

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39 [65 FR 15531 3/23/2000]

[Docket No. 96-ANE-36-AD; Amendment 39-11624; AD 2000-05-14]

RIN 2120-AA64

Airworthiness Directives; AlliedSignal Inc. ALF502 and LF507 Series Turbofan Engines

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final rule.

SUMMARY: This amendment supersedes two existing airworthiness directives (AD's), applicable to AlliedSignal Inc. ALF502 and LF507 series turbofan engines, that require rework or replacement of No. 4 and 5 bearing oil system hardware, initial and repetitive inspections of the oil system, optional installation of an improved oil filter bypass valve, and repetitive inspection of No. 4 and 5 bearing oil inlet tube, to ensure the integrity of the reduction gear system and overspeed protection system. This action would require replacement of the existing power turbine bearing housing assembly with a new, improved power turbine bearing housing assembly, and installation of a reworked or modified fourth turbine rotor disk assembly as a part of a design change to the new No. 4 bearing configuration that eliminates the requirement for repetitive inspections of oil system and No. 4 and 5 bearing oil inlet tube assembly. This amendment is prompted by one report of a contained power turbine rotor shaft separation forward of the Stage 4 low pressure turbine (LPT) rotor on an AlliedSignal Inc. ALF502R-5 engine. The LPT failure was caused by improper inspection of the engine oil system required by AD 97-05-11 R1. The actions specified by this AD are intended to prevent a No. 4 and 5 duplex bearing failure, which can result in a Stage 4 LPT rotor failure, an uncontained engine failure, and damage to the airplane.

DATES: Effective date April 27, 2000.

The incorporation by reference of SB ALF 502R-72-0160, revision 2, dated May 26, 1987; ALF 502R-72-0160, revision 1, dated March 23, 1987; SB ALF502R 79-9 revision 1, dated November 27, 1996; SB ALF502L 79-0171, revision 1, dated November 27, 1997; SB ALF502R-79-0162, revision 2, dated September 8, 1987; SB ALF502R-79-0162, revision 1, dated May 26, 1987; SB ALF502R-79-0162, dated March 23, 1987 SB LF507-1F-79-5, revision 1, dated November 27, 1996; and SB LF507-1H-79-5, revision 1, dated November 27, 1996, was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51 as of April 16, 1997.

The incorporation by reference of certain publications listed in the regulations is approved by the Director of the Federal Register as of April 27, 2000.

ADDRESSES: The service information referenced in this AD may be obtained from AlliedSignal Aerospace, Attn: Data Distribution, M/S 64-3/2101-201, P.O. Box 29003, Phoenix, AZ 85038-9003; telephone (602) 365-2493, fax (602) 365-5577. This information may be examined at the Federal Aviation Administration (FAA), New England Region, Office of the Regional Counsel, 12 New England Executive Park, Burlington, MA; or at the Office of

the Federal Register, 800 North Capitol Street, NW, suite 700, Washington, DC.

FOR FURTHER INFORMATION CONTACT: Robert Baitoo, Aerospace Engineer, Los Angeles Aircraft Certification Office, FAA, Transport Airplane Directorate, 3960 Paramount Blvd., Lakewood, CA 90712-4137; telephone 562-627-5245; fax 562-627-5210.

SUPPLEMENTARY INFORMATION: A proposal to amend part 39 of the Federal Aviation Regulations (14 CFR part 39) by superseding AD 80-22-53, Amendment 39-3995 (45 FR 83202, December 18, 1980) and AD 97-05-11 R1, Amendment 39-10091 (62 FR 41262, August 1, 1997) which are applicable to AlliedSignal Inc. ALF502 and LF507 series turbofan engines was published in the Federal Register on October 14, 1998 (63 FR 55056). That action proposed to require rework or replacement of No. 4 and 5 bearing oil system hardware, initial and repetitive inspections of the oil system, optional installation of an improved oil filter bypass valve, a more stringent oil system inspection of the full flow chip detector, oil filter impending bypass button, oil acid number, oil color, and oil quantity. Manufacturer Service Information

