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NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: June 29, 1981

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Forwarded to:  
  
Honorable J. Lynn Helms  
Administrator  
Federal Aviation Administration  
Washington, D. C. 20591  
  
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SAFETY RECOMMENDATION(S)

A-81-69

On December 7, 1980, both engines of a Continental Oil Company Lear Model 25 flamed out at about 40,000 feet while the aircraft was climbing to 43,000 feet northwest of Childress, Texas. An emergency descent was made through heavy rain, turbulence, and lightning, during which airstart attempts were not successful. However, after passing through 25,000 feet, the engines were restarted and the aircraft made a precautionary landing at Childress. No one was injured, and the aircraft was not damaged.

An investigation into the cause of the flameouts was conducted by the Safety Board with the assistance and cooperation of the Federal Aviation Administration's New England Region Engineering and Manufacturing Branch and the General Electric Co., the engine manufacturer.

Extensive testing and a teardown examination of the General Electric CJ610-6 engines determined that the flameouts were caused by reduced engine stall margin due to excessive compressor blade tip clearance and excessive compressor case runout. Although both engines had been overhauled shortly before the incident, no evidence was found to confirm that the problem could have originated at overhaul. The manufacturer could not explain the cause of the case runout and tip rub that led to increased clearances.

A review of the service history between 1976 and 1980 of General Electric CJ610-6 engine-equipped Lear aircraft revealed at least 30 other instances of engine flameout at altitude, although the December 7, 1980, incident was the only reported instance of the loss of both engines. Sixteen of the reported flameouts were attributed to excessive compressor clearances. Nearly all of the flameouts occurred at altitudes near or above 40,000 feet. Some other aircraft are equipped with CJ610-6 engines, but those aircraft are generally operated at lower altitudes than the Lear aircraft. The service history of those aircraft has been reviewed and only two incidents of flameout were reported during the same period.

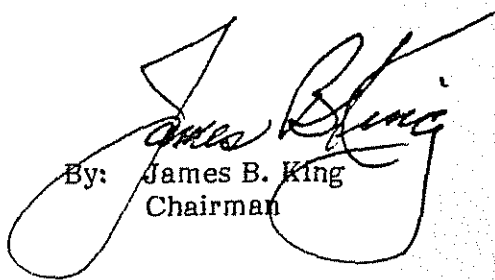
The Safety Board is aware that the engine and aircraft manufacturers are conducting a test and research program to develop a solution to the loss of engine stall margin. However, we are concerned that until a method is developed for recovering or preventing reduction of stall margin, the potential for an accident exists. Because the engine maintenance and overhaul manuals provide a method for determining loss of stall margin, the Safety Board believes it should be used periodically to check engines for decreased stall margin and that appropriate operating restrictions should be applied to those engines so identified.

The manufacturer has proposed a one-time altitude stall and acceleration check to identify engines for which a stall margin recovery fix would be necessary. However, those engines which pass this check may later develop a reduced altitude stall margin. For this reason, the Safety Board believes the check should be required periodically to identify engines which might be susceptible to altitude flameout.

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

Issue an Airworthiness Directive to: (1) require, at appropriate periodic intervals, the performance of the altitude acceleration and stall check procedure defined in the CJ610-6 overhaul manual on Lear aircraft with General Electric CJ610-6 engines installed; and (2) restrict the maximum operating altitude of those engines shown by the test procedure to have a reduced altitude stall margin until the manufacturer has developed a satisfactory method for recovering stall margin and it is incorporated in those engines. (Class II, Priority Action) (A-81-69)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in this recommendation.

  
By: James B. King  
Chairman