



National Transportation Safety Board

Washington, D.C. 20594
Safety Recommendation

Log 2000

Date: March 15, 1988

In reply refer to: A-88-39 and -40

Honorable T. Allan McArtor
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On June 20, 1987, both persons aboard a 1963 Beech Musketeer model 23, N2387J, were killed when the airplane sustained an engine stoppage and crashed at Miramar, Florida, just after takeoff from the North Perry Airport, Hollywood, Florida. The National Transportation Safety Board's investigation of the accident disclosed the presence of water in both the left and right fuel tanks. The fuel cap seals had deteriorated, and both the left and right fuel cap/adapter assemblies were found to leak appreciably when water was applied over the recessed fuel filler compartments on the upper surface of the wings. Corrosion was evidenced in the wing sump and fuel filter drains, a condition which made the latter drain somewhat difficult to operate. ^{1/}

Since 1980, Beech 19-, 23-, and 24-series airplanes have been involved in five other accidents and two incidents involving engine stoppage caused by water in the fuel and resulting in two fatalities and five serious injuries (see table, page 3). During the same period, these airplanes were involved in 21 accidents in which engine stoppage occurred for undetermined reasons. These 21 accidents, most of which occurred during the takeoff-initial climb flight phase, resulted in seven fatalities and eight serious injuries. The Safety Board believes that some of these accidents also may have involved water in the fuel. (Evidence of water in the fuel is often elusive, as in accidents involving ditching, fire after impact, or destruction of the aircraft.)

Many accidents involving water in the fuel occur after wash water and/or precipitation leaks into the airplane fuel tanks as a result of an inadequately sealed fuel filler compartment. Periodic testing and maintenance of fuel filler cap/adapter assemblies therefore is essential to check sealing integrity. This expedient is particularly true in airplanes with recessed fuel filler compartments, as in Beech 19-, 23-, and 24-series airplanes because significant quantities of precipitation or wash water may accumulate in or around the fuel filler compartment.

As evidenced in the accident involving N2387J, the fuel cap seals often are found to have deteriorated. Such deterioration probably occurs over a relatively long period, and a scenario of gradual deterioration of the seals (or of the adapter assemblies) in this and other similar Beech models is consistent with their collective dates of manufacture. For example, all six accidents caused by water in the fuel involved airplanes manufactured before 1977; three were 1963 Beech Musketeer model 23 airplanes; the others were 1966, 1975, and 1976 model airplanes. Sixteen of the 21 accidents which occurred for undetermined reasons also involved airplanes manufactured before 1977. The two incidents caused by water in the fuel involved 1977 and 1978 model airplanes.

^{1/} For more detailed information, read Field Accident Brief No. 642 (attached).

Visual inspection for evidence of leakage/seal deterioration of the fuel filler compartments (including adapter assemblies) in these older airplanes is often inadequate. To obtain a higher degree of reliability regarding fuel compartment sealing integrity, routine visual inspections of these fuel cap/adapter assemblies should be supplemented with periodic, positive (pressure) leak checks. Therefore, in view of the accidents involving older Beech 19-, 23-, and 24-series airplanes that were precipitated because of engine stoppage caused by water in the fuel and for undetermined reasons, the Safety Board believes that the Federal Aviation Administration (FAA) should mandate periodic, positive leak checks of the fuel cap/adapter assemblies installed in these airplanes. The wing sump and fuel filter drains also should be checked to verify that they open and close easily and drain properly.