The FAA has reviewed and approved the technical contents of the accomplishment instruction paragraphs of AlliedSignal Inc. Service Bulletin (SB) No. ALF/LF 72-1030, Revision 2, dated December 14, 1998, and AlliedSignal Inc. SB No. ALF/LF 72-1040, Revision 1, dated December 14, 1998, that describe procedures for installation of a reworked or modified fourth turbine rotor disk assembly, and that describes procedures for replacement of the existing power turbine bearing housing assembly with a new, improved power turbine bearing housing assembly.

Requirements of this AD

Since an unsafe condition has been identified that is likely to exist or develop on other products of this same type design, this AD supersedes AD's 80-22-53 and 97-05-11 R1 to require replacement of the existing power turbine bearing housing assembly with a new, improved power turbine bearing housing assembly, and installation of a reworked or modified fourth turbine rotor disk assembly as a part of design change to the new No. 4 bearing configuration, that eliminates the requirements for repetitive inspections of oil system and No. 4 and 5 bearing oil inlet tube assembly Correction to Note 2

Reference to Avco Lycoming Textron SB No. ALF 502R-72-0160, Revision 2, dated May 26, 1987, which was inadvertently omitted from the NPRM and has been added to Note 2. Revision 2 to SB No. ALF 502R-72-0160, dated May 26, 1987, was an editorial change to the SB and does not affect the technical content of the SB.

Interested persons have been afforded an opportunity to participate in the making of this amendment. No comments were received on the proposal or the FAA's determination of the cost to the public. The FAA has determined that air safety and the public interest require the adoption of the rule with the changes described previously. Economic Cost Analysis

There are approximately 1,500 AlliedSignal Inc. ALF502 and LF507 series turbofan engines of the affected design in the worldwide fleet. The FAA estimates that 300 engines installed on airplanes of U.S. registry will be affected by this AD, that it will take approximately 20 work hours per engine to accomplish the required actions, and that the average labor rate is \$60 per work hour. Required parts will cost approximately \$30,000 per engine. Based on these figures, the total cost impact of the AD on U.S. operators is estimated to be \$9,540,000. Regulatory Impact

This final rule does not have federalism implications, as defined in Executive Order (EO) No. 13132, because it does not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Accordingly, the FAA has not consulted with state authorities prior to publication of this final rule.

For the reasons discussed above, I certify that this action (1) is not a "significant regulatory action" under Executive Order 12866; (2) is not a "significant rule" under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979); and (3) will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. A final evaluation has been prepared for this action and it is contained in the Rules Docket. A copy of it may be obtained from the Rules Docket at the location provided under the caption "**ADDRESSES**."

List of Subjects in 14 CFR Part 39

Air Transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration amends part 39 of the Federal Aviation Regulations (14 CFR part 39) as follows:

PART 39 - AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§39.13 [Amended]

2. Section 39.13 is amended by removing Amendment 39-3995 (45 FR 83202, December 18, 1980), and amendment 39-10091 (62 FR 41262, August 1, 1997) and by adding a new airworthiness directive to read as follows:

AIRWORTHINESS DIRECTIVE

REGULATORY SUPPORT DIVISION
P.O. BOX 26460
OKLAHOMA CITY, OKLAHOMA 73125-0460

U.S. Department
of Transportation
**Federal Aviation
Administration**

The following Airworthiness Directive issued by the Federal Aviation Administration in accordance with the provisions of Title 14 of the Code of Federal Regulations (14 CFR) part 39, applies to an aircraft model of which our records indicate you may be the registered owner. Airworthiness Directives affect aviation safety and are regulations which require immediate attention. You are cautioned that no person may operate an aircraft to which an Airworthiness Directive applies, except in accordance with the requirements of the Airworthiness Directive (reference 14 CFR part 39, subpart 39.3).

