wall. The aircraft was not equipped with an emergency crossfeed fuel shutoff, so the pilot had no means of shutting off the fuel flow from the right tank. It was determined that the fuel had stopped leaking from the left engine nacelle, not because the pilot and the maintenance personnel drained the fuel from the left wing tank, but because the right fuel tank was low on fuel.

Personnel Information

The pilot was a commercial pilot with a single engine land and multiengine land ratings. He had a total of 3,195 flight hours with 834 hours of pilot in command time in the make and model of aircraft.

Aircraft Information

In 1975, because of a series of stainless steel exhaust system problems in certain Cessna series aircraft, the Federal Aviation Administration (FAA) issued Airworthiness Directive (AD) 75-23-08, which set forth the inspections and parts replacements required to improve the reliability of the exhaust systems of Cessna twin-engine, turbocharged airplanes, which included the Cessna 401. On November 4, 1986, the FAA issued revision 5 (R5) of the AD, to identify new replacement parts available for installation. The revision also identified the exhaust system components and defined a schedule to accomplish a visual inspection of the parts. Some of the parts specified in the AD required a 50 or 100 hour re-inspection interval; some of the listed parts, including Inconel exhaust components, did not require recurrent inspections.

The AD requires a visual inspection of the exhaust system. The AD does not require a detailed inspection which would require the disassembly of the exhaust system to access those areas obscured by clamps, heat shields, slip joints, or bulkheads.

Maintenance records indicate that the AD had been complied with at the last 100 hour

maintenance inspection. The last 100 hour inspection occurred on May 3, 1996, just 17 days prior to the accident. The aircraft had just 17.2 hours since the inspection.

The location of the break in the exhaust header, shrouded by a heat shield and behind a canted bulkhead, prevented the crack from being discovered during a visual inspection. In order to detect the crack in the exhaust header, the exhaust system needed to be disassembled.

The National Transportation Safety Board (NTSB) issued the Safety Recommendation A-96-36 on July 1, 1996. The NTSB recommended that the AD 75-23-08 R5 be amended to require all Cessna twin-engine, turbocharged engine exhaust system components made from stainless steel receive repetitive visual inspections of the disassembled exhaust system. (See attached Safety Recommendation)

Additional Information

The aircraft was released to Mac Air Corp., on June 3, 1996. The aircraft logbooks were released to Mr. Verle Engel, FAA FSDO, Wichita, Kansas, on June 4, 1996. The crossfeed fuel line, wye valve, left inboard exhaust manifold, and exhaust stack were released to Mac Air Corp. on December 23, 1996.

Cessna Aircraft Company was a party to the investigation.

Pilot Information

Certificate:	Commercial	Age:	30,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	Last FAA Medical Exam:	September 5, 1995
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	3195 hours (Total, all aircraft), 834 hours (Total, this make and model), 2565 hours (Pilot In Command, all aircraft), 134 hours (Last 90 days, all aircraft), 96 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N701CJ
Model/Series:	401 401	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	401A-0022
Landing Gear Type:	Retractable - Tricycle	Seats:	7
Date/Type of Last Inspection:	May 3, 1996 Annual	Certified Max Gross Wt.:	6300 lbs
Time Since Last Inspection:	17 Hrs	Engines:	2 Reciprocating
Airframe Total Time:	5449 Hrs	Engine Manufacturer:	Continental
ELT:	Installed, not activated	Engine Model/Series:	TSIO-520-E
Registered Owner:	MAC AIR	Rated Power:	300 Horsepower
Operator:		Operating Certificate(s) Held:	On-demand air taxi (135)
Operator Does Business As:		Operator Designator Code:	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:		Distance from Accident Site:	
Observation Time:		Direction from Accident Site:	
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	18 knots / 26 knots	Turbulence Type Forecast/Actual:	/
Wind Direction:	110°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:		Temperature/Dew Point:	-1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	GARDEN CITY (GCK)	Type of Flight Plan Filed:	VFR
Destination:	MCPHERSON (MPR)	Type of Clearance:	VFR
Departure Time:	14:30 Local	Type of Airspace:	Class E

Airport Information

Airport:		Runway Surface Type:	
Airport Elevation:		Runway Surface Condition:	
Runway Used:	0	IFR Approach:	
Runway Length/Width:		VFR Approach/Landing:	

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 None	Latitude, Longitude:	38.360214,-98.799354(est)

Administrative Information

Investigator In Charge (IIC):	Silliman, James
Additional Participating Persons:	MARK GRAVES; WICHITA , KS ANDREW HALL; WICHITA , KS

Original Publish Date:	May 2, 1997
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Last Revision Date:	
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Investigation Class:	Class
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Note:

Investigation Docket:	https://data.nts.gov/Docket?ProjectID=10086
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The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).