

**Textron Lycoming**  
**Model O-235, O-320, IO-320, LO-320, O-360, IO-360,**  
**LO-360, LIO-360, TIO-360, TVO-435, O-540, IO-540,**  
**TIO-540 and R-680 Series Reciprocating Engines**

**Teledyne Continental**  
**[AD 94-14-13 L](#)**  
**Effective June 23, 1994**  
**Recurring: No**

**[Priority Letter Airworthiness Directive](#)**

## **Department of Transportation**

**[Docket No. 94-ANE-34; AD 94-14-13]**

**AGENCY:** Federal Aviation Administration, DOT.

**DATES:** Issued on June 23, 1994.

**AD#: 94-14-13**

This priority letter airworthiness directive (AD) is prompted by reports of aviation gasoline (avgas) being contaminated by Jet A fuel. After investigation the source of the contamination has been determined to be the refiner of the avgas. Through its distribution system, the refiner inadvertently caused Jet A fuel to be loaded into distribution tanks intended for avgas. Contaminated avgas from these distribution tanks was then shipped to local fuel distributors. The Federal Aviation Administration (FAA) has determined that aircraft with certain Textron Lycoming (formerly Avco Lycoming) engines installed were fueled with this contaminated mixture between May 22 and June 2, 1994, at Sacramento Executive (SAC) airport, or between May 18 and June 2, 1994, at Sacramento Metro (SMF) airport. The list of U.S. registered aircraft specified in the applicability paragraph of this AD is based on investigation of fueling records secured from the two affected airports, which the FAA has determined to represent the population of affected engines. This condition, if not corrected, could result in detonation due to low octane, which can result in severe engine damage and subsequent failure.

This AD requires engines certified to operate on 91 octane or higher avgas to undergo a teardown and analytical inspection for detonation damage, and engines certified to operate on 80 octane avgas to undergo inspection for evidence of possible internal engine damage. Engineering analysis of operating these engines with avgas contaminated with Jet A fuel indicates that actual damage to the engine may range from unnoticeable to very severe, according to the duration of run, engine power level, and level of contamination. Damage may be characterized by increased operating temperatures resulting in damaged intake valves and burned pistons, and excessive loads imposed by detonation. Since internal damage may not be assessed by any other method, engines certified to operate on 91 octane or higher avgas must undergo a teardown and analytical inspection and any parts showing signs of detonation damage must be replaced. Investigation revealed the lowest octane level of the contaminated

fuel to be 83 octane, therefore engines certified to operate on 80 octane avgas need not undergo a teardown and analytical inspection unless evidence of internal engine damage is present by the required differential compression test and examination of the oil filter for metal particles. The refiner has advised the FAA that it will pay for any reasonable expense associated with the inspection and/or disassembly in accordance with the mechanic's and manufacturer's recommendations.

The FAA has reviewed and approved the technical contents of: **Avco Lycoming Service Bulletin (SB) No. 398**, dated April 30, 1976, that specifies that reciprocating engines operated with lower octane than that approved for the engine or contaminated with Jet A fuel should undergo a teardown and analytical inspection as the engine could sustain damage that cannot be assessed by any other method; and **Avco Lycoming Service Instruction (SI) No. 1191**, dated March 31, 1972, that describes procedures for differential compression tests.

Since an unsafe condition has been identified that is likely to exist or develop on other engines of this same type design that have been operated with contaminated fuel, this AD requires teardown and analytical inspection for engines certified to operate on 91 or higher octane avgas, and differential compression test and examination of the oil filter for engines certified to operate on 80 octane avgas. The actions are required to be accomplished in accordance with the SB and SI described previously.

Pursuant to the authority of the Federal Aviation Act of 1958, delegated to me by the Administrator, the following priority letter AD 94-14-13, applicable to the Textron Lycoming (formerly Avco Lycoming) reciprocating engines specified in this AD, is issued and is effective immediately upon receipt.

**94-14-13 TEXTRON LYCOMING:** Priority Letter issued on June 23, 1994. Docket No. 94-ANE-34.

**Applicability:** Textron Lycoming (formerly Avco Lycoming) O-235-12C, O-235-L, O-320-A, O-320-B2C, O-320-E, O-320-E2A, O-320-E2D, O-320-E20, O-320-D2J, O-320-D3G, O-320-H2AD, IO-320-B, IO-320-B, IO-320-C, LO-320-A4K, LO-320-D1D, O-360-A, O-360-A4M, O-360-F, IO-360-A, IO-360-BIB, IO-360-C, LO-360-A1A, LO-360-A1D, LIO-360-A1A, LIO-360-A3B6D, TIO-360-C, TVO-435-AIA, O-540-E, O-540-C, O-540-J, IO-540-C, IO-540-D, IO-540 E 290, IO-540-K, TIO-540-F, TIO-540-J, TIO-540-S, 165D-540-B 380, and R-680 series reciprocating engines, installed on the following U.S. registered aircraft:

N1010F, N106RE, N1068M, N110MP, N1285X, N1317P, N1344V, N14006, N15851, N1666C, N177DT, N1920F, N1928Q, N20HT, N20NC, N20ND, N207X, N2040Q, N2128W, N2165M, N2185K, N2232Z, N22874, N2300R, N2346G, N2394Q, N24395, N24627, N24860, N250M, N2555V, N25562, N2578L, N2603Y, N26602, N28FG, N2811R, N2815F, N2817Q, N2819A, N2848Q, N28683,

N2927M, N2964K, N3060M, N32388, N33696, N34242, N36358, N3737U, N37500, N3945K, N40ES, N40VF, N400JM, N4222J, N4293Y, N4316T, N4320F, N4497U, N4515P, N4602S, N4674S, N4687P, N47SG, N4796V, N47964, N48ES, N494FL, N5199U, N52015, N5217L, N5254K, N5344K, N5418W, N54228, N54661, N5547Q, N55521, N56GS, N56884, N59850, N6005Z, N6045M, N61569, N6239H, N62801, N6286W, N6297V, N63R, N6370P, N6412D, N64120, N6480D, N6483Q, N6493Q, N65425, N671A, N67615, N67975, N68SC, N68937, N6905V, N7ZX, N70416, N71RJ, N711PG, N714ZU, N7157V, N7195G, N7213P, N7230F, N7230Q, N7248H, N73064, N733WH, N734TA, N7361R, N737CM, N737NV, N738GX, N738KC, N738KF, N738KK, N738RC, N738ZL, N739RF, N75381, N755GA, N756RV, N757SK, N757SX, N757TU, N7724M, N777EE, N78887, N78901, N7894V, N792BW, N804EH, N8070P, N8094Q, N81RP, N81203, N8144G, N8149E, N8184X, N8201B, N82182, N8223W, N8264W, N8286W, N8306D, N8372L, N8494E, N8537J, N8579H, N8691Y, N8810P, N8961P, N9114H, N9140J, N9157S, N9296P, N9407K, N9444R, N9451B, N95WT, N9574L, N96TB, N96134, N9666V, N9673L, N9728U, N9783L, N9808J and N9864C.

**Compliance:** Required as indicated, unless accomplished previously.

To prevent detonation due to low octane, which can result in severe engine damage and subsequent failure, accomplish the following:

- (a) For engines that are certified to operate on only 91 or higher octane aviation gasoline (avgas) within the next 2 hours time in service (TIS) after the effective date of this airworthiness directive (AD) perform an engine teardown and analytical inspection, and replace with serviceable parts as necessary in accordance with **Avco Lycoming Service Bulletin (SB) No. 398**, dated April 30, 1976.
- (b) For engines that are certified to operate on 80 octane avgas, within the next 2 hours TIS after the effective date of this AD conduct a differential compression test on all cylinders in accordance with **Avco Lycoming Service Instruction (SI) No. 1191**, dated March 31, 1972, and examine the oil filter by cutting the oil filter apart and spreading the filter paper out to look for metal particles. If metal particles are present, or if one or more cylinders shows unacceptable compression as specified in **Avco Lycoming SI No. 1191**, dated March 31, 1972, perform an engine teardown and analytical inspection, and replace with serviceable parts as necessary in accordance with **Avco Lycoming SB No. 398**, dated April 30, 1976.
- (c) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Engine and Propeller Standards Staff. The request should be forwarded through an appropriate FAA Maintenance Inspector, who may add comments and then send it to the Manager, Engine and Propeller Standards Staff.

**Note:** Information concerning the existence of approved alternative methods of compliance with this airworthiness directive, if any, may be obtained from the Engine and

Propeller Standards Staff.

- (d) Special flight permits may be issued in accordance with sections 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the aircraft to a location where the requirements of this AD can be accomplished.
- (e) Priority Letter AD 94-14-13, issued June 23, 1994, becomes effective upon receipt.

**FOR FURTHER INFORMATION CONTACT:** Locke Easton, Aerospace Engineer, Engine and Propeller Standards Staff, FAA, Engine and Propeller Directorate, 12 New England Executive Park; telephone (617) 238-7113, fax (617) 238-7199.

**Manufacturer's Service Information:**

[Avco Lycoming Service Bulletin \(SB\) No. 398](#)

[Avco Lycoming Service Instruction \(SI\) No. 1191](#)