The fuel cap/adapter assemblies installed on Beech 19-, 23-, and 24-series airplanes are identical except for those installed on the 1963 Beech Musketeer model 23 airplanes (serial Nos. M-1 through M-554). The fuel cap/adapter assemblies on these airplanes were the subject of Beechcraft Service Instructions No. 0801-287, Revision 1, issued in November 1979. The service instructions, according to Beech, were issued to provide a fuel cap and adapter with improved sealing capability. Beech considered compliance with these (class I) service instructions to be a mandatory modification that should be accomplished as soon as possible but no later than the next 25 service hours. The service instructions indicate that, after the modification has been installed, the fuel tanks should be pressurized to 1 psi and a check made for leaks, using a soap-and-water solution around the fuel cap adapter and fuel cap. This modification had not been incorporated on N2387J. As a result, the Safety Board believes that the FAA should issue an airworthiness directive requiring compliance with these service instructions.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue an airworthiness directive applicable to Beech 19-, 23-, and 24-series airplanes that were manufactured 10 or more years ago requiring at the next annual or 100-hour inspection, whichever occurs first and annually thereafter, that the fuel cap/adapter assemblies on these airplanes be inspected and pressure-tested for leakage. The wing sump and fuel filter drains also should be checked to ensure that they open and close easily and drain properly. (Class II, Priority Action) (A-88-39)

Issue an airworthiness directive applicable to 1963 Beech Musketeer model 23 airplanes (serial Nos. M-1 through M-554) requiring at the next annual or 100-hour inspection, whichever occurs first, compliance with Beechcraft Service Instructions No. 0801-287, Revision 1, concerning fuel cap/adapter assemblies having improved sealing capabilities. (Class II, Priority Action) (A-88-40)

BURNETT, Chairman, and LAUBER, NALL, and KOLSTAD, Members, concurred in these recommendations

By: 
Jim Burnett
Chairman

BEECH 19-, 23-, AND 24-SERIES AIRPLANE
ACCIDENTS AND INCIDENTS INVOLVING ENGINE STOPPAGE
CAUSED BY WATER IN THE FUEL
1980 THROUGH 1987

<u>Date</u>	<u>Location</u>	<u>Model</u>	<u>Registration</u>	<u>Classification</u>
8/5/80	Greeley, CO	A23-24	N5677S	Accident*
8/15/80	Pontiac, MI	C-23	N1947L	Accident*
9/6/81	Woodland, CA	B-19	N819BA	Incident**
1/5/83	Peachtree City, GA	C-23	N9234S	Accident*
2/12/83	Naples, FL	23	N2302L	Accident*
5/19/84	West Chicago, IL	C-24-R	N24023	Incident**
3/1/87	Augusta, GA	23	N2355Z	Accident*
6/20/87	Miramar, FL	23	N2387J	Accident*

*Documented in NTSB Accident/Incident Files

**Documented in FAA Accident/Incident Files

Brief of Accident

File No. - 642 6/20/87 MIRAMAR, FL A/C Reg. No. N2387J Time (Lcl) - 1528 EDT

-----Basic Information-----
 Type Operating Certificate-NONE (GENERAL AVIATION) Aircraft Damage
 Type of Operation -PERSONAL DESTROYED
 Flight Conducted Under -14 CFR 91 Fire
 Accident Occurred During -DESCENT NONE

-----Aircraft Information-----
 Make/Model - BEECH 23 End Make/Model - LYCOMING O-320-D2B ELY Installed/Activated - YES/NO
 Landing Gear - TRICYCLE-FIXED Number Engines - 1 Stall Warning System - YES
 Max Gross Wt - 2300 Engine Type - RECIPROCATING-CARBURETOR
 No. of Seats - 4 Rated Power - 160 HP

-----Environment/Operations Information-----
 Weather Data Itinerary Airport Proximity
 Wx Briefings - NO RECORD OF BRIEFING Last Departure Point OFF AIRPORT/STRIP
 Method - N/A HOLLYWOOD, FL
 Completeness - N/A Destination SAVANNAH, GA
 Basic Weather - UMC ATC/Airspace
 Wind Dir/Speed- 120/012 KTS Type of Flight Plan - NONE
 Visibility - 10.0 SM Type of Clearance - NONE
 Lowest Sky/Clouds - 2000 FT SCATTERED Type Apch/Lnds - FORCED LANDING
 Lowest Ceilings - 25000 FT BROKEN
 Obstructions to Vision- NONE
 Precipitation - NONE
 Condition of Light - DAYLIGHT

