SP-20

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

Log 1536

ISSUED: October 12, 1982

Forwarded to:
Honorable J. Lynn Helms
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-82-135 and -136

On September 9, 1982, a Fairchild Republic Company FH-227E, N7801, departed Andros Island, Bahamas, with 38 passengers and 3 crewmembers, on an instrument flight rules (IFR) flight plan to West Palm Beach, Florida. Just after takeoff, an explosion occurred in the wheel well area of the left engine nacelle. The crew reportedly observed that all engine instrument indications were normal with the exception that the low-pressure warning light for the fuel boost pump of the left engine was illuminated. The cabin attendant then informed the crew that fuel was leaking from the left nacelle. The crew secured the engine using the "manual feathering" checklist procedure and diverted the airplane to Nassau, Bahamas, for an emergency landing. Just before landing, the wing flaps were positioned to the landing configuration. Upon landing, a massive and intense fire occurred in the aft section of the nacelle/wheel well area. The fire essentially destroyed the flaps and the entire aft portion of the nacelle structure, and heavily damaged the adjacent wing area and fuselage from the wing front spar to the aft pressure bulkhead. The rapid response and firefighting actions by the Nassau International Airport Fire Department prevented any fatalities from occurring; however, five persons were injured during the evacuation.

The Safety Board participated in the investigation under the jurisdiction of the Director of Civil Aviation, Bahamas Government. The investigation revealed that the explosion was caused by a failure of the anodized aluminum shell of the mechanical moisture separator, a part of the airplane's left pneumatic system. Fuel drained into the nacelle area after the moisture separator shell struck and dislodged the integral fuel inlet connection elbow at the elbow's connection to the collector tank. Since the main fuel tank shutoff valve was not closed during the engine securing procedure, fuel continued to drain through the dislodged connection, which resulted in an accumulation of both fuel and fuel vapor. Upon touchdown, an unknown ignition source initiated the fire.

The failed separator assembly was identified as a Walter Kidde & Company P/N 891572, S/N 40154. The Safety Board determined that the separator assembly met the engineering drawing specification requirement of Walter Kidde & Company P/N 891572-01, although the nameplate did not carry the "01" designation. The anodized aluminum shell of the separator, Walter Kidde & Company, Inc., P/N 270942, had a circumferential fatigue fracture in the threaded area near the open end of the shell. Evidence of corrosion was found in the shell's thread roots where the fatigue originated. The separator's normal operating pressure is 3,300 psig; thus, when the shell failed, it was propelled into the fuel inlet elbow connection and dislodged the elbow from its installed position.

A stamp displaying "11/75" was found on the body of the shell and most likely represents the date the separator was manufactured. Records indicate that the separator assembly was overhauled on December 15, 1977. The prior history and details of the overhaul were not available; therefore, the operational history and type of work that was accomplished is not known. The Safety Board noted that the Kidde Maintenance and Overhaul Manual F-41024B dated August 1970 specifies both an annual inspection and a tri-annual, 20,000-cycle replacement criteria for the separator shell. These inspections are conducted using both visual and fluorescent penetrant methods with special emphasis given to the internal thread runoff area.

A similar failure of the moisture separator in 1977 was reported in the Federal Aviation Administration's (FAA) Service Difficulty Reporting System. The airplane manufacturer also reported that the same type of failure occurred in the earlier configuration of the anodized aluminum shell. As a result of these failures, the Safety Board is deeply concerned about the reliability of the separator assembly inspection criteria and the specified lifespan of the separator shell.

The Safety Board believes that the Maintenance and Overhaul Manual for the moisture separator assembly addresses the above concerns. Additionally, the Safety Board is cognizant that the airplane manufacturer has issued two Service Letters, F27-671 and FH227-36-23, which generally incorporate the inspection and retirement provisions and criteria for the separator shell as specified in the separator Maintenance and Overhaul Manual and is coordinating issuance of the Service Letters with appropriate FAA personnel. Both the airplane and moisture separator manufacturers are examining the effects of shelf life on the lifespan of the separator shell. The Safety Board believes that an Airworthiness Directive is necessary to ensure compliance with the provisions of the above service letters for the inspection and replacement of the moisture separator shell.

This accident demonstrated that failure of the separator shell with the separator assembly installed in its present location in the left wheel well/nacelle area in F-27 and FH-227 airplanes can destroy the integrity of the left engine's fuel system with potentially catastrophic results. Therefore, the Safety Board believes that the separator assembly should be relocated so that critical components would not be damaged if a failure occurred.

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

> Issue an immediate Airworthiness Directive to require compliance with the provisions of Fairchild Republic Company Service Letters F27-671 and FH227-36-23 for the inspection and replacement of the moisture separator shell. (Class I, Urgent Action) (A-82-135)
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> Require the airplane manufacturer to modify the installation of the F-27 and FH-227 left mechanical moisture separator assembly so that critical aircraft components would not be damaged if any mechanical moisture separator failure should occur. (Class II, Priority Action) (A-82-136)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and McADAMS and ENGEN, Members, concurred in these recommendations. BURSLEY, Member, did not participate.

By: Jim Burnett
Chairman