

# **GUERNSEY ADVISORY CIRCULAR (GACs)**



**GAC AIR-4**



**On Condition  
Maintenance**

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First Issue

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## Revisions

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## **1 – Purpose**

### Principles and Applicability

This GAC provides acceptable means of compliance regarding aircraft On Condition (O/C) maintenance for piston engine aeroplanes below 5700 kg and piston engine rotorcraft below 3175 kg. The content of the O/C Maintenance Programme substitutes specific instructions from the Design Approval Holder, as indicated in the O/C programme; all other instructions should be complied with. This GAC provides means to establish compliance with GAR Part 39, paragraph 39.61[j].

This GAC is partially based on the industry standards UK CAP 747 Gr. 24 and the Dutch NL-2010-001R1 Maintenance Directive.

The principle of the O/C maintenance is that if it cannot be established with a reasonable certainty that the engine and/ or component will remain airworthy until the next periodic condition determination, then maintenance action is required to:

- Ensure, through additional maintenance action, the airworthiness until the next periodic condition determination, or;
- To replace the engine/ component.

When the engine and/ or component deterioration cannot be attributed to anything other than normal wear, then the O/C Maintenance Programme shall be terminated for this engine and/ or component and the engine/ component shall be replaced for overhaul. Normal wear takes place throughout the engine; replacing only the monitored parts does not keep components in service indefinitely.

## **2 – Related laws and regulations**

This GAC relates to:

- The Air Navigation (Bailiwick of Guernsey) Law, 2012 (ANL), Chapter II.
- Guernsey Aviation Requirements Part 21, 39 and 43.

## **3 – Definitions**

Definitions, in the context of this GAC, will have the meanings listed in GAR Part 1 (Definitions, Abbreviations and Units of Measurement) unless otherwise stated.

## **4 – Introduction**

Chapter II of the Air Navigation Law requires that aircraft registered in Guernsey, for which a Certificate of Airworthiness (C of A) is in force, are maintained in accordance with an approved Maintenance Programme.

GAR 39.61[b] requires the maintenance programme shall be kept up to date with the relevant Design Approval Holder's Instructions for Continuing Airworthiness and shall include details of the maintenance of the aircraft, engines, propellers, rotors, parts, components, appliances and emergency equipment items and the intervals at which these are to be performed, taking into account the anticipated utilization of the aircraft.

GAR 39.61[d] requires that the maintenance programme shall be at least equivalent to the Design Approval Holder's scheduled maintenance requirements and, where described, shall reference the required inspection standards, practices and procedures.

According to GAR 39.61[j] additional or alternative instructions may be proposed by the owner or the management personnel once approved in accordance with GAR 39.61, except for intervals of safety related tasks referred in point 39.61[h] and in GAR 39 paragraph D, which may be escalated, subject to sufficient reviews carried out in accordance with point 39.61[b] and only when subject to direct approval in accordance with GAR 39.63[a].

The instructions for continuing airworthiness requirements relating to overhaul of aircraft piston engines and its components are normally defined as the engine manufacturers' recommended overhaul periods, where these have been promulgated under a system approved by the airworthiness authority responsible for the engine.

The instructions for continuing airworthiness requirements relating to overhaul of aircraft components are normally defined in the aircraft maintenance manual (AMM) Chapter 5. Airworthiness Limitations, normally defined in Chapter 4 of the AMM, may not be replaced by O/C programmes under this GAC. The content of the O/C Maintenance Programme substitutes specific instructions from the Design Approval Holder.

The DCA policy in respect of extensions to the recommended overhaul periods (operating time and calendar time) for piston engines and aircraft components used in aircraft is set out in this GAC.

**NOTE:**

- a) For the purpose of this GAC 'engine' is as defined in the EASA's publication "CS-Definitions" and includes the components and equipment necessary for satisfactory functioning and control.
- b) For the purpose of this GAC, the definitions of 'Public Transport', and 'Commercial Operation' shall be those of the Air Navigation Law, 2012

**5 – Overhaul Period Requirements**

It is emphasised that the DCA has taken the decision to allow extension of recommended overhaul periods as defined below on the basis of the effect on airworthiness only. The economics of operation is not the responsibility of the DCA, although this may have been considered by the manufacturer in establishing the recommended overhaul periods. Aircraft Owners/ Operators must make their own decisions on these other aspects. Unless satisfied that the engine or component remains in an airworthy condition, the Owner/ Operator should have the engine or component overhauled.

