LYCOMING
[redacted]
Williamsport, PA. 17701 U.S.A.
[redacted]

SERVICE INSTRUCTION

DATE: April 24, 2020

Service Instruction No. 1009BE
(Supersedes Service Instruction No. 1009BD)
Engineering Aspects are
FAA Approved

SUBJECT: Time Between Overhaul (TBO) Schedules

MODELS AFFECTED: Lycoming Engine Models Defined Herein

REASON FOR REVISION: Added a new paragraph at the end of the Operating Hour Time Period TBO section. Added new engine model IO-390-D to Table 1. Revised Table 2 to include separate listings for engine model O-540-F1B5 for the Robinson R44 and R44 Cadet. Revised Note 10 to include reference to Note 6. Revised the paragraph after the CAUTION in the CALENDAR TIME PERIOD TBO section. Revised Note 15,c.

NOTICE: Incomplete review of all the information in this document can cause errors. Read the entire Service Instruction to make sure you have a complete understanding of the requirements.

This Service Instruction identifies the Calendar Time Period in years and the Operating Hour Time Period in hours of engine operation for the Time Between Overhaul (TBO) for certified Lycoming engine models operated and maintained in compliance with all applicable Lycoming Technical Publications and FAA Airworthiness Directives.

The TBOs stated in this Service Instruction do not apply to engines that:

a. Do not conform to the original engine model type certificate configuration;
b. Have been assembled, repaired, or overhauled with FAA-PMA parts, where the FAA-PMA parts have not been approved for use by Lycoming (contact Lycoming for information regarding FAA-PMA parts approved for use by Lycoming);
c. Have been maintained or overhauled using methods other than Lycoming approved procedures; or
d. Have been operated outside Lycoming's published specifications.

⚠ **CAUTION** REPAIR OR MODIFICATION OF ENGINES USING PARTS OR PROCEDURES NOT APPROVED BY LYCOMING CAN DAMAGE OR AFFECT THE DURABILITY, SAFETY, AND RELIABILITY OF THE ENGINE. AS A RESULT, SERVICE LIFE CANNOT BE PREDICTED FOR ENGINES THAT HAVE UNDERGONE UNAPPROVED REPAIR OR MODIFICATION.

Engine accessories and propellers can require overhaul prior to engine overhaul. TBO extensions authorized by this Service Instruction do not alter any engine accessory or propeller manufacturer's recommended overhaul schedule. Overhaul accessories and propellers in accordance with the appropriate manufacturer's recommendation.

The information in this revision of Service Instruction No. SI-1009 is approved by the FAA as an Alternative Method of Compliance (AMOC) for AD-2012-19-01, paragraphs (f)(1)(i) and (f)(2)(i).

This Service Instruction is based on the engine being active in a 30-day period. If it is known that an engine is to remain inactive for 30 or more days, refer to the latest revision of Service Letter L180.

CALENDAR TIME PERIOD TBO

All engine models are to be overhauled within twelve (12) calendar years of the date they first entered service or of last overhaul. This calendar year time period TBO is to mitigate engine deterioration that occurs with age, including corrosion of metallic components and degradation of non-metallic components such as gaskets, seals, flexible hoses and fuel pump diaphragms.

⚠ CAUTION CALENDAR YEAR TBO IS BASED ON ACCELERATED TESTING AND OVERALL FLEET SERVICE DATA. LOCAL CLIMATE CONDITIONS, STORAGE CONDITIONS, FREQUENT EXTENDED PERIODS OF INACTIVITY, PRESERVATION TECHNIQUES USED DURING INACTIVE PERIODS, AND FREQUENCY OF OIL CHANGES CAN AFFECT CORROSION OF METALS AND DEGRADATION OF NON-METALS.

