

Propeller Separates From Engine During Cruise Flight

A Piper PA-31P Navajo was in cruise flight at 10,000 feet on a flight from Canada to the United States when the flight crew heard “an unusual, very loud and very brief noise,” said the Transportation Safety Board of Canada aviation occurrence report.

The first officer observed the right propeller break away from the engine as oil spread over the right wing. The crew performed emergency procedures, informed air traffic control of the problem and conducted a single-engine landing at an en route airport

The report said that the propeller shaft-driven gear failed because of increased play and fatigue caused by corrosion pitting.

“This failure in turn led to the destruction of the propeller housing case, and the propeller separated in flight,” the report said.

Inspection showed that “the presence of corrosion pitting in various areas resulted from a lack of proper corrosion-prevention measures,” the report said. “Examination of the technical records revealed that no action had been taken to that effect. The presence of corrosion caused an accelerated wear, considering the relatively low number of hours of operation to the engine.”

The report said that a contributing factor to the occurrence was “the fact that neither the maintenance manager nor TC [Transport Canada] took into account... [Textron Lycoming] Service instruction 1009AJ concerning the time between engine overhauls.”

Service Instruction 1009AJ recommends an overhaul every 1,200 hours or every 12 years.

The engine involved in this occurrence had been overhauled 19 years and 3 months (and 1,247 operating hours) before the occurrence.

The report said, “The service instruction also states that operators may increase the number of hours between overhauls if the engine is in continuous service, that is, not out of service for longer than 30 days. The manufacturer also warns about the possibility of deterioration of materials and parts during out-of-service periods. It states that the 12-year time between overhauls should never be exceeded.”

The airplane was manufactured in 1972 and had accumulated 3,468 flight hours. The airplane was purchased in February 1998, and, after purchase, the new operator conducted a 1,000-hour major inspection in accordance with the approved inspection program. After the inspection, the airplane accumulated 69 flight hours.

The right engine was installed in August 1986, after accumulating 947 hours since a March 1979 over-haul. At the 1,000-hour inspection in 1998, the engine had accumulated 231 hours in the 12 previous years.

The propeller was installed on the right engine in July 1997 after a complete overhaul. At the 1,000-hour inspection in 1998, the propeller had accumulated 84 hours since the overhaul.

The operator’s approved maintenance organisation (AMO) performed maintenance on the airplane in accordance with a maintenance schedule approved by TC. The original operating certificate was issued in November 1997; a new operating certificate was issued in March 1998; and the first amendment to the maintenance schedule was approved in May 1998 to allow engine maintenance according to an on-condition program instead of the manufacturer’s recommended “hard-time” program. The program requires repetitive periodic

inspections to determine the condition of all components and to ensure that components are removed from service before failure.

The report said that examination of the engine after the occurrence showed that the propeller-shaft-driven gear exhibited “widespread fatigue cracking of the gear teeth, complete separation of the rim from the hub at the web and ovalization of the rim itself. Although the roots of the gear teeth were covered with a carbonaceous oil residue, there was indication of corrosion pitting. After removal of the bulk of the oil residue... the corrosion became even more noticeable. Detailed examination of the fatigue crack initiation sites established a link between the corrosion pits and the cracks.”