

Log 1601

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: February 21, 1984

Forwarded to:

Honorable Michael J. Fenello
Acting Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-84-7

On December 7, 1982, an Orion Airlines Grumman G-159 Gulfstream I, N153TG, was operating as an all-cargo flight. At about 400 feet altitude above ground level, after takeoff from DeKalb Peachtree Airport, Chamblee, Georgia, an in-flight fire occurred in the area of the right engine and engine cowl. The flightcrew secured the engine and discharged both fire extinguishers. The fire apparently was extinguished, although the affected area of the engine's cowl metal reportedly continued to glow red. The crew declared an emergency and returned the airplane to the airport without further incident. The flightcrew was not injured.

Damage to the airplane was confined to the right engine, a Rolls-Royce, Limited, Mark 529-8H turboprop, and its cowling. The Safety Board's investigation determined that the in-flight fire was caused by a failure of the No. 5 combustion chamber flame tube suspension pin, which allowed a flame breakout through the No. 5 combustion chamber. This condition can occur in the Rolls-Royce Dart 520 and 530 series engine combustion chamber air casing/flame tube suspension system if there is excess wear of the flame tube suspension pins and the flame tube locating pin liners, and cracking of the three flame tube brackets that retain the flame tube locating pin liners in their installed positions. If the suspension completely fails, the flame tube can move forward and fret through the wall of the burner stem, thereby permitting unmetered fuel to pass into the combustion chamber; in an extreme case, this can result in turbine rotor overheat and uncontained rotor disc failure.

Following several flame breakout incidents, the engine manufacturer issued a Service Bulletin Da-72-A413 in May 1975 which was initially revised in December 1981 and later revised on May 11, 1982. Also, the Federal Aviation Administration (FAA) responded by issuing Airworthiness Directive 77-18-02 effective September 28, 1977. Basically, the Service Bulletin and the Airworthiness Directive provide procedures and inspection requirements to detect flame tube suspension pin and flame tube locating pin liner wear or failure. However, they did not provide or require permanent correction of the problems.

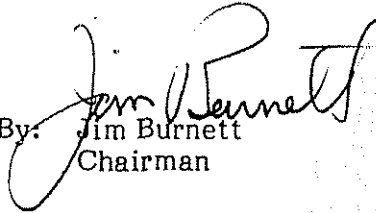
The engine manufacturer considers a flame tube suspension system failure a major in-service problem and has issued Modifications 1736 and 1719 as presented in Rolls-Royce Dart Aero Engine Modification Service Bulletin Numbers Da-72-423 and Da-72-443, respectively, to correct the problems. Service Bulletin No. Da-72-423 was issued in March 1976 and was last revised in April 1983 (Revision 14). Service Bulletin No. Da-72-443 was issued in March 1979 and was last revised in May 1982 (Revision 4).

Since 1967, there have been 25 occurrences of flame breakout in the Rolls-Royce Dart 520 and 530 series turboprop engines' combustion chamber air casing/flame tube suspension system. The Safety Board believes that the continuation of these conditions and their potential for causing in-flight engine/cowl fire hazards require that further corrective action be taken. Since this problem requires an engineering analysis to determine what modifications would be the most appropriate, the Safety Board believes that an engineering review and decision should be made by the FAA in conjunction with the United Kingdom Civil Aviation Authorities.

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

In conjunction with the United Kingdom Civil Aviation Authorities, evaluate Rolls-Royce Modification 1736 and 1719 as presented in Rolls-Royce Dart Aero Engine Service Bulletin Numbers Da-72-423 and Da-72-443, respectively, for modification of flame tube suspension systems in Rolls Royce Dart 520 and 530 series engines to determine which of these modifications are appropriate for mandatory installation. Upon completion of this review, require the installation of the appropriate modification in applicable Rolls-Royce Dart 520 and 530 series turboprop engines at the earliest feasible date. (Class II, Priority Action) (A-84-7)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY and ENGEN, Members, concurred in this recommendation. GROSE, Member, did not participate.

By: 
Jim Burnett
Chairman