For FAA Part 91 or EASA Part NCO (non-commercial) or equivalent operations, only an appropriately rated and qualified maintenance person (or international equivalent) can allow the twelve (12) calendar year TBO to be exceeded with concurrence from the controlling civil aviation authority to verify agreement with this provision and after thoroughly examining the engine for corrosion and degradation in accordance with 14 CFR 43 Appendix D (or international equivalent) and determining that the engine remains in an airworthy condition. This inspection is to be repeated annually or as necessary to ensure continued airworthiness. The twelve (12) calendar year TBO must not be exceeded if the engine is affected by AD 2012-19-01 and not in compliance with AD 2012-19-01.

⚠ WARNING OPERATION OF AN ENGINE IN A NON-AIRWORTHY CONDITION COULD RESULT IN LOSS OF LIFE, SERIOUS INJURY, AND DAMAGE TO PROPERTY. ENGINES ARE NOT TO BE OPERATED BEYOND 12 YEARS UNLESS CERTIFIED AS AIRWORTHY BY QUALIFIED MAINTENANCE PERSONNEL. ENGINES THAT FAIL TO OPERATE WITHIN LYCOMING'S PUBLISHED OPERATING SPECIFICATIONS OR THAT SHOW ANY EVIDENCE OF CORROSION, WEAR, DAMAGE, OR OTHER CONDITION AFFECTING AIRWORTHINESS MUST BE IMMEDIATELY REMOVED FROM SERVICE AND OVERHAULED PER LYCOMING TECHNICAL PUBLICATIONS.

OPERATING HOUR TIME PERIOD TBO

Operating Hour TBOs for fixed wing aircraft are in Table 1 and for rotary wing aircraft are in Table 2. These TBOs are to mitigate engine deterioration that occurs during normal operation such as wear and high cycle fatigue of metallic components.

⚠ CAUTION OPERATING HOUR TBOS ARE BASED ON ACCELERATED TESTING AND OVERALL FLEET SERVICE DATA. BECAUSE OF VARIATIONS IN THE MANNER IN WHICH ENGINES ARE OPERATED AND MAINTAINED, LYCOMING CANNOT GIVE ASSURANCE THAT ANY INDIVIDUAL OPERATOR WILL ACHIEVE THE OPERATING HOUR TBOS IDENTIFIED HEREIN.

NOTICE: The TBOs for engines used in crop dusting or other chemical application is a maximum of 1500 hours, or the time referenced in Tables 1 and 2, whichever is lower.

Tables 1 and 2 have references to the NOTES at the end of this Service Instruction with specific information regarding the engine overhaul intervals.

Engine operating hours will be monitored and recorded using the same procedure or method that the airframe manufacture or operator has chosen to monitor Time in Service for maintenance time records in accordance with 14 CFR 1.1 or its international equivalent.

Table 1
Fixed Wing Aircraft
Operating Hour Time Between Overhaul Periods

Engine Models/Series	See Note	Hours
O-235 (except -F, -G, -J)	12	2400
O-235-F, -G, -J	13	2000
O-290-D	--------	2000
O-290-D2	--------	1500
O-320 (except O-320-H)	1,10,11,15,16	2000
O-320-H	11	2000
IO-320-A, -E	1,10,11,15,16	2000
IO-320-B, -D, -F	4,6,10,11,15,16	2000
IO-320-C	2,4,10,11	1800
AIO-320 (160 HP)	6	1600
AEIO-320	6	1600
O-340	1	2000
O-360 (except O-360-E)	1,4,10,11,15,16	2000
O-360-E	4,11	2000
IO-360-L2A	11,15,16	2000
IO-360-A, -C, -D, -J (200 HP)	4,5,6,10,11,15,16	2000
IO-360-B, -E, -F, -M, -N, -P (180 HP)	1,4,10,11,15,16	2000
TO-360-C, -F; TIO-360-C	3,11	1800
TO-360-E (180 HP)	3,4,11	1800
AIO-360 (200 HP)	6	1400
TIO-360-A	3,11	1200
AEIO-360 (180 HP)	6	1600
AEIO-360 (200 HP)	6	1400
IO-390-A, -C, -D	11,15,16	2000
AEIO-390-A	6	1400
O-435; GO-435	--------	1200
GO, GSO-480; IGSO-480	1	1400
O-540-A, -B, -E4A5	1,10,15	2000
O-540-E4B5, -E4C5	1,11,15,16	2000
O-540-G, -H, -J	10,11,15,16	2000
O-540-L3C5D	2,11	2000
IO-540-A, -B (290 HP)	1,10,11	1400
IO-540-AG1A5	--------	1800
IO-540-C	1,10,11,15,16	2000
IO-540-D	1,10,15,	2000
IO-540-E, -G, -P	1,10,11	1600
IO-540-S, -AA	2,10	1800