Continuation in service shall be subject to compliance with paragraph 5.1, as qualified by paragraphs 5.1.1 to 5.1.2, as appropriate.

**5.1 Overhaul periods**

Unless otherwise stated, engines and components may be operated to the overhaul periods which have been recommended by the manufacturer and promulgated under a system approved by the airworthiness authority responsible for the aircraft and/ or engine. All such recommendations, whether stated in terms of operating time or calendar time, constitute a recommended overhaul period for the purposes of this GAC, including recommendations by the manufacturer for reduced overhaul periods with particular types of operation or particular service bulletin/ modification configurations.

5.1.1 Exceedance up to 120% of the recommended operating time or calendar time.

Under the provisions of this GAC, engines or components that have reached the operating time or calendar time limitation of a recommended overhaul period may continue in service for a further period of operation not exceeding 20% of the recommended operating time or calendar time, whichever occurs first, subject to compliance with a), b), c), d) e) and f).

- a) Compliance being shown with the appropriate limitations specified in paragraph 7, 8 and 9 of this GAC.
- b) Compliance being shown with any applicable Airworthiness Directive (AD) which requires compliance at engine or component overhaul, unless otherwise agreed by the DCA.
- c) The engine or components must have been installed and operated in a Guernsey registered aircraft, or in an aircraft whilst previously registered in an EASA Member State for a period of 200 hours immediately prior to completion of the recommended overhaul period expressed in hours, and 12 months prior to completion of the manufacturer's overhaul period expressed in terms of calendar time.
- d) For engines or components on aircraft transferring to Guernsey from operation on an EASA Member State's register, where a recommended overhaul limit has already been exceeded, shall be subject to further assessment by the DCA to determine eligibility. Under such circumstances, engines or components will only qualify under this requirement where it can be demonstrated that the previous continued in service operation was in accordance with maintenance programme instructions issued by the Competent Authority of the exporting EASA Member State.
- e) The engine or component being inspected in accordance with paragraph 6 in order to assess its condition immediately prior to the increase, and subsequently at 100 hour or yearly intervals, whichever occurs first.
- f) The data obtained during the inspections of paragraph 6 being entered in the aircraft technical records.

#### 5.1.2 Exceedance beyond 120%

Engines or components that have complied with paragraphs 5.1 and 5.1.1, and have completed 120% of the recommended operating time or calendar time, whichever occurs first, may continue in service indefinitely, subject to compliance with a), b), c) and d).

- a) The engine or component being installed in an aircraft which is not used for the purposes of Public Transport or Commercial Operation.

- b) Compliance being shown with the appropriate limitations specified in paragraph 7, 8 and 9 of this GAC.
- c) The engine or component being inspected in accordance with paragraph 6 in order to assess its condition before exceeding 120% of the recommended operating time or calendar time, whichever occurs first, and subsequently being inspected and re-assessed at 100 hour or yearly intervals, whichever occurs first.
- d) The data obtained during the inspections of paragraph 6 being entered in the aircraft technical records. An entry in the technical records should also be made to restrict aircraft usage during this extension period to flying for the purposes of private flight only.

## **5.2 Engineering investigation**

In the event that the inspection referred to in paragraphs 5.1.1 and 5.1.2 results in rejection, a thorough engineering investigation must be carried out to establish the maintenance actions required to return the engine or component to an airworthy condition.

## **6 – Inspections to assess engine or component condition**

The inspections referred to in paragraphs 5.1.1 and 5.1.2 to assess the condition of engines shall be in accordance with Appendix 2. Inspections to engines and components shall be carried out by persons or organisations as follows:

- a) Engines or components installed in aircraft that are used for the purposes of Public Transport or Commercial Operation by an ANL/ GAR 119 approved Operator under an Air Operators Certificate, shall, in order to comply with paragraph 5.1.1, be inspected by a GAR 145 Maintenance Organisation appropriately approved for the purpose.
- b) All other engines or components, in order to comply with paragraph 5.1.1 and 5.1.2, shall be inspected by an appropriately licensed aircraft maintenance engineer or an Organisation specifically approved for the purpose.

