

Safety Communique

May 1999
Revised: July 1999

TO: ALL OWNERS AND OPERATORS OF AFFECTED AIRCRAFT, RAYTHEON AVIATION CENTERS, CHIEF PILOTS, DIRECTORS OF OPERATIONS, DIRECTORS OF MAINTENANCE, AND ALL RAYTHEON AIRCRAFT AUTHORIZED SERVICE CENTERS, AND INTERNATIONAL DISTRIBUTORS AND DEALERS.

MODELS: BEECH MENTOR 45 (MILITARY YT-34), SERIALS G-3 THROUGH G-6; A45 (MILITARY T-34A), SERIALS G-7 AND AFTER; B45, SERIALS CG-1 AND AFTER; D45 (MILITARY T-34B), SERIALS BG-1 AND AFTER; AND T-34, B45 MANUFACTURED BY CANADIAN CAR AND FOUNDRY, SERIALS 34-1 THROUGH 34-125.

BEECH BONANZA MODEL 35 THROUGH MODEL G35, ALL SERIALS WHICH HAVE INSTALLED T-34 WINGS PER STC OR FIELD APPROVAL.

SUBJECT: WING SPAR ASSEMBLY AND WING ATTACHMENT FITTING FATIGUE FRACTURES – ADDITIONAL INFORMATION, GROUNDING OF AIRPLANES.

On April 19, 1999, a Beech Model A45 (T-34A) crashed near Rydal, Georgia. Investigation by the National Transportation Safety Board (NTSB), assisted by Raytheon Aircraft Company (RAC), revealed that the crash was preceded by an in-flight separation of the right wing during mock aerial combat with another T-34A airplane. Both occupants of the airplane sustained fatal injuries. Examination of the right wing initial separation fractures by NTSB and RAC metallurgists established the presence of fatigue on several of the fracture surfaces. The accident airplane was manufactured in early 1955 and accumulated about 4,000 hours in military service. It was then sold to an individual who flew it for less than 200 hours over the next 20 years. The airplane was then sold to the mock aerial combat operator, and accumulated approximately 4,000 additional hours in those operations.

The left wing remained attached to the airplane following separation of the right wing. During ground impact, the left wing forward and rear spars and the wing attach fittings sustained overload fractures. Some of those fracture surfaces also exhibited the presence of fatigue.

On April 5, 1999, another Beech T-34A crashed at Maracay, Venezuela, as a result of an in-flight wing separation following the performance of aerobatic maneuvers. An investigation was conducted by Venezuelan authorities, with assistance from RAC. The separation surfaces in the Venezuelan crash have not been available for inspection by RAC metallurgists and we are not certain whether those surfaces would also reflect the presence of fatigue.

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The YT-34, T-34A, and T-34B airplanes were designed as military trainers. Less than 1400 were built between 1953 and 1958. At that time, there was no requirement for establishment of a fatigue life for these three (3) models of military trainer. More important, the accumulated operational service history – the magnitude of g-loads experienced by the airframe and the number of applications of g-loads – of an individual airplane is unknown. Therefore, the remaining fatigue life of any individual airplane cannot be estimated. A history of ground damage or corrosion could also adversely affect the fatigue life of any individual airplane. Given the intermingling of spare and salvaged parts installed on airplanes in military service, it is usually impossible to determine accurately the overall history of the airplane.

The YT-34 and the T-34A were certified in the aerobatic category and the T-34B was certified in the utility category. However, there is no information as to operational or maintenance history which suggests that the T-34B is exempt from the same concerns with respect to fatigue life. RAC is aware that many T-34 airplanes have been subjected to aerobatic operations and other non-aerobatic operations that have imposed repeated and elevated g-loadings on the airplane. The fact that the T-34B is certified in the utility category is not an indicator of g-loading experienced by the airplane over its lifetime, nor is it an indicator of future g-loading.

The use of T-34 airplanes in mock aerial combat, in air show routines, and for aerobatic maneuvers accelerates the consumption of any available fatigue life in the airframe structure. Because, as explained above, the operational and maintenance history of any individual airplane cannot be determined, the remaining fatigue life for any individual airplane is unknown.

The investigation of T-34 accidents and incidents has led to the discovery of fatigue cracks in the following areas:

- Fatigue cracks in the right wing forward lower spar cap assembly at the outboard end of the wing attach fitting
- A fatigue crack in the right aft lower wing attach fitting
- Fatigue cracks in the right wing aft lower spar cap assemblies at the landing gear trunnion
- A fatigue crack in the left wing forward lower spar cap assembly at the outboard end of the wing attach fitting
- A fatigue crack in the right wing forward lower spar hinge extrusion 26 inches outboard of the wing attach fitting

While developing inspection procedures for the T-34 wings, additional areas of fatigue cracking were discovered in an accident-free T-34. This T-34 appeared to be in excellent condition and was extremely well maintained. At this point, these areas include:

- A fatigue crack in the right wing forward lower spar cap assembly at the outboard end of the wing attach fitting
- Three fatigue cracks in the right leading edge lower spar attach angle between the wing root and the landing gear trunnion
- A fatigue crack in the right wing box section lower forward spar attach angle between the root and the landing gear trunnion
- Multiple fatigue cracks in the left wing leading edge lower spar attach angle between the wing root and the landing gear trunnion
- A fatigue crack in the left wing box section lower forward spar attach angle between the wing root and the landing gear trunnion

There are at least three known T-34 airplanes with confirmed fatigue cracks. These cracks have been found at six location areas in the wing. Some of these areas have multiple cracks. Fatigue cracks are nearly impossible to detect without special equipment. They are concealed behind painted surfaces and "sandwiched" between adjacent structural parts that make them difficult to find. The multiple layer build up of aluminum sheet and aluminum extrusions in aircraft spar assemblies will easily conceal fatigue cracks from unqualified inspectors.

Fatigue cracks grow over time, even under light to moderate g-loads. If allowed to grow these cracks will reduce the wing's ability to carry limit load and will result in the in-flight separation of a wing. **DO NOT FLY THESE AIRPLANES.** In-flight wing separations are **EXTREMELY VIOLENT. The accompanying shock, damage, unusual attitudes, and abnormal g-loads of an in-flight wing separation can make escape with a parachute impossible.**

The NTSB, FAA, and RAC continue to cooperate in the investigation of T-34 accidents and are working together to determine additional actions to be taken with regard to T-34 airplanes. Until a final determination by FAA of the action required, the **YT-34, T-34A, T-34B AND 35 THROUGH G35 (with T-34 wings installed) AIRPLANES MUST NOT BE FLOWN.**

Note: RAC understands that an STC (or field approval) permitted installation of T-34A and T-34B wings on Bonanza Model 35 through Model G35 airplanes. Any owner of an aircraft so modified should contact your local Flight Standards District Office for more information.