Table 1 (Cont.)
Fixed Wing Aircraft
Operating Hour Time Between Overhaul Periods

Engine Models/Series	See Note	Hours
IO-540-J, -R	2,10	1800
IO-540-J4A5	10	2000
IO-540-AB1A5, -AC1A5, -AF1A5	11,15,16	2000
IO-540-K, -L, -M, -N, -T, -V, -W	10,11,15,16	2000
AEIO-540	6	1400
IGO & IGSO-540	--------	1200
TIO-540-V, -W, -AE	3,4,11	2000
TIO-540-C, -AA, -AB, -AF, -AG, -AH, -AJ, -AK	3,4,7,11	2000
TIO-540-A, -F, -J, -N, -R, -S, -U	3,4,11,14	1800
TIO-541-A (320 HP)	3	1300
TIO-541-E (380 HP)	3,9	1600
TIGO-541 (425 HP)	3	1200
IO-580-B1A	11,15,16	2000
AEIO-580-B1A	6	1400
IO-720	11	1800
TEO-540-A1A, -C1A	3,4,11	2000

Table 2
Rotary Wing Aircraft
Operating Hour Time Between Overhaul Periods

Engine Models/Series	See Note	Hours
O-320-A2C, -B2C	11,15,16	2000
HO-360-C1A	11	2000
O-360-C2B,-C2D; HO-360 (except –C1A); HIO-360-B	--------	1500
O-360-J2A	11,15,16	2000
HIO-360-A, -C, -D, -E, -F	--------	1500
HIO-360-G1A	11	2000
VO-360-A	--------	600
VO-360-B; IVO-360	--------	1000
HIO-390-A1A	11,15,16	2000
VO-435-A	--------	1200
VO-435-B	--------	1200
TVO-435	3	1000
O-540-F1B5 (Robinson R44)	11,15,16	2000
O-540-F1B5 (Robinson R44 CADET)	15	2200
IO-540-AE1A5	11,15,16	2000
VO-540	8	1200
IVO-540	--------	600
TVO, TIVO-540	3,8	1200

NOTES

1. Only engines built with 1/2 in. (12.7 mm) dia. exhaust valve stems. Engines of this series with 7/16 in. (11.1 mm) dia. exhaust valves must not exceed 1200 hours between overhauls regardless of the type of operation. New and rebuilt engines built with 1/2 in. (12.7 mm) dia. exhaust valve stems are identified, respectively, by serial numbers and date in the latest revision of Service Instruction No. 1136.
2. These engines are designed to incorporate exhaust turbocharging.
3. Turbochargers could require removal, prior to engine overhaul, for carbon removal and repair.
4. Engines with reverse rotation have same overhaul times as corresponding normal rotation engines.
5. 1200 HOURS: Engines that do not have large main bearing dowels must not be operated more than 1200 hours between overhauls.

   1400 HOURS: Engines that have large main bearing dowels can be operated to 1400 hours between overhauls. These include engines with serial numbers L-7100-51A and up, and L-101-67A and up; engines which are in compliance with the latest revision of Service Bulletin No. 326; and remanufactured engines shipped after January 26, 1970.

