

SOUTH AFRICAN



**CIVIL AVIATION
AUTHORITY**

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**Manufacturer's Recommended 12 Year Calendar Life Overhaul for
Textron Lycoming and Teledyne Continental Reciprocating Aircraft
Engines**

1. Introduction

The issue of the manufacturers' 12-year overhaul recommendation for Textron Lycoming¹ and Teledyne Continental² reciprocating aviation engines have been the subject of considerable discussions between the CAA and sectors of the aviation industry. These deliberations, in part, gave rise to the issue of AIC 18.19, which contained the special conditions for granting of a general exemption, by the Commissioner, which was effective from 22nd March 2001 and will expire on 30th August 2001.

- 1.1 Regulations 43.02.2 (b)(i) read together with 43.02.6 and 43.02.12 (General Maintenance Rules) of the current South African Civil Aviation regulations, makes the manufacturer's recommended overhaul of these engines mandatory after a 12-year calendar life span. The basis for making these manufacturers' service information letter a mandatory safety requirement is, however, open to considerable debate.
- 1.2 The Commissioner for Civil Aviation reviewed a considerable amount of material on the subject, including documentation from the manufacturers, other regulatory authorities, records of CAA-industry meetings, submissions from the aviation industry and requests for exemptions from the provision of AIC 18.19. The following is intended to serve as a ruling on the matter.

2. Engine Certification

¹ "Teledyne Continental Motors **recommends** that the following information be used, along with the engine's published TBO (time between engine overhaul), in determining the engine's continued airworthiness:

1. Whether the engine has been operated regularly or has been in storage; gaskets, seals, synthetic and natural rubber goods deteriorate over time. Environmental corrosion can occur internally and externally on the engine. This naturally occurring process can inevitably affect the continued airworthiness of the engine and engine mounted components and accessories. For these reasons, overhaul the engine at least every twelve (12) years, or on accumulation of the operating hours listed for the engine model."

SIL98-9 17 November 1998

² "Engine deterioration in the form of corrosion (rust) and the drying out and hardening of composition materials such as gaskets, seals, flexible hoses and fuel pump diaphragms can occur **if** an engine is out of service for an extended period of time. Due to the loss of a protective oil film after an extended period of inactivity, abnormal wear on soft metal bearing surfaces can occur during engine start. Therefore, all engines that do not accumulate the hourly period of time between overhauls specified in this publication **are recommended** to be overhauled in the twelfth year."

Textron Lycoming Service Instruction No. 1009AP (Supersedes SI No. 1009AN) 16 May 2001

