ROTAX®
AIRCRAFT ENGINES

BRP

# MAINTENANCE MANUAL

## (LINE MAINTENANCE) FOR ROTAX® ENGINE TYPE 912 i SERIES


ref. no.: MML-912 i | part no.: 898742

picture: ROTAX® 912 iS with options

**⚠ WARNING**

**Before starting any maintenance work, please read the Maintenance Manual, as it contains important safety relevant information. Failure to do so may result in personal injuries including death. Consult the original equipment manufacturer´s handbook for additional instructions!**



Approval of translation has been done to best knowledge and judgement - in any case the original text in german language is authoritative.

# Chapter: INTRO

## GENERAL NOTE

**Foreword**

Before carrying out maintenance work on the engine, read the Maintenance Manual (Line Maintenance) carefully.

If any passages of the Manual are not clearly understood or if you have any questions, please contact an authorized distributor- or Service Center for ROTAX aircraft engines.

**Chapter structure**

The structure of the Manual follows whenever it is possible the structure of the ATA (Air Transport Association) standards. The aim is the compatibility with the aircraft manufacturers documentation, which means they must then adapt the documentation to their standard. They partially modular design offers an another advantage.
The Maintenance Manual is subdivided into the following chapters:

| Subject | Chapter |
|---|---|
| Introduction | Chapter INTRO |
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| Airworthiness Limitations | Chapter 04-00-00 |
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# Chapter: LEP

## LIST OF EFFECTIVE PAGES

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| INTRO | Title page | |
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# Chapter: TOA

## TABLE OF AMENDMENTS

***Approval**

The technical content of this document is approved under the authority DOA ref. EASA.21J.048

Note: THE APPROVAL IS GIVEN TO ALL CHAPTERS EXCEPT THE AIRWORTHINESS LIMITATIONS SECTION 04-00-00 WHICH IS SUBJECT TO SPECIFIC APPROVAL OF THE EASA.

| no. | chapter | page | date of change | remark for approval | date of approval from authorities | date of inclusion | signature |
|---|---|---|---|---|---|---|---|
| 0 | INTRO | all | 01 01 2012 | | | | |
| 0 | LEP | all | 01 01 2012 | | | | |
| 0 | TOA | all | 01 01 2012 | | | | |
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| 1 | LEP | 1,2 | 07 01 2012 | DOA* | | | |
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| 1 | 04-00-00 | 1 | 07 01 2012 | EASA approved | | | |
| 1 | 05-10-00 | 1,7 | 07 01 2012 | DOA* | | | |
| 1 | 05-50-00 | 21 | 07 01 2012 | DOA* | | | |

NOTES

# Chapter: TOA

## SUMMARY OF AMENDMENTS

**Content** Summary of the relevant amendments in this context, but without requirement on completeness.

| current no. | chapter | page | date of change | comment |
|---|---|---|---|---|
| 1 | 04-00-00 | 1 | 07 01 2012 | Airworthiness Limitations: Approval inserted |
| 1 | 05-10-00 | 7 | 07 01 2012 | Time limits for parts: Fuel pressure regulator assy. inserted |
| 1 | 05-50-00 | 21 | 07 01 2012 | Smooth performance of the engine: change of text |

NOTES

# Chapter: 00-00-00

## GENERAL NOTE

**Introduction**

This section describes this maintenance of engine type ROTAX 912 i Series.

NOTE: **The ROTAX 912 i Series includes 912 iSc and 912 iS.**

**Table of contents**

This chapter of the Maintenance Manual contains general and safety information concerning the operation and maintenance of the aircraft engine.

NOTES

## 1) General note

**Purpose**

The purpose of this Maintenance Manual is to acquaint maintenance service staff (iRMT) approved by the local aviation authorities with some basic maintenance and safety information for service work.

**Documentation**

For more detailed information regarding, maintenance, safety or flight operation, consult the documentation provided by the aircraft manufacturer and/or dealer.

For additional information on engines, maintenance or parts, you can also contact your nearest authorized ROTAX-aircraft engine distributor.

**ROTAX Distributors**

For ROTAX Authorized Distributors for Aircraft Engines see latest Operators Manual or on the Internet at the official Website www.FLYROTAX.com.

**Engine serial number**

When making inquiries or ordering parts, always indicate the engine serial number, as the manufacturer makes modifications to the engine for product improvement. The engine serial number (1) is on the top of the crankcase, behind of the propeller gearbox. See Fig. 1.

