

100-1278

NATIONAL TRANSPORTATION SAFETY BOARD WASHINGTON, D.C.

Corrected copy

ISSUED: April 2, 1981

Forwarded to:

Mr. Charles E. Weithoner
Acting Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-81-36 through -38

On November 26, 1980, a Piper Model PA-20, N7453K, crashed approximately 3 miles southwest of East Berlin, Pennsylvania, after the right wing separated in flight due to metal fatigue failure of the lower rear lift strut fork. All three persons aboard were killed.

In Safety Recommendation A-80-26, issued on April 9, 1980, the Safety Board directed the Federal Aviation Administration's (FAA) attention to several similar fatal accidents involving Piper aircraft. As a result, the FAA issued two emergency airworthiness directives (AD) dated April 17, 1980, and April 25, 1980, and AD 80-22-15 dated October 29, 1980, warning of potential fork fatigue cracking and failures. These directives required the replacement of machine (cut)-thread forks with forks having rolled threads within the next 50 hours or 180 days, whichever occurred first, and periodic dye penetrant and/or magnetic particle inspections of the forks. Maintenance records indicate that the accident aircraft, N7453K, had been inspected in accordance with the April 25, 1980, directive and that the forks had been inspected magnetically.

A review of AD 80-22-15 indicates that the directive is confusing and difficult to comply with and that it makes no reference to the previous emergency directives (which were effective upon receipt). Although AD 80-22-15 contains fork replacement requirements identical to those contained in the emergency directives (i.e., within the next 50 hours in service or 180 days), it has an effective date of November 3, 1980. However, discussion with FAA Eastern Region personnel indicated that the requirement for the 50-hour/180-day inspection period and the requirement for replacing with rolled-thread forks was intended to have been effective upon receipt of the first emergency directive issued on April 17, 1980.

Neither emergency directive was indexed in the FAA's biweekly listing. Therefore, unless the owner/operator recipients of the emergency directive advised them, maintenance personnel would not have been routinely aware of any potential lift strut fork fatigue problems before October 29, 1980, when AD 80-22-15 was issued. As a result, some affected aircraft given annual inspections between April 17, 1980, and October 29, 1980, were inadvertently certified as airworthy without complying with the emergency directives.

AD 80-22-15 requires that maintenance personnel distinguish between lift strut forks with machined threads and those with rolled threads. However, there is no advice, method, or procedure contained in the AD (such as reference to appropriate magnification, thread gauge, etc.) to assist them in doing so. The mechanic who inspected the fork which failed in the accident aircraft incorrectly identified rolled threads as being machined threads. Comments from other mechanics indicated that they are experiencing similar difficulties in distinguishing rolled threads and machined threads. Therefore, the Safety Board believes that forks with rolled threads should have a part number different from those of forks with machined threads to simplify identification and to avoid the identification problem in future inspections.

The airframe maintenance log for the accident aircraft indicated that the lift strut forks had been inspected by magnetic means in June 1980. Examination of the failed fork, however, revealed extensive fatigue cracking across the face of the fracture and in several other thread root sections of the fork as well. It is unlikely that this fatigue developed in the interim between the June inspection and the accident. Rather, it appears that it was simply not detected during the required magnetic inspection performed in the field. Other similar field inspections have indicated cracked forks where no cracks actually existed. Because of the physical characteristics of the fork threads, considerable experience and expertise may be required in interpreting the results of the magnetic particle inspection. Therefore, the Safety Board believes that performance of the inspection should be limited to designated central facilities such as the manufacturer's plant, where fork inspection, metallurgy, and quality control can be closely monitored by specialists.

The Safety Board concludes that AD 80-22-15 and the preceding emergency directives have not been effective in assuring the continued airworthiness of these lift strut forks and that any effort to amend the AD would further complicate an already confused situation. The Safety Board believes that a new AD is needed to resolve the doubt which exists regarding the condition of all lift strut forks currently installed, including those with rolled threads. Consequently, the superseding AD should require the replacement of all existing lift strut forks with new forks unless such replacement has already been accomplished in compliance with AD 80-22-15. The periodic fork inspection and replacement intervals specified in AD 80-22-15 appear adequate and should be retained in the new AD.

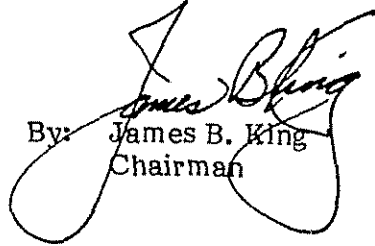
Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue an airworthiness directive superseding AD 80-22-15 to require that all lift strut forks currently installed on affected Piper aircraft, including forks with rolled threads, be replaced with new, certified, magnetically inspected forks. (This requirement need not apply in cases where such new forks have already been installed in accordance with AD 80-22-15.) (Class II, Priority Action) (A-81-36)

Require manufacturers of rolled thread lift strut forks to be installed on Piper aircraft to identify them with a part number different from that of forks with machined threads. (Class II, Priority Action) (A-81-37)

Specify that required inspections of lift strut forks on Piper aircraft (enumerated in AD 80-22-15) be performed only by manufacturers authorized to fabricate these forks or by other designated central inspection facilities having the requisite facilities and expertise. (Class II, Priority Action) (A-81-38)

KING, Chairman, DRIVER, Vice Chairman, and McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.


By: James B. King
Chairman