2000-05-14 ALLIEDSIGNAL INC.: Amendment 39-11624. Docket 96-ANE-36-AD
Supersedes AD 80-22-53, Amendment 39-3995, and AD 97-05-11 R1, Amendment 39-10091.

Applicability: Allied Signal Inc. (formerly Textron Lycoming and Avco Lycoming) ALF502 and LF507 series turbofan engines, installed on but not limited to British Aerospace BAe 146-100A, BAe 146-200A, BAe 146-300A, AVRO 146-RJ70A, AVRO 146-RJ85A, AVRO 146-RJ100A, and Canadair Model CL-600-1A11 series airplanes.

NOTE 1: This airworthiness directive (AD) applies to each engine identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For engines that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with paragraph (h) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

Compliance: Required as indicated, unless accomplished previously.

To prevent a No. 4 and 5 duplex bearing failure, which can result in a Stage 4 low pressure turbine (LPT) rotor failure, an uncontained engine failure, and damage to the airplane, accomplish the following:

Replacement or Rework of the No. 4 and 5 Bearing Inlet Assembly

(a) For AlliedSignal Inc. (formerly Textron Lycoming and Avco Lycoming) ALF502L and ALF502L2 series engines, prior to further flight, rework or replace the following parts and reassemble in accordance with Avco Lycoming Service Bulletin (SB) No. ALF502-72-0008, Revision 1, dated October 14, 1980, and SB No. ALF502-72-0010, dated October 14, 1980:

- (1) Remove No. 4 and 5 bearing inlet tube assembly, part number (PN) 2-141-380-07/-08/-11/-12 and replace with PN 2-141-380-13/-14.
- (2) Remove adapter assembly, PN 2-141-640-01 and replace with PN 2-141-640-02.
- (3) If not previously incorporated, install Bracket, PN 2-143-049-01, spacer PN 2-143-051-01, two bolts PN STD3061-11, Clamp PN TA1501H05, Bolt PN MS9565-06, Nut PN STD3073-3, and Washer PN STD3035C2.
- (4) Rework fourth stage turbine nozzle, PN 2-141-150-38, to PN 2-141-150-42, or PN 2-141-150-39 to PN 2-141-150-41 in accordance with SB No. ALF502-72-0010.
- (5) Rework upper half of fire shield, PN 2-163-990-04 to 2-163-990-07, or PN 2-163-

990-05 to 2-163-990-08 in accordance with SB No. ALF502-72-0010.

(6) Install: Washer, PN 2-163-585-01, and Spring PN 2-163-586-01, and Retainer PN 2-163-584-01.

(7) Remove oil feed line, PN 2-173-240-02 and replace with PN 2-303-377-01.

(8) Remove jam nut, PN R44118P05W. (The function of the jam nut is accomplished by the parts in paragraphs (a)(6) and (a)(7) of this AD.)

(9) Remove oil inlet support bracket, PN 2-141-335-02 and replace with PN 2-141-335-03.

(b) After replacement of the No. 4 and 5 bearing oil inlet tube and associated hardware in accordance with paragraph (a) of this AD, inspect the No. 4 and 5 bearing oil inlet tube at intervals not to exceed 100 hours time in service (TIS) since last inspection for chafing, in accordance with Avco Lycoming SB No. ALF502-72-0008, Revision 1, dated October 14, 1980. Prior to further flight, replace oil inlet tubes that exhibit chafing in excess of 0.010 inch deep with serviceable parts.

Inspection of Oil Filter Bypass Valve

(c) For ALF502R series engines equipped with oil filter bypass valve, PN 2-303-432-01, accomplish the following:

(1) Inspect the engine oil filter bypass valve for leakage within the next 25 hours TIS or 25 flights in service, whichever occurs first, from the effective date of this AD, in accordance with Avco Lycoming Textron SB No. ALF 502R-79-0162, Original, dated March 23, 1987, or Revision 1, dated May 26, 1987. Prior to further flight, remove from service oil filters exhibiting any leakage and replace with serviceable parts.