## **7 – Components excluded from On Condition maintenance**

The components that are excluded from O/C maintenance are presented in tabular form below.

These components cannot be included in the aircraft maintenance programme as being maintained on O/C basis. For these the components the manufacturer's recommended overhaul limits shall be followed.

| <b>Components excluded from O/C</b>                                                         |                                                                                                                               |
|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Component Excluded</b>                                                                   | <b>Reason</b>                                                                                                                 |
| 1) Fuel Injection systems                                                                   | No reliable condition determination is known to 2-REG                                                                         |
| 2) Constant-speed (variable pitch) propellers & constant-speed propeller parts & systems.   | Critical failures can develop from the inside. No reliable condition determination is known to 2-REG                          |
| 3) Fixed pitch metal blade propellers                                                       | All O/C programmes known to 2-REG basically contain the same instructions as applicable to overhaul, therefore no added value |
| 4) Flexible hoses carrying flammable liquids. Critical failures can develop from the inside | No reliable condition determination is known to 2-REG                                                                         |
| 5) Pitot Static System (incl. flexible hoses)                                               | No reliable condition determination is known to 2-REG                                                                         |

## **8 – Engines excluded from On Condition maintenance and limitations to engines.**

The CAA UK has sought the advice (Ref. CAP 747 Gr. 24) of the manufacturers of the majority of the piston engines currently used in light aircraft to try to identify those engine components which service experience has shown to have running time limits beyond which it would not be reasonable to operate, (i.e. components the failure of which are not susceptible to prior detection but which would result in either an unacceptably high failure rate or a hazardous failure). Any limits identified are reflected in tabular form below.

| <b>Engines excluded from O/C maintenance and limitations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Limitations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                             |
| Rolls-Royce (de Havilland) Gipsy Major Engines - Prior to running beyond 120% of the manufacturer's recommended overhaul period, engines other than Major 10 and earlier marks incorporating Modification 2385 (splined propeller attachment) must have the taper portion of the crankshaft "Sulfinuz" treated by Modification 2690 or appropriate alternative. In accordance with Rolls-Royce Technical News Sheet G15, engines must not exceed an overhaul period of 1000 hours unless Modification 2495 is embodied. |                                                                                                                                                                                                                                                                             |
| Rolls-Royce (de Havilland) Gipsy Engines - With effect from 1 January 2011, crankshafts fitted to engines on aircraft used for the purposes of Public Transport or Commercial Operation must be fully inspected in accordance with the relevant overhaul manual workshop instructions at intervals not exceeding 20 years, if operating hours limits requiring overhaul are not achieved within this period.                                                                                                            |                                                                                                                                                                                                                                                                             |
| <b>Excluded engines</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                             |
| The following engine types have yet to accumulate sufficient service experience to demonstrate acceptable reliability when operating at the manufacturer's recommended overhaul period. The provisions of this GAC are not applicable to:                                                                                                                                                                                                                                                                               | a) Société de Motorisations Aeronautique - All types;<br>b) Rotax - All types;<br>c) Thielert Centurion Engines - All types;<br>d) Mid-West Engines - All types;<br>e) Continental Diesel Engines (formerly Thielert) - All types;<br>f) Austro Diesel Engines - All types. |

## **9 – Technical and trend monitoring requirements for engines and components**

On Condition Maintenance (O/C) is the maintenance philosophy in which:

- a) the condition of a component is periodically determined, and
- b) during such condition determination it is established that the component will not fail before the next periodic condition determination.

If O/C is applied instead of hard time intervals specified by the Design Approval Holder, then it may be required to perform additional maintenance tasks, other than the periodic monitoring mentioned above, in order to ensure continuing airworthiness. The instructions for this periodic monitoring and, as applicable, for the additionally required maintenance tasks are referred to as “O/C maintenance” in this GAC.

NOTE:

- In some cases the Design Approval Holder provides an O/C programme, as part of its instructions for continuing airworthiness. This publication does not apply to such cases, but only addresses situations where one deviates from Design Approval Holder instructions.
- O/C aims to prevent component failure, the same as the hard time interval it replaces. It therefore fundamentally differs from Condition Monitoring, where component failure is allowed. Obviously, applying the Condition Monitoring philosophy to flight critical systems is not allowed.