- 2.1.1 The basis for certification of these engines by the FAA include specific operational limitations, service and maintenance requirements necessary for the continued airworthiness of the engine. Subsequent to certification, the certifying regulatory authority will also issue Airworthiness Directives (AD's) in the event that additional significant safety issues emerge in the course of the lifetime of these engines. Such AD's then become an integral part of the Instructions for Continuous Airworthiness (ICA) of that engine. Other regulatory authorities may also initiate AD's where a clear safety case emerges within their area of jurisdiction.
- 2.2 Manufacturer's are understandably loath to place definitive warranties on the serviceability of their engines, e.g.
"Because of variations in the manner in which engines are operated and maintained. Textron Lycoming can give no assurance that any individual operator will achieve the recommended TBO"
 Service Instruction No. 1009AP, 16th May 2001.
- 2.2.1 The continued airworthiness of their product is influenced by the conditions under which the engine is operated, the maintenance record, the period of storage, the conditions under which storage may take place, etc. Hence the manufacturers clearly indicate that certain operations such as crop spraying, parachute drops, etc., place a specific strain on their engines and hence recommend shorter service time limits.
- 2.2.2 Mandatory Periodic Inspections (MPI) every 100 hours or 12 calendar months, for these engines is designed to ensure their serviceability over the next MPI period. It is unclear how the calendar life of an engine will compromise the MPI assessment. Some countries such as Canada have, however, introduced specific "on condition" checks at the MPI's subsequent to the 12-year calendar life to ensure continued airworthiness.
- 2.2.3 Manufacturers may also issue service letters and service bulletins, which are not necessarily translated into AD's. In fact, Teledyne Continental has in SIL93-11, 12th May 1993 classified its service bulletins in to 5 categories, ranging from:
- (i) **Category 1: a Mandatory Service Bulletin (MSB)**; Service documents, relating to known or suspected hazards to safety, that have been incorporated in whole or part in an Airworthiness Directive issued by the FAA or have been issued at the directive of the FAA, by the manufacturer, in order to require compliance with an already issued AD – or an equivalent issued by another country's airworthiness authority),
 - (ii) **Category 2: a Critical Service Bulletin (CSB)**; Service documents (not included in Category 1) that have been determined by the product manufacturer to constitute a threat to continued safe operation of an aircraft or to persons or property on the ground unless some specific action (inspection, repair, replacement, etc.) is taken by the owner or operator. Documents in this category are candidates for incorporation in an Airworthiness Directive issued by the FAA (but may not be)
 - (iii) **Category 3: a Service Bulletin (SB)**; Service documents (not included in Categories 1 and 2) considered by a product manufacturer to constitute a substantial improvement to the inherent safety of an aircraft or component of an aircraft. This "Service Bulletin" category also includes updates of instructions for continued airworthiness.
 - (iv) **Category 4: a Service Information Directive (SID)**: Service documents (not included in Categories 1,2, and 3) that have been determined by the manufacturer to be of value to an owner/ operator in the use of a product by enhancing safety, maintenance or economy, to
 - (v) **Category 5: a Service Information Letter (SIL)**: This Category includes all information (not included in categories 1-4) that may be of use to the owner, operator or maintainer of the aircraft.
- 2.3 The Teledyne Continental Service Information Letter No. SIL98-9 recommending the 12-year overhaul has been **classified as a Category 5, Service Information Letter.**
- 2.4 A manufacturer's recommendation cannot be automatically accepted as a mandatory safety requirement unless there is a clear safety case. Hence, the FAA clearly states in this regard that,
- "mandatory service bulletins (SB's) issued by manufacturers... are to be considered advisory only. ...Small airplane design approval holders cannot unilaterally impose mandatory*

compliance with manufacturer's SB's. ... FAA policy does not permit this approval to be delegated to organizations or individuals."

Michael Gallagher, Manager Small Airplane Directorate, 25 April 2001.

- 2.5 The UK CAA at present does not implement the Lycoming Service Instruction No. 1009 or Teledyne Continental Service Information Letter SIL98-9. The CAA NZ considers that the *"recommended overhaul periods are not mandatory. For Air Transport operations an aircraft must be maintained in accordance with an approved maintenance schedule and the CAA does not permit deviations from manufacturer's recommendations except under a strictly controlled escalation program. Thus the 12 year recommended overhaul period is only applicable to Air Transport aircraft in NZ"*
David Gill, Airworthiness Engineer, 14th March 2001

