

Log 1685

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: January 25, 1985

Forwarded to:

Honorable Donald D. Engen
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-85-8 through -10

On September 24, 1983, a Mooney Model M20F, C-GOEL, experienced a complete loss of power because of water in the fuel and crashed immediately after takeoff from Burlington International Airport, Burlington, Vermont. One of the four persons aboard was killed and three others were seriously injured. The airplane had been flown to Burlington earlier in the day from Syracuse, New York, where it had last been refueled. According to the pilot, there was no evidence of water in the fuel during his preflight inspection at Syracuse and no additional fuel was added at Burlington. (See attached brief of accident.)

The National Transportation Safety Board's investigation of the accident disclosed that the O-rings on the flush-mounted fuel filler cap assembly were cracked and deteriorated so as to allow rain or water used in washing the airplane to leak into the outboard bay of the three-bay, internally sealed, integral wing fuel tanks. The airplane had been parked at Syracuse for about five days preceding the accident during which time 2 inches of rain had fallen.

The investigation disclosed also that each fuel tank has a sump drain located in the inboard fuel bay. If water enters the outboard or middle fuel bays, some of it flows to these drains through small holes at the bottom of the tank in the wing fuel bay ribs. These rib holes are placed 2 to 3 inches apart between the wing's forward and main spars, and the first of the holes in the rib separating the middle and inboard fuel bays is located about one-half inch forward of the main spar. However, the first of similar holes in the rib separating the middle and outboard fuel bays is located about 3 inches forward of the main spar. Because of the orientation of the fuel tank in normal airplane attitudes, the lack of a hole in this aft area of the outboard fuel bay provides an interior region in which at least several ounces of water may be entrapped, and therefore, cannot be drained. It is believed that water was so entrapped in the accident airplane. As a result, the Safety Board believes that additional holes or other remedial measures are needed in this area to assure that water and/or other contaminants can flow inboard to the fuel tank sump drains while the airplane is parked.

From 1978 through 1983, other Mooney airplanes with fuel tanks similar to those of C-GOEL were involved in 11 accidents and 9 incidents in which water in the fuel was determined to be a causal factor. The Safety Board believes that deteriorated fuel filler cap seals and/or adapter assemblies which allow water to leak into the tanks may also have been involved in several of these occurrences. Comments contained in the investigative dockets of these cases include: "left wing fuel tank contained over a quart of water;" "owner reported that rain water leaked into the left tank while the airplane was parked;" "fuel cap seals, P/N 530001-000, hard and all pliability lost"; "engine lost power after liftoff, found water in fuel, pilot had drained sumps, water found in fuel previous day"; and "fuel cap O-rings worn, did not seal, large quantity of water found in right tank."

There is no detailed information in Mooney Aircraft service or maintenance manuals regarding inspection of fuel filler caps and adapter assemblies for proper sealing, nor has Mooney issued any service bulletins regarding this subject. However, the aforementioned accidents and incidents involving water in the fuel and the potential hazards relating to faulty fuel tank filler cap seals clearly illustrate the need for the Mooney Aircraft Corporation to prepare and disseminate such material to Mooney airplane owners and operators. Moreover, because other Mooney airplanes may have deteriorated fuel filler caps and/or adapter assemblies as was the case with C-GOEL, the Safety Board believes that the Federal Aviation Administration should issue an Airworthiness Directive requiring an inspection of these assemblies.

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

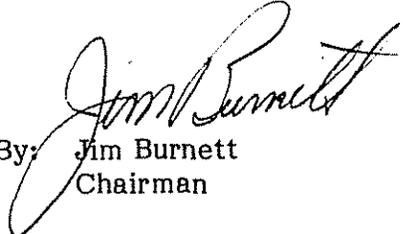
Require Mooney Aircraft (1) to incorporate an appropriate design change in all current production airplanes to eliminate the possibility of water becoming entrapped in the outboard bay area of the fuel tanks, and (2) to distribute instructions for field modification of existing Mooney Models M20B, M20C, M20D, M20E, M20F, M20G, M20J (201) and M20K (231) to incorporate the design change or an equivalent remedial measure. (Class II, Priority Action) (A-85-8)

Require Mooney Aircraft to develop a service bulletin applicable to Mooney Models M20B, M20C, M20D, M20E, M20F, M20G, M20J (201) and M20K (231) regarding the inspection and maintenance of fuel filler cap assemblies, fuel adapter assemblies, and related leak testing procedures to assure the proper sealing of fuel tanks and to incorporate similar information in the corresponding Mooney service and maintenance manuals. (Class II, Priority Action) (A-85-9)

Issue an Airworthiness Directive applicable to Mooney Model M20B, M20C, M20D, M20E, M20F, M20G, M20J, (201) and M20K (231) airplanes to require an inspection of fuel tank filler cap and adapter assemblies

and/or leak tests to assure proper sealing and the incorporation of an appropriate modification of the fuel tank outboard bays to eliminate the potential for water entrapment. (Class II, Priority Action) (A-85-10)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, Member, concurred in these recommendations.