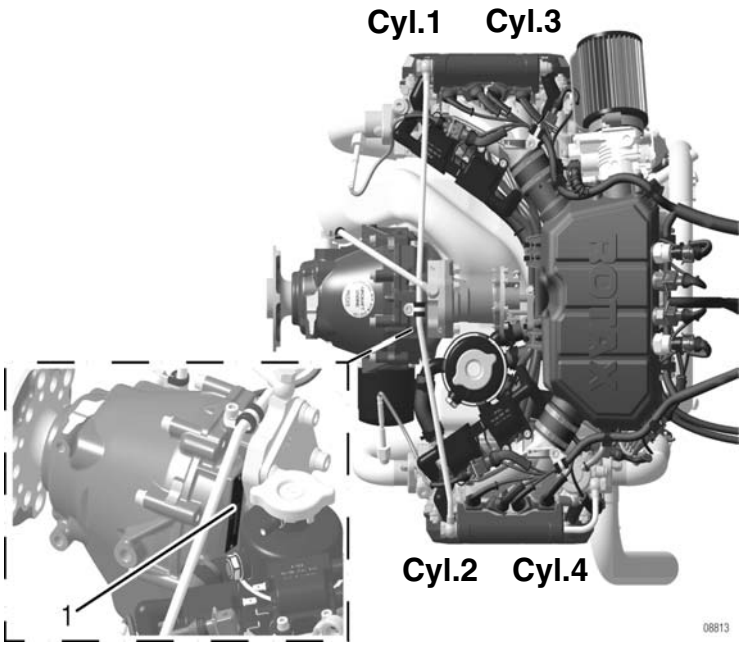


*Fig. 1*

NOTES

## 2) Abbreviations and terms used in this Manual

**Abbreviations**

| Abbreviation | Description |
|---|---|
| * | Reference to another section |
| ⊕ | center of gravity |
| 💧 | The drop symbol indicates use of sealing agents, adhesives or lubricants (only in the Illustrated Parts Catalog). |
| °C | Degrees Celsius (Centigrade) |
| °F | Degrees Fahrenheit |
| 912 iS | see OM (Type designation) |
| 912 iSc | see OM (Type designation) |
| A | Ampere |
| AAPTS | Ambient Air Pressure Temperature Sensor |
| AC | alternating current |
| Ah | Ampere hour |
| A/C | Aircraft |
| AD | Airworthiness Directive |
| A/F | Across-flat dimension |
| ASB | Alert Service Bulletin |
| ACG | Austro Control GmbH |
| API | American Petrol Institute |
| ASTM | American Society for Testing and Materials |
| ATA | Air Transport Association |
| AWG | American Wire Gauge |
| CAN/CGSB | Canadian General Standards Board |
| CPS 1+2 | Crankshaft Position Sensor 1+2 |
| CSA | Constant Speed Actuator |
| CTS | Cooling Temperature Sensor |
| CS-E | Certification Specifications for Engines |
| CW | Clockwise |
| CCW | Counter-clockwise |
| DCDI | Dual Capacitor Discharge Ignition |
| DC | direct current |
| DOA | Design Organisation Approval |
| DOT | Department of Transport |
| EASA | European Aviation Safety Agency |
| ECU | Engine Control Unit |
| EGT | Exhaust Gas Temperature |
| EMS | Engine Management System |

| Abbreviation | Description |
|---|---|
| EN | European Norm |
| FAA | Federal Aviation Administration |
| FAR | Federal Aviation Regulation |
| hr. | hours |
| HIC A | Human Interface Connector A |
| HIC B | Human Interface Connector B |
| IFR | Instrument Flight Rules |
| IM | Installation Manual |
| INJ 1-8 | Injector 1-8 |
| INTRO | Introduction |
| IPC | Illustrated Parts Catalog |
| iRMT | independent ROTAX Maintenance Technician |
| ISA | International Standard Atmosphere |
| kg | kilograms |
| LEP | List of Effective Pages |
| MAPS 1+2 | Manifold Air Pressure Sensor 1+2 |
| MATS 1+2 | Manifold Air Temperature Sensor 1+2 |
| MM | Maintenance Manual |
| MON | Motor Octane Number |
| MS | Magneto Side |
| N | new part (only Illustrated Parts Catalog) |
| n.a. | not available |
| nB | as necessary (only Illustrated Parts Catalog) |
| NDT | Non Destructive Testing |
| Nm | newtonmeter |
| OHM | Overhaul Manual |
| OM | Operators Manual |
| OPS | Oil Pressure Sensor |
| OTS | Oil Temperature Sensor |
| part no. | Part number |
| POA | Production Organisation Approval |
| PTO | power take off side |
| Rev. | Revision |
| RON | Research Octane Number |
| ROTAX | is a trade mark of BRP-Powertrain GmbH & Co KG |
| rpm | Revolutions per minute |
| SAE | Society of Automotive Engineers |
| SB | Service Bulletin |

