

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

SP-20

Log 1819

ISSUED: October 31, 1985

Forwarded to:

Honorable Donald D. Engen
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-85-108 through -111

On August 30, 1985, a Cessna Model T303 Crusader, N6490V, crashed at Simi Valley, California, after sustaining an in-flight engine fire and loss of power during an instructional flight. The airplane essentially was new and had been operated for only approximately 60 hours since it was manufactured. It was destroyed as a result of ground impact and postimpact fire, and the three occupants aboard the airplane sustained serious burns.

The National Transportation Safety Board's investigation of the accident disclosed evidence of engine exhaust leakage (blowby) at the right engine turbocharger gasketed inlet surface and of a cracked brass fuel tee fitting, Teledyne Continental Motors (TCM) part No. 646289, on the nearby engine fuel metering unit. The Safety Board believes that pressurized fuel spurted from the cracked tee fitting in flight and was ignited by the hot turbocharger assembly and/or the exhaust leak. The resultant fire damaged the area surrounding the fuel metering unit, and the blowtorch effect created by the exhaust leakage impinged upon and burned through the silicon oil separator drain hose, Cessna part No. S2554-4. While the turbocharger inlet gasket on the left engine disclosed no similar evidence of exhaust leakage, the preimpact condition of the tee fitting on the fuel metering unit on the left engine and of the oil separator drain hose could not be determined because of severe postimpact fire damage.

Because of the potential hazards of similar exhaust leakage, fuel leakage, and fire affecting other Cessna Model T303 airplanes, the Federal Aviation Administration (FAA) should issue an Airworthiness Directive requiring an immediate inspection of the airplane's turbocharger inlet surfaces and surrounding areas for evidence of leakage or fire and an inspection of the fuel metering unit tee fitting, TCM part No. 646289, for evidence of cracks.

Additionally, because of its location immediately adjacent to the intensely hot engine exhaust assembly, and the circumstances of the accident involving N6490V, the Safety Board believes that the silicon oil separator drain hoses, Cessna part No. S2554-4, should be replaced with flexible, fireproof stainless steel braided hoses.

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The exhaust leakage may have been caused by undertorquing of the bolts connecting the exhaust turbo inlet elbow to the turbocharger inlet surface, warped turbocharger inlet surfaces, and/or a defective or unsuitable turbocharger inlet gasket. Considering the aforementioned circumstances and the short time since the airplane was manufactured, the Safety Board believes that it would be prudent for the FAA to evaluate the adequacy of the turbocharger inlet gasket; the related turbocharger installation procedure, including bolt torque specifications; and the necessity of installing additional heat shielding on or around the exhaust-turbocharger assembly or on or around the fuel and oil lines and other vital components in close proximity to this assembly.

A metallurgical examination of the cracked tee fitting indicated that the entire fracture surface consisted of ductile dimples indicative of a ductile overload failure. No torsional shear dimples indicative of any twisting forces were observed. No evidence was found of any time-dependent failure mode such as fatigue or stress corrosion cracking. Consequently, the Safety Board believes that the crack in the tee fitting probably occurred when the fuel lines were being connected to it and as a result of an improper assembly procedure, i.e., failure to restrain the tee fitting properly as the fuel line nuts were being tightened. Since such an occurrence reflects a potential lack of quality control, it is imperative that the FAA review applicable Cessna Aircraft Company assembly procedures to protect the structural integrity of these and similar tee fittings during manufacture.

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

Issue an Airworthiness Directive applicable to Cessna Model T303 airplanes to require the following immediate action: (a) Inspect the turbocharger inlet surfaces for evidence of exhaust gas leakage (blowby) or fire due to undertorqued bolts, warped surfaces, or a defective or unsuitable gasket, and if evidence of leakage or fire is detected, take appropriate remedial action, and (b) Remove and inspect the fuel metering unit tee fittings, Teledyne Continental Motors part No. 646289, for evidence of cracks and install new tee fittings as necessary or as an alternative to inspection, using the proper tee fitting/fuel line installation procedures. (Class I, Urgent Action) (A-85-108)

Issue an Airworthiness Directive applicable to Cessna Model T303 airplanes to require the replacement of silicon oil separator drain hoses, Cessna part No. S2554-4, with flexible, fireproof stainless steel braided hoses. (Class II, Priority Action) (A-85-109)

Evaluate the suitability of the turbocharger inlet gaskets on Cessna Model T303 airplanes; the related turbocharger installation procedure, including bolt torque specifications, and the necessity of installing additional heat shielding on or around the exhaust turbocharger assembly or on or around the fuel and oil lines and other vital components in close proximity to this assembly. If warranted, require the installation of additional exhaust-turbocharger heat shielding and a redesigned or improved turbocharger inlet gasket on both new and in-service airplanes, and prescribe appropriate torque values for bolts connecting the turbocharger to the turbo inlet elbow in applicable assembly, maintenance, or service manuals. (Class II, Priority Action) (A-85-110)

Review manufacturing quality control procedures during aircraft assembly at the Cessna Aircraft Company to ensure the structural integrity of the fuel metering unit tee fittings, Teledyne Continental Motors part No. 646289, and similar fittings. (Class II, Priority Action) (A-85-111)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, Member, concurred in these recommendations.

By: *Patricia A. Goldman*
Jim Burnett
Chairman *ja*