3. South African CAA Policy Framework

- 3.1 The CAA's primarily legislated mandate is firstly, the continued enhancement of aviation safety and secondly, the general promotion of aviation development in South Africa. Our safety standards are derived from global aviation safety standards, which have evolved through the history of aviation, often from the burning embers of aviation disasters.
- 3.2 In this respect, ICAO's Standards and Recommended Practices (SARPS) are intended to capture the internationally agreed upon minimum safety standards, albeit often in the form of general frameworks, which states are required to codify in national aviation legislations and regulations. International best practice as reflected in the regulatory regimes of the major aviation nations, hence provide a valuable source of more specific approaches to addressing aviation safety threats. The introduction of specific regulations must, however, be based on a clear safety case basis, whether based on international or local data
- 3.3 Hence, the CAA policy for ensuring compliance with global aviation safety standards should be guided in the first instance by South Africa's obligations in terms of the Chicago convention Secondly, we need to be guided by international best practice as represented by policies in the major aviation nations of the world. In this respect we refer to the situation in the USA, UK, Canada and countries with comparable aviation profiles such as Australia and New Zealand. In the case of a certified aviation product, the policies of the manufacturing nation will carry significant weight. The South African CAA at this stage neither has the research capacity nor information database to independently make a safety case at variance to the approach of the FAA in respect of the Lycoming and Continental reciprocating aviation engines.
- 3.4 This review of the 12-year overhaul requirement hence reflects on a broader approach to aviation safety rule making in South Africa. We need to have a clear safety case for introducing rules, which differ from international best practices.
- 3.5 In the case of the 12-year overhaul recommendation, the policies of the FAA clearly do not convert a manufacturer's recommendation into a mandatory airworthiness requirement.
- 3.6 The CAA was unable to uncover any local or international safety case, i.e. significant statistical data to point to the engine calendar life being a determining factor in aircraft engine failure or problems which gave rise to accidents. Nor is there comparable data to indicate why 12 years represents a specific cut off point in the airworthiness of reciprocating aircraft engines. For example,
"I have consulted with our continuing airworthiness specialists and our Safety Investigation Unit and they report they do not recall any anecdotal evidence of a higher failure rate for high time engines, nor do any particular examples spring to mind"
David Gill, CAA NZ Airworthiness Engineer, 14th March 2001
- 3.7 In reviewing the 12-year overhaul issue in South Africa, the Commissioner for Civil Aviation could find no compelling argument for South Africa to differ from that of the regulatory requirements in the manufacturing nation, i.e. the FAA. Hence, the manufacturers' 12-year life overhaul will not be a mandatory requirement in terms of the continued airworthiness of these engines in South Africa.
- 3.8 In this regard, we also see no reason to depart from the manufacturer's recommendation on engine accessories, viz

"Engine mounted components and accessories require overhaul at the same hourly and calendar intervals as the engine, unless otherwise specified by the component or accessory manufacturer" SIL98-9 See also Precision Service Bulletin MSA3 rev 1 and PRS-97 rev 1

- 3.9 In order to align the regulatory requirements with this policy ruling, the Commissioner for Civil Aviation has granted a general exemption from the provisions of regulation 43.02 2(b) (1) read together with regulation 43.02. 6 and 43.02.12 in so far as the aforementioned regulations prescribed compliance with the 12-year overhaul recommendation. This exemption is effective from 24 August 2001, until such time as one or all of the regulations mentioned above have been either amended or repealed. The details concerning this general exemption are also published in AIC18.18. The aforementioned exemption has however been granted subject to the requirements contained in paragraph 4.1 here under, being complied with.

4. Maintenance Requirements for Engines 12 Years or Older

- 4.1 These requirements will be applicable to Textron Lycoming and Teledyne Continental reciprocating aircraft engines that have reached a 12-year calendar life, but not exceeded the hourly limitation imposed, and shall be carried out to ensure continued compliance with the airworthiness standards for the engine:
- a. All such engines, which have not been overhauled for the past 12 years or more, or upon reaching the 12-year calendar life period, shall be inspected and all AMO's shall record this in the relevant logbook. This entry will state that all Instructions for Continuous Airworthiness (ICA) requirements (Certification Requirements and AD's) have been complied with.
 - b. There will be an initial 90-day period for such engines to be so inspected and certified by an AMO. The 90-day period will not however automatically exempt any person from complying with a component or accessory manufacture's limitation.
 - c. The engine must be inspected for defects and a blow-by and baroscope inspection carried out on all cylinders. The blow-by and baroscope inspection must be within acceptable limits and certified as such in the applicable logbook. The engine must conform to all relevant Airworthiness Directives.
 - d. All fuel carrying line and oil leaks must be investigated and rectified where necessary seals and hoses requiring replacement are to be replaced.
 - e. Engine mounted components and accessories requiring overhaul at the same hourly or calendar intervals as the engine, shall be overhauled at the same time as the engine, unless otherwise specified by the component or accessory manufacture whichever is the shortest period.
 - f. In the event of a shock load inspection being conducted on an engine, such an inspection will be considered as an acceptable method of complying with [the provisions of 4 \(a to e\) above](#), providing all cylinder assemblies were disassembled and inspected at that time.
- 4.2 The Commissioner for Civil Aviation reserves the right to review this ruling on the basis of new AD's which the manufacturing state may issue in relation to the continuing airworthiness requirements of these engines or a significant safety case based upon recorded aviation safety data involving these engines.
5. Effective Date on receipt of this AIC or
30th August 2001

Commissioner for Civil Aviation