| Abbreviation | Description |
|---|---|
| SI | Service Instruction |
| SL | Service Letter |
| SMD | Surface Mounted Devices |
| S/N | Serial Number |
| s.v. | still valid (only Illustrated Parts Catalog) |
| TOA | Table of amendments |
| TC | Type certificate |
| TOC | Table of Contents |
| TSN | Time Since New |
| TSNP | Time Since New Part |
| TSO | Time Since Overhaul |
| V | Volt |
| VFR | Visual Flight Rules |
| XXX | shows the serial component number |

## 2.1) Conversion table

**Units of length:**

1 mm = 0.03937 in
1 in = 25.4 mm
1 ft = 12 in
= 0.3048 m

**Units of area:**

1 $cm^2$ = 0.155 sq in ($in^2$)
1 sq in ($in^2$) = 6.4516 $cm^2$

**Units of volume:**

1 $cm^3$ = 0.06102 cu in ($in^3$)
1 cu in ($in^3$) = 16.3871 $cm^3$ ($in^3$)
1 $dm^3$ = 1 l
1 $dm^3$ = 0.21997 gal (UK)
1 gal (UK) = 4.5461 $dm^3$
1 $dm^3$ = 0.26417 gal (US)
1 gal (US) = 3.7854 $dm^3$

**Units of mass:**

1 kg = 2.2046 lb
1 lb = 0.45359 kg

**Density:**

1 $g/cm^3$ = 0.016018 $lb/ft^3$
1 $lb/ft^3$ = 62.43 $g/cm^3$

**Units of force:**

1 N = 0.224809 lbf
1 lbf = 4.4482 N

**Units of pressure:**

1 Pa = 1 $N/m^2$
1 bar = 100 000 Pa/1000 hPa/ 100 kPa
1 bar = 14.5037 $lbf/in^2$ (psi)
1 in Hg = 33.8638 hPa

**Units of power:**

1 kW = 1.341 hp
1 hp = 0.7457 kW
1 kW = 1.3596 PS
1 PS = 0.7355 kW

**Units of temperature:**

K = °C - 273,15
°C = (°F - 32) / 1,8
°F = (°C x 1.8) + 32

**Units of velocity:**

1 m/s = 3.6 km/h
1 ft/min = 0.3048 m/min
= 0.00508 m/sec
1 m/s = 196.85 ft/min
1 kt = 1.852 km/h
1 km/h = 0.53996 kn

**spec. fuel consumption:**

1 g/kWh = 0.001644 lb/hph
1 lb/hph = 608.277 g/kWh

**Units of torque:**

1 Nm = 0.737 ft lb
= 8.848 in lb
1 ft lb = 1.356 Nm
1 in lb = 0.113 Nm

**Cable cross-section:**
**Conversion table - Wire Gauge:**
**AWG-$mm^2$**

| AWG | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|---|---|---|
| $mm^2$ | 21 | 13 | 8.4 | 5.3 | 3.3 | 2.1 | 1.3 | 0.8 | 0.52 |

## 3) Safety notice

**General note**

Although the reading of such information does not eliminate the hazard, understanding the information will promote its correct use. Always use common workshop safety practice.

The information and components system descriptions contained in this Manual are correct at the time of publication. BRP-Powertrain, however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on its products previously manufactured.

**Revision**

BRP-Powertrain reserves the right at any time, and without incurring obligation, to remove, replace or discontinue any design, specification, feature or otherwise.

**Measure**

Specifications are given in the SI metric system with the USA equivalent in parenthesis.

**Symbols used**

This Manual uses the following symbols to emphasize particular information. This information is important and must be observed.

