



Advisory Circular

AC91-19

Piston Engine TBO Mixed Agricultural and Other Operations

01 April 2016

General

Civil Aviation Authority Advisory Circulars contain information about standards, practices, and procedures that the Director has found to be an **Acceptable Means of Compliance (AMC)** with the associated rule.

An AMC is not intended to be the only means of compliance with a rule, and consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices, or procedures are found to be acceptable they will be added to the appropriate Advisory Circular.

An Advisory Circular may also include **Guidance Material (GM)** to facilitate compliance with the rule requirements. Guidance material must not be regarded as an acceptable means of compliance.

Purpose

This Advisory Circular provides guidance material (GM) to operators when calculating the piston engine TBO for aircraft on mixed agricultural and non agricultural operations and changing to, or from, agricultural and non-agricultural operations.

Related Rules

This Advisory Circular relates specifically to Mongolia Civil Aviation Rule Parts 91 and 43.

Change Notice

Subject to “Memorandum for Technical Cooperation” between the CAA of Mongolia and New Zealand on mutual cooperation in implementation of Assembly Resolution A29-3: Global Rule Harmonization, 29th ICAO Assembly, 1992, which urges States to promote global harmonization of national rules, dated 6th of May, 1999, Mongolian Civil Aviation Safety Regulation has been reconciled to the Civil Aviation Regulation of New Zealand.

Amendment 164 of Annex 1 to the Chicago Convention on International Civil Aviation urges flight crew members, ATC personnel and aircraft maintenance engineers to comply with the language proficiency requirements; and

Under Article 14 of the Civil Aviation Law of Mongolia 1999, "Use of foreign language in civil aviation" the AC has been released in English version only, in order to prevent any mistranslation and misuse of the aviation safety related documents.

This AC91-19 was developed based on NZ AC91-19, dated on 24 February 2011.

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General

This Advisory Circular provides guidance material on acceptable methods for calculating the TBO for piston engines installed in aircraft on mixed agricultural and non agricultural operations. It also provides guidance in calculating engine TBO when an aircraft is commencing agricultural or mixed operations, from non agricultural operations or from agricultural or mixed operations to non agricultural operations.

Operators are required to comply with the engine manufacturer's recommended TBO periods. Some engine manufacturer recommended TBO periods differ for agricultural and non agricultural operations.

Refer to rule 91.603(c)

An accurate record is to be kept in the applicable Engine Logbook of agricultural and non agricultural time in service. In the case of a change of role of the engine, for example; from non agricultural to agricultural operations, or an engine change between aircraft in different operations, the change of roles and time remaining to overhaul, will need to be clearly documented.

Refer to rule 91.617.

Compliance time for Airworthiness Directives (ADs) and other time in service required inspections are to be performed at the normal Total Time Since New or Overhaul hours not the agricultural corrected times.

The examples given in this Advisory Circular do not allow for any approved engine escalation programmes or manufacturer's calendar TBO periods. The requirements of any approved engine escalation programme and manufacturer's calendar TBO periods must be accounted for when using this Advisory Circular to calculate the engine TBO period.

Abbreviations:

In this Advisory Circular:

TBO means time between overhaul.

TSN means time since new.

TSO means time since overhaul.

Agricultural Factor calculation:

Where a manufacturer specifies different recommended TBO periods for agricultural operations and non agricultural operations, an *Agricultural Factor* has to be established.

Given an **example** of a manufacturer recommended agricultural TBO of 1500 hours and a non agricultural TBO of 2000 hours, an *Agricultural Factor* to be applied for mixed operations can be calculated as follows:

Non agricultural TBO	2000 hours
Agricultural TBO	1500 hours
Agricultural factor=	$2000/1500 = 1.33$

That is, every hour of agricultural operations equals 1.33 hours non agricultural operations.

Various Scenarios

Continuing with the **example** of a manufacturer's recommended agricultural TBO of 1500 hours and a non agricultural TBO of 2000 hours, the following 4 scenarios are given as examples of the required calculations:

Scenario One

For engines operated on 100% agricultural operations, the manufacturer's TBO of 1500 hours applies. Unless otherwise approved by the Director, the engine must be overhauled at the manufacturer's recommended TBO before it is used on any type of operation.

Scenario Two

For engines operated on mixed agricultural/non agricultural operations, an accurate record is to be kept of times flown on agricultural and non agricultural operations. Every hour flown on agricultural operations is to be multiplied by the calculated *agricultural factor* and this time added to the running Total Time Since New/Overhaul.

Hours flown on non agricultural operations are added to the Total Time Since New/Overhaul in the normal manner.

CAA 2158 Engine Logbook (Revised 01/09) *Section 1 Service Record* is used to record the time in service of the engine. When operating on mixed operations, the column headed *Cycle/Other Record* is to be used to record the time since new/overhaul to include agricultural hours calculated to non agricultural hours (x *agricultural factor*) and non agricultural hours. When the total in this column reaches the manufacturer's recommended non agricultural TBO, the engine is time expired. The totals in columns *Total Time Since New* and *Total Time Since O/H* are to be recorded in the normal manner.

Example of Engine Logbook

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**SECTION 1
SERVICE RECORD**

Date	Hours Flown	Total Time Since New	Total Time Since O/H	Cycle/Other Record		Maintenance Required
		Hours	Hours	Hours	Number	
Totals Brought Forward		3773 05	1773 05	1976 35		
	1:30	3774 35	1774 35	1978 10	Ag	(1.30 x 1.33 = 1.75)
	.90	3775 25	1775 25	1979 00		
	.45	3775 70	1775 70	1979 45		
	.45	3776 15	1776 15	1979 90		
	1:10	3777 25	1777 25	1981 35	Ag	(1.10 x 1.33 = 1.45)
	.35	3777 60	1779 70	1983 80		
	1:75	3781 45	1781 45	1986 15	Ag	(1.75 x 1.33 = 2.35)
	.95	3782 40	1782 40	1987 10		
	1:25	3783 65	1783 65	1988 75		
	.20	3783 85	1783 85	1988 95		
	A:00	3787 85	1787 85	1992 95		
	2:30	3791 05	1791 05	1997 20	Ag	(3.30 x 1.33 = 4.25)
	.40	3791 45	1791 45	1997 60		
	1:50	3792 95	1792 95	1999 60	Ag	(1.50 x 1.33 = 2.00)
	.40	3793 35	1793 35	2000 00		Engine time expired Overhaul required.
Totals Carried Forward		3793 35				

Scenario Three

For engines coming off 100% agricultural or mixed agricultural/non agricultural operations to 100% non agricultural operations, the time in service is recorded in all three columns in the normal way. The engine becomes time expired when the total in the *Cycle/Other Record* column reaches the engine manufacturer's non agricultural TBO; (in this case 2000 hours.)

Scenario Four

For engines coming on to mixed agricultural/non agricultural operations from 100% non agricultural operations; the time in service on agricultural operations is to be calculated (time in service x *agricultural factor*) and recorded in the *Cycle/Other Record* column as shown above.