(2) Thereafter, inspect the oil filter bypass valve for any leakage in accordance with Avco Lycoming Textron SB No. ALF 502R-79-0162, Original, dated March 23, 1987, or Revision 1, dated May 26, 1987, at intervals not to exceed 50 hours TIS or 50 flights in service since last inspection, whichever occurs first, and at the same time accomplish the following:

(i) Visually inspect the following engine chip detectors for metal contamination:

(A) For engines with a full flow chip detector installed, inspect the full flow chip detector.

(B) For engines without a full flow chip detector installed, inspect the chip detectors located in the accessory gearbox, Number 2 bearing scavenge line, and No. 4 and 5 bearing scavenge line.

(ii) For engines with engine chip detectors exhibiting Condition 3, or Condition 2, or Condition 1 where the oil filter bypass indicator is extended, prior to further flight, remove oil filter bypass valves exhibiting any leakage and replace with a serviceable part.

NOTE 2: Chip detector conditions are described in Figures 1, 2 and 3 of Avco Lycoming Textron SB No. ALF 502R-72-0160, Revision 1, dated March 23, 1987, or Revision 2, dated May 26, 1987.

(3) At the next engine shop visit, or within 2,500 hours TIS after the effective date of this AD, whichever occurs first, conduct the oil filter bypass valve spring compression force check, in accordance with Avco Lycoming Textron SB No. ALF 502R-79-0162, Original, dated March 23, 1987. Oil filter bypass valves that do not comply with the spring compression force limits contained in Avco Lycoming Textron SB No. ALF502R-79-0162, Original, dated March 23, 1987, must be removed and replaced with oil filter bypass valve, PN 2-303-432-02. Replacement of oil filter bypass valve, PN 2-303-432-01, with the improved oil filter bypass valve, PN 2-303-432-02, constitutes terminating action for the inspection requirements of

paragraphs (c)(1) and (c)(2) of this AD.

Definition of a Shop Visit

(4) For the purpose of this AD, an engine shop visit is defined as engine maintenance that entails any of the following:

(i) Separation of a major engine flange (lettered or numbered) other than flanges mating with major sections of the nacelle reverser. Separation of flanges purely for purposes of shipment, without subsequent internal maintenance, is not a "shop visit."

(ii) Removal of a disk, hub, or spool.

(iii) Removal of the fuel nozzles.

(d) For ALF502R, ALF502L, LF507-1F, and LF507-1H series engines, equipped with the No. 4 and 5 duplex bearing assembly numbers 2-141-930-01, 2-141-930-02, or 2-141-930-03, perform the repetitive oil system maintenance and inspections in accordance with the intervals and procedures described in the Accomplishment Instructions paragraphs of the applicable AlliedSignal Inc. SBs referenced in paragraphs (d)(1), (d)(2), (d)(3), and (d)(4) of this AD, within the next 25 hours TIS or 25 flights in service, whichever occurs first, from the effective date of this AD.

(1) For ALF502R series engines, in accordance with AlliedSignal Inc. SB No. ALF502R 79-9, Revision 1, dated November 27, 1996.

(2) For ALF502L series engines, in accordance with AlliedSignal Inc. SB No. ALF502L 79-0171, Revision 1, dated November 27, 1996.

(3) For LF507-1F series engines, in accordance with AlliedSignal Inc. SB No. LF507-1F-79-5, Revision 1, dated November 27, 1996.

(4) For LF507-1H series engines, in accordance with AlliedSignal SB No. LF507-1H-79-5, Revision 1, dated November 27, 1996.

Modification of the No. 4 and 5 Duplex Bearing Assembly

(e) Modify the fourth turbine rotor disk assembly at the next access to the No. 4 and 5 duplex bearing assembly during the engine shop visit not to exceed 6,000 cycles in service (CIS) or 6,000 hours TIS, whichever occurs first, from the effective date of this AD, in accordance with the accomplishment instructions paragraph of AlliedSignal Inc. SB No. ALF/LF 72-1030, Revision 2, dated December 14, 1998.