**⚠WARNING** **Identifies an instruction which, if not followed, may cause serious injury including the possibility of death.**

**⚠CAUTION** **Identifies an instruction which, if not followed, may cause minor or moderate injury.**

***NOTICE*** **Denotes an instruction which, if not followed, may severely damage the engine or other component.**

NOTE: **Indicates supplementary information which may be needed to fully complete or understand an instruction.**

**ENVIRONMENTAL NOTE**
Environment note gives you tips and behaviors to environmental protection.

**A revision bar outside of the page margin indicates a change to text or graphic.**

d05023.fm

## 3.1) Safety notice

**General note**

This information relates to the preparation and use of ROTAX aircraft engines and has been utilized safely and effectively by BRP-Powertrain. However, BRP-Powertrain disclaims liability for all damage and/or injuries resulting from the improper use of the contents. BRP-Powertrain requires that any service be carried out and verified by a technician that has a current iRMT rating.
See chap. 05-00-00 section 1.2)

**Manual**

This Manual has been prepared as a guide to correctly service and maintain all ROTAX 912 i Series engines.

This edition was primarily published to be used by aircraft mechanics who are already familiar with all service procedures relating to ROTAX aircraft engines.

This Manual uses technical terms which may be slightly different from the ones used in the Illustrated Parts Catalog.

It is understood that this Manual may be translated into another language. In the event of any discrepancy the German version prevails.

**Warning**

It is your responsibility to be completely familiar with the safety instructions including warnings and cautions described in this Manual. These warnings and cautions advise of specific operating and servicing methods that, if not observed, can cause a serious engine malfunction or cause the engine to lose power in flight which can result in loss of life, injury or damage to equipment.

It is, however, important to understand that these warnings and cautions are not exhaustive. BRP-Powertrain could not possibly know, evaluate and advise the user of all conceivable ways in which service might be done or of the possible hazardous consequences of each way.

**Safety instruction**

In addition to observing the instructions in our Manual, general safety and accident preventative measures, legal regulations and regulations of any aeronautical authority must also be observed.

Where differences exist between this Manual and regulations provided by any authority, the more stringent regulation should be applied.

**Illustration**

The content depicts parts and/or procedures applicable to the particular product at its time of manufacture. It does not include dealer and manufacturer modifications, whether authorized or not by BRP-Powertrain, after manufacturing the product.

**Locking devices**

Locking devices (e.g. locking tab, self-locking fasteners, etc.) must be installed or replaced with new ones, where specified. If the efficiency of a locking device is impaired, it must be replaced.

**Torque wrench tightening**

***NOTICE*** If not specified otherwise, the threads are not lubricated when fastened.

Torque wrench tightening specifications must be strictly adhered to.

## 3.2) Instruction

**General note**

Engines require instructions regarding their application, use, operation, maintenance and repair.

Technical documentation and directions are useful and necessary complementary elements for personal instruction, but can by no means substitute theoretical and practical instructions.

These instructions should cover explanation of the technical context, advice for operation, maintenance, use and operational safety of the engine.

**Safety notice**

In this technical Manual passages concerning safety are especially marked. Pass on safety warnings to other users!

**Accessories**

This engine must only be operated with accessories supplied, recommended and released by BRP-Powertrain. Modifications are only allowed after consent by the engine manufacturer.

**Spare parts**

***NOTICE***

Spare parts must meet with the requirements defined by the engine manufacturer. This is only warranted by use of GENUINE ROTAX spare parts and/or accessories (see IPC) or suitable equivalent in the manufacturer's opinion otherwise, any limited warranty by BRP-Powertrain is null and void (see Warranty Conditions).
Spare parts are available at the authorized ROTAX Distributor and their Service Center.
Any warranty by BRP-Powertrain becomes null and void if spare parts and or accessories other than
GENUINE ROTAX spare parts and/or accessories are used (see latest Warranty Conditions).

**Tools**

***NOTICE***

In principle use only tools and appliances which are either cited in the Manual or in the Illustrated Parts Catalog.

**Standstill**

After engine standstill (longer than 2 months) observe without fail the instructions for engine "out of use". Protect fuel system against contamination.

**Returning**

When returning the engine or its components (e.g. propeller gearbox) to an authorized overhaul or repair company, ensure that the necessary documentation (log book, maintenance records etc.) are enclosed.

## 3.3) Maintenance Concept

**General note**

The maintenance functions detailed in this Manual fall into two categories:

- Maintenance I (Line Maintenance)
- Maintenance II (Heavy Maintenance)

Repairs beyond the levels detailed in this Manual are not recommended as maintenance functions and must be done by an authorized overhaul facility.