The following failure conditions should be accounted for:

- a) Fatigue;
- b) Wear;
- c) Material degradation (corrosion, drying out, hardening, etc.).

**Trend Monitoring Requirements** If use is made of trend monitoring, then the following should be taken into account:

- a) In some cases obtaining the data to be analysed may not be feasible prior to release to service of the aircraft. This may be the case if special tools, equipment and/or skills are required, for example when use is made of Spectrographic Oil Analysis. If it is technically justifiable to release the aircraft to service before the data is available and the analysis is performed, then the O/C programme should specify this, and include a maximum time between release to service and subsequent analysis of the data. Obtaining the sample may require maintenance action, which requires a release to service. Analysis of the data to establish if the component can be allowed to continue in operation until the next analysis can be regarded as another (type of) release to service. Both tasks are required.
- b) Trend analysis should be performed by an organisation or person competent to perform such monitoring. Note that this is a specialist task.

- c) Evidence of their involvement and responsibility should be provided by signing off on each sample analysis, in such a way that the person signing can be identified.
- d) Note that when a CAMO is contracted, the responsibility already rests with that CAMO.
- e) Sample and trend data and the required follow-up actions are part of the aircraft technical records.
- f) Individual samples of which the trend is composed should be comparable; effects on the trend of different circumstances, such as aircraft utilisation, should be taken into account in the analysis.
- g) The aircraft technical records should link the analysis and the corresponding, subsequent actions.

**Refer to Appendix 2 for specific guidance on piston engine maintenance requirements.**

### **10 – Mandatory requirements**

In no case shall any mandatory requirements be exceeded, and the compliance with mandatory bulletins/ modifications/ inspections shall be completed at the specified times. If during the course of operating beyond the engine or components manufacturer's recommended overhaul limits in accordance with this GAC the engine experiences a mechanical failure or inspection requirement necessitating full or significant partial engine or component disassembly, the organisation performing the work should inspect the engine or component to determine if it is practicable to restore the engine or component to a serviceable condition without performing an overhaul. The results of the inspection should be recorded in the aircraft technical records. Examples of activities requiring significant disassembly include propeller strike/ shock load inspections and crankshaft/ camshaft replacements for wear-related issues. Defects requiring replacement of individual cylinder and piston assemblies, and oil pump (where such work does not involve the removal/ replacement of individual gears) are not included in the category of maintenance necessitating assessment.

**11 – Service bulletins/ modifications or parts**

In the case of engines or components not incorporating all the service bulletins/ modifications or parts that would enable it to qualify for any manufacturer's recommended overhaul period as defined in paragraph 5.1 of this GAC, or in the case of engine types not included in the manufacturers' bulletins, a specific statement of acceptability in writing must be sought from the aircraft or engine manufacturer, and if this is not obtainable, an application must be made to the DCA. The DCA need not be consulted in a case where the only question is that an engine manufacturer's documents restrict recommended overhaul periods to engines embodying only parts specified by the engine manufacturer. The DCA will not require such restrictions to be applied provided that all parts are acceptable under UK Leaflet B110 of CAAIP (CAP 562) and there has been no adverse experience relating to the use of such parts.

**12 – Requirements in tabular form**

For clarity, the requirements of paragraph 5 are presented in tabular form in Appendix 1.

## Appendix 1

### Overhaul Periods piston engines and components (piston engine aeroplanes below 5700 kg and piston engine rotorcraft below 3175 kg):