(f) Modify the power turbine bearing housing assembly at the next access to the No. 4 and 5 duplex bearing assembly during the engine shop visit not to exceed 6,000 CIS or 6,000 hours TIS, whichever occurs first, from the effective date of this AD, in accordance with the accomplishment instructions paragraph of AlliedSignal Inc. SB No. ALF/LF 72-1040, Revision 1, dated December 14, 1998.

(g) Performance of the modifications described in paragraphs (e) and (f) of this AD constitutes terminating action to the rework and replacement requirements of paragraph (a), and the repetitive inspection requirements of paragraphs (b), (c), and (d) of this AD.

NOTE 3: Installation of a reworked or modified fourth turbine rotor disk assembly as a part of a design change to the new No. 4 bearing configuration that eliminates the requirements for repetitive inspections of oil system does not relieve the operators from accomplishment of the engine oil system inspection in accordance with the engine manufacturer's applicable maintenance documents.

Alternative Method of Compliance

(h) 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, Los Angeles Aircraft Certification Office. Operators shall submit their requests through an appropriate FAA Principal Maintenance Inspector, who may add comments and then send it to the Manager, Los Angeles Aircraft Certification Office.

NOTE 4: Information concerning the existence of approved alternative methods of compliance with this airworthiness directive, if any, may be obtained from the Los Angeles Aircraft Certification Office.

Special Flight Permits

(i) 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 airplane to a location where the requirements of this AD can be accomplished.

Manufacturer Service Bulletins

(j) The inspections, modifications, and rework shall be done in accordance with the following AlliedSignal Inc. (formerly Textron Lycoming and Avco Lycoming) service bulletins:

Document No.	Pages	Revision	Date
ALF502-72-0008 Total Pages: 6	All	1	October 14, 1980
ALF502-72-0010 Total Pages: 8	All	Original	October 14, 1980
ALF/LF 72-1030 Total pages: 56	12	2	December 14, 1998
	3	1	February 23,1998
	4	2	December 14, 1998
	5	1	February 23,1998
	6-7	2	December 14, 1998
	8-9	1	February 23,1998
	10	2	December 14, 1998
	11-14	1	February 23,1998
	15	2	December 14, 1998
	16-17	1	February 23,1998
	18-55	2	December 14, 1998
	56 (blank)		
ALF/LF 72-1040 Total pages: 46	1-3	1	December 14, 1998
	4-13	Original	October 20, 1997
	14-46	1	December 14, 1998

(k) The incorporation by reference of SB ALF 502R-72-0160, revision 2, dated May 26, 1987; ALF 502R-72-0160, revision 1, dated March 23, 1987; SB ALF502R 79-9 revision 1, dated November 27, 1996; SB ALF502L 79-0171, revision 1, dated November 27, 1997; SB

ALF502R-79-0162, revision 2, dated September 8, 1987; SB ALF 502R-79-0162, revision 1, dated May 26, 1987; SB ALF502R-79-0162, dated March 23, 1987; SB LF507-1F-79-5, revision 1, dated November 27, 1996; SB LF507-1H-79-5, revision 1, dated November 27, 1996, was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51 as of April 16, 1997.

Address for Obtaining Referenced Service Bulletins

(l) Copies may be obtained from AlliedSignal Aerospace, Attn: Data Distribution, M/S 64-3/2101-201, P.O. Box 29003, Phoenix, AZ 85038-9003; telephone (602) 365-2493, fax (602) 365-5577. Copies may be inspected at the Federal Aviation Administration (FAA), New England Region, Office of the Regional Counsel, 12 New England Executive Park, Burlington, MA; or at the Office of the Federal Register, 800 North Capitol Street, NW, suite 700, Washington, DC.

(m) This amendment becomes effective on April 27, 2000.

Issued in Burlington, Massachusetts, on March 6, 2000.

David A. Downey, Assistant Manager, Engine and Propeller Directorate, Aircraft Certification Service.