

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: December 9, 1980

Forwarded to:

Honorable Langhorne M. Bond  
Administrator  
Federal Aviation Administration  
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-123 and -124

On May 9, 1980, a Bell 206B helicopter operating as an unscheduled air-taxi passenger flight crashed near Brighton, Utah, during an emergency autorotation following an engine flameout. There were no injuries, but the aircraft was damaged substantially. At the time, investigators were unable to determine the cause of the engine flameout. About 2 weeks later another Bell 206 from the same operation had four flameouts in one flight, with successful engine relight each time. The investigation determined that a drain valve on the engine-driven fuel pump in this second aircraft was leaking. Based on this determination, further investigation and testing of the Brighton accident engine determined that when the engine, an Allison 250C-20B, is operated without the fuel boost pumps operating, air can enter the fuel lines through loose fittings or a partially open valve and then be trapped in the fuel filter of the engine-driven pump. When this trapped air migrates through the engine fuel system, it causes fuel flow interruption and engine flameout or loss of power.

Some helicopter manufacturers install a drain valve on the engine-driven fuel pump low-pressure filter. Some of these valves have been found to leak, which permits air to enter the filter during engine operation. If the boost pump is not operating, air can also enter the system when the valve is opened to drain the filter during preflight.

The engine manufacturer, Detroit Diesel Allison, recognized over a year ago that air could be trapped in the filter housing. In June 1979, the manufacturer issued Service Letter CSL-1081 which advised operators of the possibility of trapped air and presented a procedure for purging air from the engine system.

Following the two cited incidents, Detroit Diesel Allison advised all helicopter manufacturers using the 250C-20 engine that air from any number of sources, when ingested into the fuel system, can cause a power loss or flameout. Specifically, the manufacturer cited the filter drain valves as a source of the introduction of air into the fuel system and recommended that the system be purged using the procedure in Service Letter CSL-1081 any time the system is opened. A review of several FAA-approved

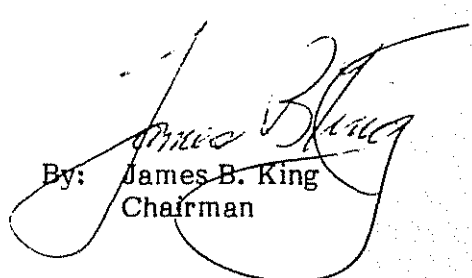
flight manuals for helicopters using the 250C-20 engine revealed that the procedures for draining this filter during preflight inspection are vague and do not require that the system be pressurized to insure that air will not enter the filter when the valve is opened. Detroit Diesel Allison has stated that the system should be purged after opening the valve, or the system should be pressurized by means of the boost pumps before opening the valve.

Because of the serious consequences which can result from engine flameout or power loss, the Safety Board believes that positive action is necessary to preclude the loss of power from air trapped in the engine low-pressure filter. Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require, for all helicopters powered by Detroit Diesel Allison 250C-20 engines, the revision of the FAA-approved flight manual to include a detailed preflight procedure for draining the engine-driven fuel pump low-pressure filter which will preclude the entrance of air into the fuel system, or alternatively a procedure for purging the system of air after draining the filter. (Class II, Priority Action) (A-80-123)

Review fuel system designs with helicopter manufacturers to determine if drain valves on the Detroit Diesel Allison 250C-20 engine-driven fuel pump low-pressure filters are necessary. If determined to be unnecessary, issue appropriate Airworthiness Directives to require removal. (Class III, Longer Term Action) (A-80-124)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.

  
By: James B. King  
Chairman