|                                                                                                                                                  | Aircraft used for the purposes of Public Transport or Commercial Operation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Aircraft not used for the purposes of Public Transport or Commercial Operation (i.e. used for private flight only)                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Within Recommended Overhaul Period</p> <p>Extensions not exceeding: 20% of Recommended Overhaul Period (operating time and calendar time)</p> | <p>Manufacturer's recommended overhaul period, defined in operating time and calendar time (if applicable), provided the engine or component conforms to appropriate service bulletin/modification configuration and types of operation. (Otherwise see paragraph 8 of this GAC)</p> <p>Acceptable subject to:<br/>Compliance with paragraph 7, 8 and 9 of this GAC.</p> <p>Compliance with all applicable ADs required to be incorporated at engine or component overhaul.</p> <p>Inspections in accordance with paragraph 6 of this GAC at completion of recommended overhaul period (operating time or calendar time) and then at 100 hour or yearly intervals, whichever occurs first.</p> <p>The engine or component must have been installed and operated in a Guernsey or EU Member State registered aircraft for a period of 200 hours prior to completion of the engine or component manufacturer's recommended overhaul period. (In some circumstances, aircraft imported from outside the EU which have not exceeded the manufacturer's recommended overhaul period but which have less than 200 hours remaining could be considered for extension with suitable technical justification to the DCA).</p> |                                                                                                                                                                                                                                                                                          |
| Extensions in excess of: 20% of Recommended Overhaul Period                                                                                      | <p>No further extension</p> <p>(In exceptional circumstances, the DCA may consider applications for extension for a limited period to address an urgent operational need).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p>Engines or components may continue in service indefinitely subject to:</p> <p>a) Compliance with paragraph 7, 8 and 9 this GAC.</p> <p>b) Further inspection in accordance with paragraph 6 of this GAC at 120% and then at 100 hour or yearly intervals, whichever occurs first.</p> |

**NOTE: This Table is intended for easy reference only; for detail the main text of this GAC applies.**

## **Appendix 2**

### **Piston Engine Maintenance Requirements For Operation Beyond Manufacturers' Recommended Overhaul Periods (piston engine aeroplanes below 5700 kg and piston engine rotorcraft below 3175 kg):**

1. This Appendix gives guidance on the procedures which are necessary for a light aircraft piston engine to be accepted as being in a condition that will allow operation beyond the recommended overhaul period under the terms of this GAC.

2. A piston engine that has reached the end of its normal overhaul period may be expected to have suffered some wear to cylinders, pistons, valves, bearings and other moving parts, but an engine that has been carefully operated and maintained may still be in a condition suitable for a further period of service.

2.1 Many factors affect the wear that takes place in an engine, the most important of these include: the efficiency of the air intake filter, the techniques used in engine handling, particularly during starting, the quality of the fuel and oil used in the engine and the conditions under which the aircraft is housed when not in use. Conditions of operation are also relevant; the length of flights, the atmospheric conditions during flight and on the ground, and the type of flying undertaken. Many of these factors are outside the province of the maintenance engineer, but meticulous compliance with the approved O/C Maintenance Programme and any instructions provided in the form of service bulletins or constructor's recommendations will undoubtedly help to prolong the life of an engine.

2.2 The inspections and tests that may be necessary to assess the condition of an engine in compliance with this GAC are detailed in the following paragraphs.

### **3 Inspection and Maintenance**

A number of items included in the normal scheduled maintenance of an engine may be repeated to determine the condition of an engine at the end of its normal overhaul period, and additional inspections may also be specified.

#### **3.1 External Condition.**

The engine should be examined 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.

#### **3.2 Internal Condition.**

Significant information concerning the internal condition of an engine may be obtained from an examination of 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 service.

#### **3.3 Oil Consumption.**

Since the oil consumption of an engine may have increased towards the end of its normal overhaul period, an accurate check of the consumption over the last 10 flying hours would show whether it is likely to exceed the maximum recommended by the constructor, if the overhaul period were to be extended.

### **3.4 Compression Check.**

Piston ring or cylinder wear, or poor valve sealing could, in addition to increasing oil consumption, result in a 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 manufacturer's recommendations. In the absence of any published recommendations for a particular engine type, the method below should be used.

3.4.1 A further method of checking engine compression is the differential pressure test.

In this test a regulated air supply (normally 560kPa (80 lbf/in<sup>2</sup>)) is applied to each cylinder in turn and a pressure gauge used 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.

## **4 Power Output of Aeroplane Engines**

The power developed by an aeroplane engine after initial installation is established in the form of a reference engine speed, which is recorded in the appropriate log book so that a comparison can be made during subsequent power checks. The reference engine speed is the observed engine speed obtained using specified power settings and conditions, corrected, by means of graphs supplied by the engine constructor (or those contained in the UK Civil Aircraft Airworthiness Information and Procedures (CAAIP), CAP 562, Leaflet 70-70 Piston Engine Overhaul - Correcting Engine Test Results), to the figure which would be obtained at standard sea-level atmospheric temperature and pressure; changes in humidity do not produce large changes of power and are ignored for the purpose of establishing a reference engine speed or subsequently checking engine power. Power checks should be corrected in the same way.