-----Personnel Information-----
 Pilot-In-Command Age - 66 Medical Certificate - VALID MEDICAL-NO WAIVERS/LIMIT
 Certificate(s)/Ratings(s) Biennial Flight Review Flight Time (Hours)
 PRIVATE Current - YES Total - 416 Last 24 Hrs - 4
 SE LAND Months Since - 7 Make/Model- UNK/NR Last 30 Days- UNK/NR
 Aircraft Type - UNK/NR Instrument- UNK/NR Last 90 Days- 7
 Multi-Eng - UNK/NR Rotorcraft - UNK/NR

-----Narrative-----
 Instrument Ratings(s) - NONE
 AFTER THE PLT LNDD, THE ACFT WAS SERVICED WITH 58.9 GAL OF FUEL. ITS FUEL CAPACITY WAS 60 GAL. SUBSEQUENTLY, WHEN THE PLT TOOK OFF, THE ACFT REMAINED ON THE RWY FOR ABOUT 2500' OF THE AVAILABLE 3000'. AFTER LIFT-OFF, THE ACFT ENTERED A RGT TURN & REACHED A RPRTD ALT OF ONLY ABOUT 100'. ONE WITNESS SAID THE ENG WAS NOT RUNNING AT FULL PWR & THAT DARK GRAY SMOKE WAS COMING FROM ITS EXHAUST. HE ALSO STATED THAT THE ACFT STALLED AS THE PLT WAS APPARENTLY ATTEMPTING TO TURN BACK. THE ACFT CRASHED ON THE ROOF OF AN UNOCCUPIED CHURCH SCHOOL. AN EXAM OF THE ACFT REVEALED BOTH FUEL TANKS WERE CONTAMINATED WITH WATER & SAND. WATER & SAND WERE ALSO FND IN THE FUEL FILTER & CARRURETOR FINGER STRAINER. BOTH FUEL CAPS WERE TESTED & FND TO LEAK WHEN WATER WAS APPLIED TO THE UPPER WING SURFACE. THE MANUFACTURER (BEECH) HAD ISSUED A CLASS I SVC BULLETIN (SB) FOR INSTALLATION OF IMPROVED FUEL TANK CAPS; HOWEVER, IMPROVED FUEL CAPS HAD NOT BEEN INSTALLED. ALSO, CORROSION WAS EVIDENT IN THE WING SUMP & FUEL FILTER DRAINS, MAKING THE LATTER DIFFICULT TO OPERATE.

Brief of Accident (Continued)

File No. - 642 6/20/87 MIRAMAR, FL A/C Reg. No. N2387J Time (LCL) - 1528 EDT

Occurrence #1 LOSS OF POWER(PARTIAL) - NON-MECHANICAL
Phase of Operation TAKEOFF - INITIAL CLIMB

Findings(s)

1. MAINTENANCE, INSPECTION OF AIRCRAFT - INADEQUATE - OTHER MAINTENANCE PSNL
2. FUEL SYSTEM, DRAIN - CORRODED
3. FUEL SYSTEM, CAP - DETERIORATED
4. MAINTENANCE, SERVICE BULLETINS - NOT PERFORMED -
5. FLUID, FUEL - CONTAMINATION
6. FLUID, FUEL - WATER
7. AIRCRAFT PREFLIGHT - INADEQUATE - PILOT IN COMMAND

Occurrence #2 FORCED LANDING
Phase of Operation MANEUVERING - TURN TO LANDING AREA (EMERGENCY)

Occurrence #3 LOSS OF CONTROL - IN FLIGHT
Phase of Operation MANEUVERING - TURN TO LANDING AREA (EMERGENCY)

Findings(s)

8. MANEUVER - INITIATED -
9. AIRSPEED - INADEQUATE - PILOT IN COMMAND
10. STALL - INADVERTENT - PILOT IN COMMAND

Occurrence #4 IN FLIGHT COLLISION WITH OBJECT
Phase of Operation DESCENT - UNCONTROLLED

Findings(s)

11. OBJECT - BUILDING(NONRESIDENTIAL)

-----Probable Cause-----

The National Transportation Safety Board determines that the Probable Cause(s) of this accident is/are finding(s) 5,6,7,9,10

Factor(s) relating to this accident is/are finding(s) 1,2,3,4