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**Maintenance I (Line Maintenance)**

Chapter 00,05 and 12

The scope of line maintenance consists of removal, installation and adjustment of engine components (including part wear). All procedures in this Manual are to be considered line maintenance.

NOTE: Where applicable, you will be referred to the Heavy Maintenance Manual for work above and beyond line maintennace.

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**Maintenance II (Heavy Maintenance)**

Separate Manual

Maintenance Manual II details removal, installation and repair of components or parts normally considered beyond the capabilities of the "Line Maintenance".

NOTE: This Manual can **only** be used in combination with Maintenance Manual I (Line Maintenance), as it builds up on it.

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## 3.4) Technical documentation

**General note**

These documents form the instructions ensuring continued airworthiness of ROTAX aircraft engines.

The information contained is based on data and experience that are considered applicable for authorized mechanics (iRMT) under normal conditions.

Due to the fast technical progress and fulfilment of particular specifications of the customers it may occur that existing laws, safety prescriptions, constructional and operational regulations cannot be transferred completely to the object bought, in particular for special constructions, or may not be sufficient.

**Documentation**

- Installation Manual
- Operators Manual
- Maintenance Manual (Line and Heavy Maintenance)
- Overhaul Manual
- Illustrated Parts Catalog
- Alert Service Bulletin
- Service Bulletin
- Service Instruction
- Service Letter

**Status**

The status of the Manuals can be determined with the aid of the table of amendments. The first column indicates the revision state. This figure should be compared with the revision provided on ROTAX Aircraft Engines Website: www.FLYROTAX.com.

Amendments and current versions can be downloaded free of charge.

**Replacement pages**

Furthermore the Manual is constructed in such a way that single pages can be replaced instead of the complete document. The list of effective pages is given in the chapter LEP. The particular edition and revision number is given on the footer of each page.

**Reference**

***NOTICE***

This Manual for maintenance is only part of the Technical Documentation and will be supplemented by the respective Operators Manual, Installation Manual, Overhaul Manual and Illustrated Parts Catalog.
Pay attention to references to other documentation, found in various parts of this Manual.

Any reference to a document refers to the latest edition issued by BRP-Powertrain, if not stated otherwise.

**Illustrations**

The illustrations in this Manual are mere sketches and show a typical arrangement. They may not represent in full detail or the exact shape of the parts which have the same or similar function. Therefore deduction of dimensions or other details from illustrations is not permitted.

NOTE: The Illustrations in this Manual are stored in a graphic data base system and are provided with a consecutive irrelevant number.

This number (e.g. 00277) is of no significance for the content.

## 3.5) Use for intended purpose

**General note**

**⚠WARNING** Explosion hazard.
Never run an engine without propeller. Flying components can cause serious injuries.

**Use**

The engine ROTAX 912 iSc is intended for use in certified aircraft. In case of doubt the regulations of the national authorities or the respective sportive federations have to be observed.

**Certified engines**

The certified aircraft engine ROTAX 912 iSc is tested as per aeronautical standards for safety and time between overhaul. It was developed to conform to the latest technological standards and rigorously tested.

**Non certified engines**

The engine ROTAX 912 iS is not certified. These engines have not received any aeronautical standards or regulatory safety or durability testing, and conform to no aircraft standards. These engines are for use in experimental, uncertificated aircraft and vehicles only in which an engine failure will not compromise safety.

NOTE: These engines are technically equivalent to certified engines and have been manufactured by BRP-Powertrain using the same quality assurance system.

**Engine stoppage**

The operator assumes all risk of use, and acknowledges by this use that he/she knows this engine is subject to sudden stoppage.

**Maintenance and repair conditions**

Use for intended purpose also includes observation of the operational, maintenance and repair conditions prescribed by the manufacturer. This is a crucial factor concerning the reliability of the engine and can increase the durability of the engine.

# Chapter: 04-00-00
# AIRWORTHINESS LIMITATIONS

**Approval**

THE AIRWORTHINESS LIMITATIONS SECTION IS APPROVED BY THE EUROPEAN AVIATION SAFETY AGENCY (EASA) IN ACCORDANCE WITH PART 21A.31(a)(3) AND FAR 33.4. ANY CHANGE TO EACH MANDATORY REPLACEMENT TIME, INSPECTION INTERVAL, AND RELATED PROCEDURE CONTAINED IN THIS AIRWORTHINESS LIMITATIONS SECTION MUST ALSO BE APPROVED.

| no. | chapter | page | date of change | remark for approval | date of approval from authorities | date of issue | signature |
|---|---|---|---|---|---|---|---|
| 1 | 04-00-00 | all | 07 01 2012 | EASA approved | | | |

**Introduction**

This chapter 04-00-00 provides information about “Airworthiness Limitations“.