### **4.1 Power Checks.**

The majority of light aeroplane piston engines are air-cooled and rely on an 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. Cooling can be assisted by facing the aircraft into wind, but high wind conditions must be avoided when making power checks, as they will significantly affect the results obtained. Before running the engine at high power the normal operating temperatures should be obtained (not the minimum temperatures specified for operation) and during the test careful watch should be kept on oil and cylinder temperatures to prevent the appropriate limitations being exceeded.

4.1.1 Normally-aspirated engines are tested at full throttle and, where a controllable-pitch propeller is fitted, with fully fine pitch selected. The changes in barometric pressure affecting engine power are considered to be balanced by changes in propeller load, so that only a temperature correction is necessary. This correction factor may be obtained from a graph supplied by the engine constructor or, if this is not available, from the graph shown in UK CAAIP (CAP 562) Leaflet 70-70 Piston Engine Overhaul - Correcting Engine Test Results (Figure 1). The observed full throttle speed multiplied by the correction factor will give the corrected speed.

4.1.2 Although normally-aspirated engines are often fitted with variable-pitch propellers, the engine speed obtained at full throttle is usually less than the governed speed and the propeller remains in fully fine pitch. With supercharged engines, however, the propeller is usually governed to a constant speed at high power settings and small changes in power will not affect engine speed. The power of a supercharged engine is, therefore, checked by establishing a reference speed at prescribed power settings.

a) Since a supercharged engine is run at a specified manifold pressure regardless of the atmospheric pressure, corrections must be made for both temperature and pressure variations from the standard atmosphere.

b) The procedure is to run the engine until normal operating temperatures are obtained, open up to maximum take-off manifold pressure, decrease power until a fall in engine speed occurs (denoting that the propeller blades are on their fine pitch stops), then throttle back to the manifold pressure prescribed by the constructor and observe the engine speed obtained.

c) The correction factor to be applied to the observed engine speed of a supercharged engine may be obtained from graphs supplied by the engine constructor.

4.1.3 Although the engine speed obtained during a check of engine power is corrected as necessary for atmospheric temperature and pressure, no correction is made for humidity, ambient wind conditions or instrument errors and, consequently, the corrected engine speed is seldom exactly equal to the reference speed even if engine condition is unchanged. However engine power may usually be considered satisfactory if the corrected speed obtained during a power check is within 3% of the reference speed.

4.1.4 If it is not possible to assess power deterioration by means of a power check (e.g. due to fitting a different propeller), a rate-of-climb flight test should be carried out.

## **5 Power Output of Rotorcraft Engines**

The power developed by the engine of a single-engined helicopter is considered to be adequately checked during normal operations any loss of power should be readily apparent. It is thus not considered necessary to check the power output of a helicopter engine separately specifically for the purpose of complying with this GAC.

## **6 Power Loss**

If the power check (paragraph 4) or normal engine operation reveal an unacceptable loss of power or rough running, it may be possible to rectify this by carrying out certain normal servicing operations or by replacement of components or equipment. The replacement of sparking plugs, resetting of tappets or magneto contact breaker points, or other adjustments to the ignition or carburetion systems, are all operations that may result in smoother running and improve engine power.

## **7 Servicing**

If the engine proves to be suitable for further service, a number of servicing operations will normally be due, in accordance with the approved O/C Maintenance Programme. Unless carried out previously (paragraph 6) these operations should be completed before the engine is returned to service.

**8 Log Book Entries**

A record of the checks made, and any rectification or servicing work, must be entered and certified in the engine log book before the engine is cleared to service for its recommended or extended life under the provision of this GAC. The log book entry made should also specify any restriction on further use (see paragraph 5.1.2 of this GAC).

**9 Maintenance Schedule and Programme Amendments**

The aircraft O/C maintenance programme should reflect the maintenance requirements required and their periodicity, to operate the aircraft engine beyond its recommended overhaul period as detailed in this GAC.

**END**

