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National Transportation Safety Board

Washington, D.C. 20594
Safety Recommendation

Date: July 1, 1986
In reply refer to: A-86-47

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

On April 14, 1985, an Ercoupe Model 415, C-FTER, crashed near Brigden, Ontario, Canada, after losing engine power during a cross country pleasure flight. The pilot performed an emergency landing in a plowed field, but the airplane flipped over on its back resulting in serious injuries to the passenger. An investigation by the Canadian Aviation Safety Board disclosed that the airplane's fuel system gascolator separated from the carburetor resulting in fuel starvation. The gascolator was cantilever-mounted directly to the carburetor with standard fittings made of aluminum alloy. These consisted of an elbow fitting, part No. AN 914-2D, and a nipple fitting, part No. AN 911-2D, which screws into the elbow fitting. The nipple fitting failed as a result of high cycle, low stress metal fatigue.

On September 13, 1982, at Englewood, Colorado, an Ercoupe Model 415C, N87141, also crashed after losing engine power due to a similar fatigue failure of the fuel gascolator nipple fitting. In addition to disrupting the fuel flow and causing fuel starvation, the broken fitting allows fuel to be spewed into the engine compartment and provides the potential for an engine fire. Although there was no fire, a strong odor of fuel was detected by the occupants of the airplane while on the downwind leg of the airport traffic pattern just prior to the power loss. Subsequently, the airplane was unable to reach the runway and nosed over while landing on uneven terrain and again resulted in serious injuries to one of the occupants.

As a result of similar failures many years ago, the gascolator elbow and nipple aluminum alloy fittings were the subject of Ercoupe Service Bulletins Nos. 12 and 24, respectively, which recommended that they be replaced with brass fittings, part Nos. AN 914-2 and AN 911-2. Airworthiness Directive (AD) 46-38-03 required replacement of the gascolator elbow in accordance with Service Bulletin No. 12 prior to November 15, 1946, but no subsequent, similar regulatory action was taken in connection with Service Bulletin No. 24. In addition to the recommended change in material composition of the gascolator nipple, Service Bulletin No. 24 also outlines a simple installation procedure to assure proper alignment of the gascolator piping and thereby avoid excessive loads on the nipple. Ercoupe Service Memorandum No. 52 also warns of the possibility of cracking this fitting as a result of excessive tightening and indicates that the maximum torque on the nipple should not exceed 7 to 8 foot-pounds.

According to the type certificate holder for the Ercoupe model 415 airplanes, the Univair Corporation of Aurora, Colorado, the gascolators on these airplanes should not be cantilever-mounted, but should be clamped and supported by one or two tube braces. For example, airplanes with serial numbers 113 through 4500 should have an aft brace installed, Ercoupe part No. 48076, and airplanes with serial numbers 4501 and subsequent should also have a forward (double support) brace installed, Ercoupe part No. 48096. However, the Safety Board learned that only 7 of 18 Ercoupe airplanes surveyed during a recent fly-in/meeting of Ercoupe owners used a gascolator brace of any kind. The gascolators on the other 11 airplanes (as well as that on C-FTER) were cantilever-mounted directly to the carburetor. The owners of these older airplanes and/or the maintenance personnel who inspect and maintain them were, presumably, unaware of a requirement for gascolator braces. As a result, these and many other Ercoupe gascolator assemblies which are likely to be similarly mounted are subject to considerable vibratory loading which can eventually cause or contribute to cracking or breaking of the fittings. Although at least one gascolator brace is essential, the Safety Board believes that the manufacturer's incorporation of the double support brace during the latter stage of Ercoupe production was indicative of a continued concern regarding the breaking of the gascolator fittings and that both forward and aft braces should be installed on the gascolators of all Ercoupe Model 415 airplanes.

Since 1980, there have been seven accidents involving a loss of engine power for undetermined reasons in Ercoupe Model 415 airplanes, including one accident in which the airplane was destroyed and the two occupants aboard were killed. Because of the substantial engine damage sustained in some of the accidents, it would have been impossible to ascertain the precrash integrity or causal significance of the fuel system gascolator fittings. Nonetheless, because of the historical occurrence of failure of these fittings, particularly the AN 911-2D fitting, they are considered suspect in at least some of these accidents.

The Ercoupe Model 415 airplanes have not been manufactured since 1949. However, there are still about 1500 of the airplanes in service in the United States. Therefore, in view of the aforementioned accidents, the potential for deterioration and failure of the gascolator assembly, and the importance of assuring the integrity of both the fuel system gascolator elbow and nipple fittings, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue a new Airworthiness Directive superceding AD 46-38-03 and applicable to Ercoupe Model 415 airplanes requiring compliance with Ercoupe **Service Bulletins** Nos. 12 and 24, **Service Memorandum** No. 52, and the installation of fuel gascolator forward and aft braces (Ercoupe part Nos. 48076 and 48096 or their equivalent), unless previously accomplished, at the next 100 hour or annual inspection or at any prior time when the fuel system gascolator is removed, whichever occurs first. Class II, Priority Action) (A-86-47)

GOLDMAN, Acting Chairman, and BURNETT, LAUBER, and NALL, Members concurred in this recommendation.


By: Patricia A. Goldman
Acting Chairman