By:  Jim Burnett
Chairman

NTSB # NYC83FA256

Brief of Accident/Incident

RUNDATE: 12 19 84

File No. - 6012 9/24/83 BURLINGTON,VT

A/C Reg. No. CGOEL

Time (Lcl) - 1317 EDT

Basic Information
Type Operating Certificate-NONE (GENERAL AVIATION)

Type of Operation -PERSONAL
Flight Conducted Under -14 CFR 91
Acc/Inc Occurred During -DESCENT

Aircraft Damage
DESTROYED
Fire NONE
Crew Pass

Fatal Serious Minor None
0 1 0 0
1 2 0 0

Aircraft Information
Make/Model - MOONEY M20F
Landing Gear - TRICYCLE-RETRACTABLE
Max Gross Wt - 2740
No. of Seats - 4

Eng Make/Model - LYCOMING IO-360-A1A
Number Engines - 1
Engine Type - RECIP-FUEL INJECTED
Rated power - 200 HP

ELI Installed/Activated - YES/NO
Stall Warning System - YES

Environment/Operations Information

Weather Data
Wx Briefing - NO RECORD OF BRIEFING
Method - N/A
Completeness - N/A
Basic weather - VMC
Wind Dir/Speed- 340/005 KTS
Visibility - 25.0 SM
Lowest Sky/Clouds - UNK/NR
Lowest Ceiling - NONE
Obstructions to Vision- NONE
Precipitation - NONE
Condition of Light - DAYLIGHT

Itinerary
Last Departure Point
SAME AS ACC/INC
Destination
SYRACUSE,NY

Airport Proximity
ON AIRPORT
Airport Data
BURLINGTON INTERNATIONAL
Runway Ident - 19
Runway Lth/Wid - 3600/ 150
Runway Surface - ASPHALT
Runway Status - DRY

Personnel Information

Pilot-Tr-Command Age - 27
Certificate(s)/Rating(s) Bimennial Flight Review
COMMERCIAL Current - YES
SE LAND Months Since - 8
Aircraft Type - C-152
Medical Certificate - VALID MEDICAL-NO WAIVERS/LIMIT
Flight Time (Hours) 542
Total Make/Model- 4
Instrument- 122
Last 24 Hrs - 2
Last 30 Days- UNK/NR
Last 90 Days- 13

Instrument Rating(s) - AIRPLANE

Narrative

ACFT HAD BEEN PARKED ON RAMP AT SYRACUSE FOR APRX 5 DAYS WITH PARTIALLY FULL TANKS & EXPOSED TO RAINY WX. ACCORDING TO THE FLT, THERE WAS NO EVIDENCE OF WATER DURING PREFLIGHT. FLT TAXIED TO ANOTHER AREA WHERE 40 GALS OF FUEL WAS ADDED. FLT FROM SYRACUSE TO BURLINGTON WAS UNEVENTFUL. NO SERVICES WERE OBTAINED AT BURLINGTON BUT 1 QT OF OIL WAS ADDED. AFTER A GROUND TIME OF ABOUT 2 HRS, A TAKEOFF WAS INITIATED FOR THE RETURN FLT TO SYRACUSE. WITNESSES REPORTED THE ENG LOST POWER AT ABOUT 100 FT AGL. ACFT THEN ENTERED A SMALL/SPIN, CRASHED & COLLIDED WITH A HELICOPTER. WATER WAS FOUND IN ENG DRIVEN FUEL PUMP, LINE FROM PUMP TO FUEL SERVO, FUEL SERVO, LINE TO MANIFOLD VALVE & INJECTOR NOZZLES. FUEL SELECTOR WAS AT LEFT TANK POSITION. LEFT TANK WAS DAMAGED & EXPOSED TO FIRE FIGHTING AGENT SO PRESENCE OF WATER COULD NOT BE MEASURED. LEFT FUEL CAP WAS DETERIORATED & THERE WAS EVIDENCE IT HAD ALLOWED WATER TO LEAK INTO THE TANK. FUEL TANK HAD THREE BAYS. WATER COULD BECOME TRAPPED AT REAR INBOARD CORNER OF OUTER TANK BAY.

Brief of Accident/Incident (Continued)

File No. - 6012 9/24/83 BURLINGTON, VT A/C Reg. No. CGOEL Time (LCL) - 1317 EDT

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

Finding(s)

1. FUEL SYSTEM,CAP - DETERIORATED
2. MAINTENANCE - INADEQUATE - OTHER MAINTENANCE PSNL
3. PROCEDURE INADEQUATE,CONDITION(S)/STEP(S) INSUFFICIENTLY DEFINED -- MANUFACTURER
4. WEATHER CONDITION - RAIN
5. FUEL SYSTEM,CAP - LEAK
6. FLUID,FUEL - WATER
7. FUEL SYSTEM,TANK - INADEQUATE
8. AIRCRAFT/EQUIPMENT,INADEQUATE DESIGN(STANDARD/REQUIREMENT),AIRFRAME - PRODUCTION/DESIGN PSNL

Occurrence #2 LOSS OF CONTROL - IN FLIGHT
Phase of Operation TAKEOFF

Finding(s)

9. AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
10. STALL/SPIN - INADVERTENT - PILOT IN COMMAND

Occurrence #3 IN FLIGHT COLLISION WITH TERRAIN
Phase of Operation DESCENT - UNCONTROLLED

Occurrence #4 ON GROUND COLLISION WITH OBJECT
Phase of Operation OTHER

Finding(s)

11. OBJECT - AIRCRAFT PARKED

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

The National Transportation Safety Board determines that the Probable Cause(s) of this accident/incident is/are finding(s) 1,2,3,5,6,7,8,9,10

Factor(s) relating to this incident is/are finding(s) 4