   2000 HOURS: Engines that have large main bearing dowels and redesigned camshafts can be operated to 2000 hours between overhauls. These include engines with serial numbers L-9762-51A and up; IO-360-C1E6 engines with serial numbers L-9723-51A and up; LIO-360-C1E6 engines with serial numbers L-524-67A and up; engines that are in compliance with the latest revision of Service Bulletin No. 326 and Service Instruction No. 1263. Rebuilt engines shipped after October 1, 1972, can be operated to 2000 hours between overhauls except those with serial numbers L-2349-51A and L-7852-51A which do not have the redesigned camshaft and must not exceed 1400 hours of operating time between overhauls.
6. The reliability and service life of engines can be detrimentally affected if they are repeatedly operated at alternating high and low power applications which cause extreme changes in cylinder temperatures. Flight maneuvers which cause engine overspeed also contribute to abnormal wear characteristics that tend to shorten engine life. These factors must be considered to establish TBO of aerobatic engines; therefore, it is the responsibility of the operator to determine the percentage of time the engine is used for aerobatics and establish his own TBO. The maximum is the time specified in this instruction.
7. TIO-540-C Series engines with serial numbers L-1754-61 and up, TIO-540-C Series engines that were rebuilt or overhauled at Lycoming Engines, Williamsport, PA after March 1, 1971, and TIO-540-C series engines that have been modified to incorporate large main bearing dowels as described in the latest revision of Service Instruction No. 1225 can be operated to 2000 hours. Engines that do not incorporate this modification must not exceed 1500 hours between overhauls.
8. VO, TVO and TIVO-540 engines built with P/N 77450 connecting rods as described in the latest revision of Service Bulletin No. 371 can be continued in service to 1200 hours. Engines that do not incorporate this new connecting rod are restricted to 1000 hours for VO-540 models and 900 hours for TVO and TIVO-540. See the latest revision of Service Bulletin No. 371 for improved connecting rod assembly.
9. TIO-541-E series engines with serial numbers L-804-59 and up, rebuilt engines shipped after March 1, 1976, and all engines that incorporate the improved crankcases and cylinder assemblies described in the latest revision to Service Bulletin Nos. 334 and 353 can be operated for 1600 hours before overhaul. Engines not in compliance with these requirements are limited to a 1200-hour TBO.

10. Some engines in the field have been altered to incorporate an inverted oil system in order to perform aerobatic maneuvers. Whenever this modification is done to an engine, the TBO of the engine must be determined in the same manner listed for AEIO engines of the same model series. See Note 6.

11. If an engine is being used in "frequent" type service, by accumulating 40 hours or more per month, and has been so operated consistently since being placed in service, add 200 hours to TBO time. (Engines affected by AD 2012-19-01 and not in compliance with AD-2012-19-01 are not eligible for this TBO extension.)

12. To qualify for the 2400 hour TBO, high-compression, O-235 engines must have the increased strength pistons (P/N LW-18729). See the latest revision of Service Letter No. L213.

13. The high-compression O-235-F, -G and -J series do not have the increased-strength pistons (P/N LW-18729); therefore, they do not qualify for the 2400 hour TBO.

14. TIO-540-A series engines with serial numbers L-1880-61 and up, TIO-540-A series engines that were rebuilt or overhauled at Lycoming Engines, Williamsport, PA after March 1, 1971, and TIO-540-A series engines that have been modified to incorporate large main bearing dowels as described in the latest revision of Service Instruction No. 1225 can be operated to 1800 hours. Engines that do not incorporate this modification must not exceed 1500 hours between overhauls.

15. A 200-hour extension to the listed TBO can be applied to Lycoming Factory New, Lycoming Factory Rebuilt, and Lycoming Factory Overhauled engine models. Engine repairs or field overhauls that are performed by any entity other than the Lycoming Factory in Williamsport PA must meet all of the following requirements to be eligible for this 200-hour TBO extension:
    a. Be performed using ONLY Lycoming genuine parts or FAA-PMA parts approved by Lycoming
    b. Be performed using ONLY Lycoming approved procedures
    c. Block 12 of FAA form 8130-3 or international equivalent must indicate the repair or overhaul was performed using ONLY Lycoming approved procedures and Lycoming genuine parts or FAA-PMA parts approved by Lycoming

    A repair or overhaul performed using any FAA approved local shop procedures or using FAA-PMA parts not approved by Lycoming is not eligible for this 200-hour TBO. (Engines affected by AD 2012-19-01 and not in compliance with AD-2012-19-01 are not eligible for this TBO extension.)

