NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

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Forwarded to:

Honorable John L. McLucas
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-77-3 and 4

The National Transportation Safety Board has investigated several accidents involving engine stoppage caused by fuel starvation. These investigations have disclosed a potential operational hazard relating to the Airborne fuel selector mechanism which incorporates ball check valves on certain Piper airplanes. The Safety Board believes that the problem merits engineering flight testing and other related corrective action by the Federal Aviation Administration.

On certain Piper models, if the ball is improperly seated in these check valves as a result of foreign material between the ball and the valve seat, the intake port will leak. The leak can cause an unwanted transfer of fuel between tanks and a partial depletion of the available fuel supply. More importantly, air may be ingested from an empty tank through the leaking port and adversely affect engine operation. Currently, the exact conditions under which this situation could occur cannot be ascertained because of a lack of comprehensive test data. However, the loss of engine power in a number of accidents involving such a leaky valve assembly prompted the Safety Board's concern.

For example, the fuel selector was installed in a Piper model PA-32-260 which was involved in a fatal accident at Cable, Wisconsin, on February 20, 1976. This airplane crashed shortly after takeoff following loss of engine power caused by fuel starvation. The day before the accident, fuel from the left wingtip tank had emptied into the left main fuel tank and caused it to overflow. The fuel could have crossfed only through the fuel selector mechanism since the tanks were not interconnected. Thus, the fuel crossfeed was indicative of a leaking intake port.

On June 21, 1974, a Piper model PA-28-235 was involved in an accident at Troy, Michigan. The accident also occurred just after takeoff when engine power was lost because of fuel starvation. The airplane struck an electrical power line and crashed into a highway embankment, critically injuring the pilot. Investigation disclosed that a small amount of fuel-tank sloshing sealer had prevented seating of the ball check valve and that a fuel crossfeed problem, similar to the PA-32-260 described above, had also occurred.

An accident involving a Piper PA-32-300 at Eagle, Colorado, on October 6, 1973, was characterized by circumstances similiar to those of the Troy, Michigan, accident--a loss of engine power immediately after takeoff and the subsequent discovery of foreign material affecting normal operation of a fuel selector ball check valve. An emergency landing was accomplished which caused substantial damage to the airplane. None of the eight persons on board was injured.

Airworthiness Directive 67-3-7, applicable to certain Piper PA-32-260 airplanes, was issued to prevent fuel transfer through malfunctioning fuel selector valves. In addition, Piper issued Service Aid MISC/TP-1013, which contained a suggested fuel flushing procedure for removing dirt from these valves. Despite these measures, the problem of malfunctioning fuel selector valves continues. A review of FAA's General Aviation Service Difficulty Reports for 1972 through 1976 disclosed a significant number relating to these type fuel selectors. Some reports merely referred to fuel crossfeeding as a result of leaking intake ports; others cited such leaky ports as the suspected cause in incidents involving actual engine stoppage.

From 1971 through 1975, single engine Piper airplanes equipped with this Airborne fuel selector were involved in 19 accidents relating to powerplant stoppage or failure for undetermined reasons. The Piper Model PA-32 was involved in 15 of these. While the results of flight tests of a PA-32-260 conducted by Piper in 1969 indicated that a leaky fuel selector valve would not cause engine stoppage, accidents involving powerplant stoppage and FAA General Aviation Service Difficulty Reports reviewed by the Safety Board suggest the need for more comprehensive testing. Such information may provide considerable insight regarding the causal circumstances of several accidents and contribute effectively toward corrective actions to eliminate the leaky valves.

In view of the need to ascertain the effects on engine operation of leaking ball check valves in Airborne fuel selectors and the possibility of fuel leakage or fuel mismanagement, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Conduct engineering flight tests of Airborne fuel selectors installed on Piper models PA-28-235, PA-32-260, PA-32-300, PA-24-400 and PA-30 to determine, for airplane attitudes, flight maneuvers, and power conditions relating to takeoff, if air ingestion through a leaking ball check valve can cause engine power interruption or stoppage. (Class II--Priority Followup) (A-77-3).

Issue an Airworthiness Directive, similar to AD 76-18-04 and applicable to the above airplanes, requiring a fuel system check and appropriate corrective action, if necessary. (Class II--Priority Followup)(A-77-4).

TODD, Chairman, BAILEY, Vice Chairman, McADAMS, HOGUE, and HALEY, Members, concurred in the above recommendations.

By: Webster B. Todd, Jr.
Chairman

THESE RECOMMENDATIONS WILL BE RELEASED TO THE PUBLIC ON THE ISSUE DATE SHOWN ABOVE. NO PUBLIC DISSEMINATION OF THE CONTENTS OF THIS DOCUMENT SHOULD BE MADE PRIOR TO THAT DATE.