

NATIONAL TRANSPORTATION SAFETY BOARD WASHINGTON, D.C.

ISSUED: April 9, 1980

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

SAFETY RECOMMENDATION(S)
A-80-27 through -29

The National Transportation Safety Board has learned of an incident which occurred January 1, 1980, wherein a fuel leak was discovered in the tailcone service area of a Learjet-36 during a postflight inspection. The leak was traced to the left motive flow valve (PN AV16E1182) (SNH46478) which is located in the tailcone service area where the batteries and other electrical components are positioned. The valve had operated about 1,663 hours. It was reported that, when the valve was pressurized, fuel spurted about 5 inches into the air and sprayed into the service area in sufficient quantity to wash soot from installed equipment in the compartment. Portions of the electrical junction box adjacent to the valve were saturated with fuel.

The valve was removed and forwarded to the Gates Learjet Corporation under warranty for replacement, and a Service Difficulty Report, No. 01110043, was prepared. Under the Safety Board's supervision, the valve was X-rayed, examined visually, and then bench-tested at the Gates Learjet facility in Wichita, Kansas. The X-ray and the visual examination did not reveal any apparent defects. The screws that attached the valve motor to the valve body were tight and properly safetied. The cure dates of the "O" rings were marked "4th quarter 1974" and the assembly date was September 5, 1974.

The valve was installed in a pressure test device and tested at the normal operating pressures it would experience in the aircraft. Fluid leaked at the mounting plate where the valve motor attached to the valve body. The test results were:

Pressure	Rate of leakage (gph)
250 psi	5.54
310 psi	5.23
500 psi	6.49
310 psi	5.10
250 psi	4.43

The valve motor was then removed from the valve body. The mating surfaces were clean, and there were no visible defects. The upper "O" ring (MS29513-16) was found to be broken into 3 pieces, and one piece was found between the valve body and the cylinder wall. The lower "O" ring was intact.

A review of Federal Aviation Administration service difficulty reports uncovered two additional reports, dated 1975 and 1977, of fuel leaks in motive flow valves installed on Gates Learjet aircraft.

The Safety Board is concerned about the extreme hazard that would be associated with having a relatively high-volume fuel leak in a compartment where there are many potential ignition sources. In its report of an accident involving a Gates Learjet at Sanford, North Carolina, the Safety Board determined that the probable cause of the accident was ". . . one or more low-order explosions in the aircraft's aft fuselage which resulted in a fire and loss of control capability. The Safety Board could not determine conclusively the fuel and ignition sources of the initial explosion; however gases from the aircraft's batteries or fuel leaks from fuel system components, or both, could have been present in the area of the initial explosion." 1/

The Safety Board is aware that the FAA is reviewing the information gathered during the examination and testing of the motive flow valve involved in this incident. We are also aware that the Gates Learjet maintenance manual was revised on September 28, 1979, to require a check of the hydraulic and fuel system components in the tailcone of Learjet aircraft for general condition and leaks during postflight inspections following major inspections, repairs, or alteration to the aircraft. Finally, we have been informed that the FAA and Gates Learjet are considering the installation of a shroud, with overboard drains, around the motive flow valve assembly. However, we believe the hazard associated with a fuel leak in the tailcone area of these aircraft requires additional corrective action. Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Notify all Learjet operators by telegram of the motive flow valve leak found in this incident, and require an immediate and a recurring inspection of these valves under operating pressures to detect and correct any fuel leaks found. (Class I, Urgent Action) (A-80-27)

Review the manufacturing processes used in assembling the motive flow valve to determine the cause of this "O" ring failure and take appropriate action to correct any deficiencies detected to preclude future fuel leaks from the motive flow valve during its normal operations. (Class II, Priority Action) (A-80-28)

1/ For more detailed information, read "Aircraft Accident Report — Champion Home Builders Company, Gates Learjet 25B, N999HG, Sanford, North Carolina, September 8, 1977" (NTSB-AAR-79-15)