16. When NOTE 15 is referenced with NOTE 11 for engine models in Tables 1 and 2, and the conditions of both NOTES are met, the sum of the extended TBO hours in both NOTES 11 and 15 can be added to the required TBO, thus extending the TBO a total of 400 hours. (Engines affected by AD 2012-19-01 and not in compliance with AD-2012-19-01 are not eligible for this TBO extension.)

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

Aviation Safety

New York ACO Branch
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Westbury, NY 11590
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April 24, 2020

Ms. Marian Folk
Principal Consulting Engineer
Lycoming Engines
[redacted]
Williamsport, PA 17701

Reference: Log No. 20-15. WTS No. 20-DOC-07399

Subject: A Global Alternative Method of Compliance (AMOC) to Airworthiness Directive (AD) 2012-19-01. (Engine Crankshaft Replacement)

Dear Ms. Folk

The Federal Aviation Administration (FAA) has received your proposal dated April 13, 2020 proposing a Global AMOC to paragraph(s) (f) (1) (i) and (f) (2) (i) of AD 2012-19-01.

The New York Aircraft Certification Office Branch (NYACO) approves your Global AMOC proposal to paragraph(s) (f) (1) (i) and (f) (2) (i) of AD 2012-19-01 to use the time periods specified in Lycoming Service Instruction (SI) 1009BE to define the time of the next engine overhaul, and crankshaft replacement. Since the overhaul times in the new SI 1009BE are the same as in the superseded SI 1009BD, the addition of the new engine models does not affect the scope or intent of the AD, and will provide an equivalent level of safety.

The changes in this new version of SI 1019BE were; a new paragraph at the end of the Operating Hour Time Period (TBO, Time Between Overhauls) section; the addition of new IO-390-D engine models to Table 1; a revision to Table 2 to include separate listings for engine model O-540-F1B5 for the Robinson R44 and R44 Cadet; a revision to Note 10 to include reference to Note6; a revision to the to the paragraph after the CAUTION in the CALENDER TIME PERIOD TBO section; and a revision to Note 15c.

The following limitations apply to this Global AMOC:

- Engine crankshafts, listed in Table 5 by serial number, must be replaced as specified in paragraph (f) of AD2012-19-01.
- Changes to the notes in SI 1009BE that could provide an extension of TBO state that these do not apply to engines subject to this AD.
- This FAA Global AMOC is transferable with the engine to an operator who operates the aircraft under U.S. registry.
- Before using this Global AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local Flight Standards District Office/Certificate Holding District Office.

The preceding paragraph also applies to any applicable foreign-registered aircraft upon transfer of the aircraft to the U.S. registry if compliance with the Global AMOC has not been accomplished. All provisions of AD 2012-19-01 that are not specifically referenced above remain fully applicable and must be complied with accordingly.

- This Global AMOC only applies to the FAA AD listed above. The FAA does not have the authority to approve this as a Global AMOC to any AD issued by another civil aviation authority (CAA). Approval of an Global AMOC to another CAA's AD must come from that CAA. A copy of this response will be forwarded to the CAA where these engines are registered for their consideration.

If you have any questions, or need additional information, please contact Norman Perenson at [redacted] or email [redacted]

Sincerely,

[redacted]
COS Program Manager, NYACO Branch

Digitally signed by JAMES E DELISIO
Date: 2020.04.24 09:32:41 -04'00'

For: Anthony E. Gallo
Manager, New York ACO Branch
Compliance & Airworthiness Division
Aircraft Certification Service

cc:
James Delisio, COS Program Manager NYACO Branch
Norman Perenson (NYACO)
John Keymont (AEG)