

Log 1519

NATIONAL TRANSPORTATION SAFETY BOARD WASHINGTON, D.C.

ISSUED: September 9, 1982

Forwarded to:

Honorable J. Lynn Helms :
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-82-120 through - 122

On August 16, 1982, a Cessna 421B, N1969J, (Riley Conversion), was operating on an IFR flight plan to El Paso, Texas. During the descent and near 19,000 feet, the airplane suddenly yawed to the left and then to the right. The yawing was followed by a high-pitched "whine," and an explosion in the right engine. The engine, an Avco Lycoming LTP-101, had a total service time of about 198 hours. Metal fragments from the right engine penetrated the right side of the fuselage and injured the pilot; he declared an emergency and safely landed the airplane at the El Paso International Airport.

Investigation revealed that the N₂ accessory idler gear, Part No.(P/N) 4-083-007-01, in the right engine had broken into three pieces and that the gear hub was loose on the N₂ accessory idler gear shaft. The idler gear assembly also incorporates an N₂ accessory speed pickup disc and a small key that secures the idler gear to the shaft. Examination revealed that the keyway in the idler gear shaft was severely worn, and that the broken gear with the key installed could be rotated about 20° relative to the idler gear shaft.

The power turbine wheel for the right engine was missing and has not been recovered. The engine case was severed and an area about 2 inches wide was torn open circumferentially in the area of the missing power turbine wheel. The failure of the N₂ accessory idler gear apparently allowed the power turbine wheel to overspeed and disintegrate.

Metallurgical examination of the N₂ accessory idler gear revealed several fatigue cracks in the failed areas. The fatigue cracks initiated from severe fretting on the unloaded side of several gear teeth. In addition to the severely worn keyway on the idler gear, the gear shaft was worn out of round and was reduced in diameter about 0.008 inch. The uneven wear on one side of the shaft was caused by the excessive rotational movement of the gear relative to the shaft.

The N₂ accessory speed pickup disc, P/N 4-083-064-03, was loose on the idler gear shaft. The disc mounting hole was badly worn and elongated which created an off-center and out-of-balance condition. The movement of the disc had worn a groove 0.030 inch deep in the idler gear shaft.

The Safety Board investigated another fatal accident involving a Cessna 421C airplane, on February 11, 1980; the airplane also was equipped with the Avco Lycoming LTP 101 turboprop engines. The power turbine wheel had separated from the left engine and was never located, and the area of the engine case covering the power turbine wheel was damaged in a manner similar to the damage found in the El Paso accident. Also, the engine shroud had separated and had rolled back throughout its entire circumference, and the N_2 accessory idler gear exhibited similar damage and wear patterns. The N_2 accessory speed pickup disc had separated from the idler gear assembly and was never located. The key and keyway of the idler gear shaft were extremely worn and would have allowed excessive rotation of the idler gear relative to the gear shaft.

On May 14, 1982, Avco Lycoming issued Service Bulletin No. LTP 101A-72-0021, which recommends modification of the N_2 accessory gear assembly by fastening with rivets the accessory speed pickup disc to the N_2 accessory idler gear. The Safety Board believes that incorporation of the recommended changes set forth in Service Bulletin LTP 101A-72-0021 should alleviate the problem with the speed pickup disc. However, we do not believe that the incorporation of the modifications will correct the excessive rotational movement between the idler gear and its shaft because they do not deal with the keyway and key that secures the idler gear to its shaft.

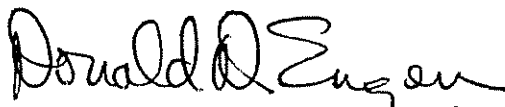
Accordingly, in view of the potentially catastrophic results of an N_2 accessory idler gear failure, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require an immediate inspection of the N_2 accessory idler gear assembly on all Avco Lycoming LTP-101 (turboprop) engines for proper rigidity of the assembly. (Class I, Urgent Action) (A-82-120)

Require modification of the N_2 accessory idler gear assembly in accordance with the provisions of Avco Lycoming Service Bulletin LTP 101A-72-0021, dated May 14, 1982, and establish a mandatory inspection interval for reinspection of the modified gear assembly. (Class I, Urgent Action) (A-82-121)

Review the design of the N_2 accessory idler gear assembly on the Avco Lycoming LTP 101 engines to verify the adequacy of the gear assembly design and require modifications as necessary to preclude failure of the gear assembly. (Class II, Priority Action) (A-82-122)

BURNETT, Chairman, McADAMS, BURSLEY, and ENGEN, Members, concurred in these recommendations. GOLDMAN, Vice Chairman, did not participate.

for By:  *Member*
Jim Burnett
Chairman