Irish Aviation Authority
The Times Building
11–12 D'Olier Street
Dublin 2, Ireland
www.iaa.ie

Safety Regulation Division

Údarás Eitlíochta na hÉireann
Foirgneamh na hAmanna
11–12 Sráid D'Olier
Baile Átha Cliath 2, Éire

Rannán na Rialachán Sábháilteachta

AERONAUTICAL NOTICE

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MAINTENANCE OF PISTON ENGINES INSTALLED ON AIRCRAFT OPERATING ON A FLIGHT PERMIT

Irish registered aircraft defined in Annex I to Commission Regulation (EU) 2018/1139 or in Commission Regulation (EU) 2018/1139 Article 2(8)(a) operating on a Flight Permit do not comply with internationally recognised airworthiness standards. As such, pilots should be aware that components fitted may fail at any time. This includes engines, so pilots should not fly such aircraft over areas in which they can't make a safe forced landing.

Owners must familiarise themselves with the maintenance/inspection recommendations published by component/engine manufacturers. The owner is responsible for reviewing all recommendations and applying them, where appropriate. These are often published in Owners' Manuals, Service Manuals, or Service Bulletins/Letters/Instructions.

A record of the review of such recommendations and the outcome of that review should be recorded in the aircraft logbooks.

This Notice does not override any maintenance such as Airworthiness Directives and is supplementary to inspection items included in the Flight Permit inspection.

Time Between Overhaul

Engine manufacturers usually recommend a time interval after which the engine should be overhauled. If an aircraft owner chooses to operate an engine beyond that recommended time, the owner should consider having the engine inspected more frequently and to perform the inspection items listed in Appendix 1 to this notice, or parts thereof.

This notice replaces Aeronautical Notice A.43B at Issue 02 which should be discarded.

Aviation Regulator/CEO Designate
Irish Aviation Authority

Notes:

1. The TBO for an engine may be affected by the incorporation (or non-incorporation) of certain manufacturers' modifications, or operating environment therefore caution should be exercised in determining the normal TBO.

2. The concept of allowing engines to run beyond the manufacturer's recommended TBO's depends upon it being possible to assess the condition of the engine by prescribed inspections carried out at defined intervals. It is not the intention to provide a freedom to run the engine until it fails.

3. This Aeronautical Notice gives guidance on the extension of recommended overhaul periods on the basis of the effect on airworthiness alone. The economics of operation has not been considered, whereas this may have been considered by the manufacturer when establishing the recommended overhaul periods. Aircraft owners/operators must make their own decisions with regards to overhaul periods based on the operation of the aircraft, environmental effects and economical considerations. Unless satisfied that the engine remains in an airworthy condition, the owner/operator should have the engine overhauled.

4. Preserve engines with low utilisation in accordance with manufacturer's recommendations. For guidance purposes, engines not operated for more than 1 month should be considered for preservation measures.

Appendix I

Maintenance Requirements for Piston Engine Operation beyond Manufacturers' Recommended Time Between Overhaul (TBO)

It is recommended that this inspection be carried out every 100Hours/1 year, whichever occurs first.

INSPECTION

1. Ensure that all applicable Airworthiness Directives and mandatory requirements due at the normal overhaul period have been complied with.

2. Inspect the engine externally for obvious defects, such as a cracked crankcase, excessive play in the propeller shaft, overheating and corrosion, which would make it unacceptable for further use.

3. Inspect the internal condition of the cylinders, valves, crankshaft etc. for satisfactory condition by removing the cylinders(s) or crankcase covers or through the use of borescope equipment.

4. Examine the oil filters and magnetic plugs for metal particle contamination. These checks may be sufficient to show that serious wear or breakdown has taken place and that the engine is unacceptable for further use.

5. Check the oil consumption of the engine over the last 10 flying hours to establish whether it is likely to exceed the maximum recommended by the manufacturer, where applicable.

6. Carry out a compression check and establish if the results are satisfactory for continued use. Piston ring or cylinder wear, or poor valve sealing could, in addition to increasing oil consumption, result in significant loss of power. A cylinder compression check is a method of determining, without major disassembly, the standard of sealing provided by the valves and piston rings. This should be carried out in accordance with the TC Holder's/manufacturer's instructions.

   In the absence of any published recommendations, one of the methods below should be used. Record the type of test carried out and the results in the Engine Log Book.

   a. On engines with a small number of cylinders, a simple compression check may be carried out by rotating the engine by hand and noting the resistance to rotation as each cylinder passes through its compression stroke. The check should normally be made shortly after running the engine while a film of oil remains on the rubbing surfaces, to assist sealing and preventing scoring the working parts. If this is not possible, the manufacturer may recommend that oil is introduced into each cylinder and the engine turned through a number of revolutions before conducting the test.
      This method may be used to determine serious loss of compression on a single cylinder or the difference between the compressions of individual cylinders, but may not accurately show a similar partial loss of compression on all the cylinders of an engine.
      An alternative method, which will give a more accurate result, is to fit a pressure gauge (reading

up to 1400 kPa (200 lbf/in^2) in place of one sparking plug in each cylinder in turn and note the reading as the piston passes through Top Dead Centre (TDC) on the compression stroke.

b. A direct compression test is by the use of a proprietary type of compression tester equipped with a means of recording cylinder pressure. One set of plugs should be removed immediately after an engine run and the compression tester fitted to each cylinder in turn while rotating the engine by means of the starter motor. The effectiveness of combustion charge sealing can be judged by assessment of the records obtained.

c. A differential pressure test involves applying a regulated air supply (normally 560kPa (80 lbf/in^2)) to each cylinder in turn and a pressure gauge to record the actual air pressure in the cylinder. Since some leakage will normally occur, cylinder pressure will usually be less than supply pressure and the difference will be an indication of the condition of the piston rings and valves. By listening for escaping air at the carburettor intake, exhaust and crankcase breather, a defective component may be located. As with the previous tests, it is usually recommended that the differential pressure test is carried out as soon as possible after running the engine.

7. Perform an engine performance power check in accordance with the manufacturer's recommendations or a satisfactory timed power climb against Flight Manual figures. The majority of light aircraft piston engines are air-cooled and rely on adequate flow of air for proper cooling of the cylinders. This condition can only be obtained during flight, and ground runs should, therefore, be as brief as possible.

8. In the event that this inspection results in rejection, a thorough investigation must be carried out to establish the maintenance actions required to return the engine to an airworthy condition.

9. Record and certify the checks carried out, and any rectification or servicing work, in the engine log book.