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MAR 30 1967

Honorable William F. McKee
Administrator
Federal Aviation Agency
Washington, D. C. 20553

Dear General McKee:

This letter reiterates the information our Director, Bureau of Safety, with personnel of his staff, communicated to management and technical personnel of your Flight Standards Service concerning the Allison Aeroproducts Model A644L71/606 and /606A propeller during a meeting at FAA Headquarters on March 17, 1967. Mr. George S. Moore of your immediate staff was also present.

The investigation of the Lake Central Airlines Allison-Tropjet Convair 580, N73130, aircraft accident which occurred near Marseilles, Ohio, on March 5, 1967, has focused attention on the pitch lock safety feature of the Allison Aeroproducts propeller. At this stage of the investigation we believe a logical and reasonably conclusive sequence of events related to the right propeller is as follows:

1. The inner and outer splines of one of the four torque piston assemblies became excessively worn until the inner splines wore completely away because of improper material processing during manufacture. This aspect of the problem was treated in your telegraphic AD of March 8, 1967.
2. When the one piston became ineffective the correct propeller pitch was maintained by the three remaining torque unit assemblies. The decreased effective piston area required an increase in pitch control oil pressure. Since the piston was unrestrained, it was forced to the outer extremity of the cylinder, thereby increasing the cylinder wall area subjected to the increased pitch control oil pressure. This condition resulted in a substantial increase in loading on the torque cylinder.
3. The torque cylinder, being subjected to substantially increased loading, separated because of a fatigue failure at the change in cross section. The significant feature of this fracture is that the fatigue

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developed and progressed around the entire inner circumference of the cylinder with no penetration of the outer surface until the complete separation suddenly occurred from overload on the remaining material. Thus, there was a sudden loss of blade pitch control oil pressure.

4. With the abrupt loss of control oil pressure, a twisting torque toward low pitch that is always applied to an operating propeller moved the blades rapidly toward low pitch. Physical evidence shows that the blades did, in fact, decrease pitch to about the mechanical low pitch stop.
5. A decreasing blade angle with other parameters remaining essentially constant results in a propeller overspeed. Under these circumstances an overspeed capable of failing the blades in the shank area by primarily centrifugally induced tension overload would be produced. The four propeller blades were, in fact, found failed in the shank area with essentially tension overload indications.
6. A hydromechanical pitch lock is provided to stop blade pitch decrease before damaging rpm's are attained. Pitch lock action is initiated by an increase in rpm and/or a decrease in control oil pressure with no crew attention or action required. Both triggering elements developed and damage to the pitch lock and blade master gear engaging teeth indicates pitch lock action was initiated. The only conclusion we are able to advance at this time is that the rate of blade pitch change was sufficiently high that effective engagement of the pitch lock teeth did not occur.

As expressed at the aforementioned meeting, our concern is with the failure of the pitch lock to accomplish its intended function. The pitch lock is solely a safety device and its primary function is to prevent destructive overspeeds. We recognize the circumstances of this particular loss of blade pitch control very probably subjected the pitch lock mechanism to an extremely severe test. However, since the pitch lock can be categorized as a last effort safety device, we feel that it should function reliably under the most severe condition that can be visualized.

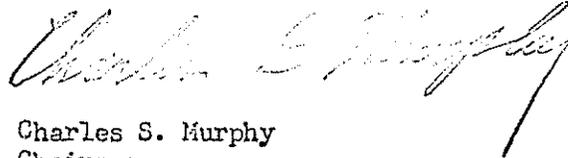
In view of the circumstances of the referenced accident, we recommend that the pitch lock capability with respect to rate of blade angle change be reliably established and correlated with

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maximum blade angle change rates that might be encountered, and if a deficiency is found to exist, that it be corrected. It is further suggested that this matter be treated with the greatest possible urgency.

Our technical staff is available if we can be of assistance in your consideration of this matter.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Charles S. Murphy". The signature is written in dark ink and is positioned above the typed name and title.

Charles S. Murphy
Chairman