**Airworthiness Limitations**

**- NONE**

For the ROTAX type engine 912 i Series the airworthiness limitations are not applicable.

NOTE: Regarding engine operating limitations see the relevant chapter “limits of operation“ in the relevant Operators Manual.

Maintenance checks and replacement of defined components are required on this engine! These procedures are descriped in chapter 05 and are a required by the authority in order to ensure the Continued Airworthiness!

See chapt. 05-00-00.

**Continued Airworthiness**

Scheduled inspections of the engine including replacement and overhaul of defined components are required in order to ensure the Continued Airworthiness of ROTAX aircraft engines.

NOTES

# Chapter: 05-00-00

# MAINTENANCE

**Introduction**

The information given in the Maintenance Manual is based on data and experience which are considered to be applicable for a skilled aviation mechanic (iRMT) under normal working conditions.

**Table of contents**

In this chapter the maintenance of engine ROTAX 912 i Series is described. The description is subdivided into sections and description of function of the various systems. Some overlapping maintenance instructions are treated as generally valid information at the beginning of this section.

NOTES

# 1) Maintenance

## 1.1) General note

**Safety notice**

**⚠WARNING** Non-compliance can result in serious injuries or death! Besides our instructions in the documentation supplied, also respect generally valid safety and accident preventive directives and legal regulations.

**Procedures and limits**

The procedures and limits in this Manual constitute the manufacturers official recommendation for engine maintenance and operation.

**Instruction**

The guidelines given in the Maintenance Manual are useful and necessary supplements to training. They, however, cannot substitute competent theoretical and practical personal instruction.

**Modifications**

Non-authorized modifications as well as the use of components and auxiliary components not corresponding to the installation instructions exclude any liability of the engine manufacturer.

**Parts and accessories**

We particularly emphasize that parts and accessories not supplied as genuine BRP-Powertrain parts are not verified for suitability by BRP-Powertrain and thus are not authorized for use. Installation and/or use of such products may possibly change or negatively influence the constructive characteristics of the engine. For damages resulting from use of non-genuine parts and accessories manufacturer refuses any liability.

**Special tools**

Maintenance of engines and systems requires special knowledge and special tools. Use only the special tools recommended by BRP-Powertrain when disassembling and assembling the engine.

## 1.2) Authorized personnel

**General note**

It is a requirement that all organizations or individuals possess the required special tooling. Technicians must have type-specific training and keep a recurrent knowledge status for the level of work they intend to perform. Technicians may require accreditation from their local aviation authority in addition to any BRP-Powertrain requirements.

**Requisite knowledge**

Any task outlined herein may be performed if the organization or individual has met the following conditions:

| **Requisite knowledge of the task as a result of:** |
|---|
| - Type-specific training (for the applicable ROTAX aircraft engine) which is approved by the national aviation authority and/or BRP-Powertrain. |
| **or** |
| - Experience in performing the task **or**<br>- Formal instruction from a BRP-Powertrain authorized training facility **or**<br>- Instruction by a BRP-Powertrain or authorized BRP-Powertrain Distributor representative. |
| **Technicians must:** |
| - Maintain a suitable work environment to prevent contamination or damage to engine parts or modules.<br>- Use the required tools and fixtures as outlined in the ROTAX Maintenance Manual.<br>- Ensure reasonable and prudent maintenance practices are utilized.<br>- Ensure the requirements of the applicable regulatory authority regarding maintenance procedures are met. |

For more detailed information, maintenance organizations and individuals are encouraged to contact BRP-Powertrain through its worldwide distribution network for information and guidance on any of the tasks outlined herein. See chap. 00-00-00 section: 3.4)

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**Type-specific training**

| Type-specific training: |
| --- |
| - Independent ROTAX Maintenance Technician (iRMT) training can be obtained from a ROTAX approved training organization. Courses are available in various levels to suit the requirements of work the technician needs to perform. Each rating is valid for a 2 year period. |

**Valid time**

ROTAX iRMT specialty ratings are valid for a 2 year period after initial instruction. Recurrent training is required after 2 years to maintain a current status. In order to be eligible for the renewal program training, the technician must be able to show and declare that they have been working on ROTAX engines during the past 2 years.

## 1.3) Procedure notes

**General note**

**⚠WARNING**

Non-compliance can result in serious injuries or death!
When carrying out maintenance and service work, respect without fail all safety regulations.

---

**Ignition “OFF“**

**⚠WARNING**

Non-compliance can result in serious injuries or death!
This precautionary measure serves to avoid any injuries in case of an unintentional start of the engine.
Principally ensure the following at **each maintenance event**
- Ignition is “**OFF**“ and system grounded,
- Disconnect battery
and secure engine against unintentional operation.

---

**Ignition “ON“**

**⚠WARNING**

Risk of electric shock!
The ignition is **switched on**, as long as the ground-cable (P lead) is not properly connected to ground.

At maintenance work which requires ignition “ON“ and battery connected, take care of the following:

- Secure the propeller against unintentional turning by hand and
- Secure and observe propeller zone

---

**Handling of operating fluids**

**⚠WARNING**

Failure to comply with this instruction may cause severe burns or scalding!
Hot engine parts!
Always allow the engine to cool down to ambient temperature before starting work.

At maintenance of cooling, lubricating and fuel system take care without fail that no contamination, metal chips, foreign material and/or dirt enters the system.

---

**Disassembly**

At disassembly of the engine, mark the components as necessary to avoid any mix-up. Take care of these marks, don’t ruin them.

---

**Tool**

**NOTICE** In order to avoid mechanical damage, always loosen or tighten screws and nuts with specified tools.

**Safety wiring**

**NOTICE** If during disassembling/reassembling the removal of a safety item (e.g. safety wiring, self-locking fastener, etc.) should be necessary, it must be always replaced by a new one.

**Cleaning of parts**

**NOTICE** All metal and synthetic parts should be washed with suitable cleaning agents. Before using new and unknown cleaning agents, check their compatibility with the materials they are being used on.

**Removed parts**

Before re-using disassembled parts, clean, check and refit them as per instructions.

Use clean screws and nuts. Always inspect the contact face and thread for damage. If unsure, use new parts.

**self-securing nuts**

Once loosened, **always** replace self-securing nuts.

**⚠WARNING** Non-compliance can result in serious injuries or death! Exactly observe the tightening torques for screws and nuts. Overtightening or too loose of a connection could cause serious engine damage.

**Sealing rings, O-rings**

At reassembly of the engine, replace all sealing rings, gaskets, securing elements, O-rings and oil seals.

**Re-assembly**

Before re-assembly check components for missing parts. Only use adhesives, lubricants, cleaning agents and solvents indicated in the maintenance instructions. Failure to comply may result in damage.

## 1.4) Trouble shooting

**General notes**

In the Operators Manual, possible problems are listed. At the same time, a brief description of the necessary remedial action is given.

See chapter 4 in the Operators Manual for engine type 912 i Series.

## 1.5) Consumable Materials

**General note**

**NOTICE** Use only the specified or **technically equivalent** materials from BRP-Powertrain for all maintenance work. When handling chemicals, comply with all the customary regulations and specifications of the producer, including the expiry date and instructions of use.

NOTE: To some extent product descriptions deviate in spite of equivalent technical properties, i.e.: LOCTITE 221 and LOCTITE 222. If necessary contact the manufacturer concerning the comparability. In some cases information can be obtained from the local authorized distributors and service partners for ROTAX engines.

NOTE: Respect the manufacturers instruction concerning the curing time and the expiry date of the particular surface sealing compound.

The materials specified have been tested for a long time and are suitable for all operating conditions indicated by the manufacturer.

| No. | part no. | Description, Application | Qty. |
|---|---|---|---|
| 1 | 897651 | **LOCTITE 243 blue,**<br>medium-duty screw securing agent | 10 ml (0.003 gal (US)) |
| 3 | 899788 | **LOCTITE 648 green,**<br>high strength screw securing agent | 5 ml (0.001 gal (US)) |
| 3 | 899789 | **LOCTITE 603 green,**<br>oil-tolerant grouting product, high-strength | 10 ml (0.003 gal (US)) |
| 4 | 898241 | **LOCTITE 480 black,**<br>instant adhesive increased flexibility | 20 ml (0.005 gal (US)) |
| 5 | 899791 | **LOCTITE 5910 black,**<br>surface sealing compound, can be used instead LOCTITE 574 and LOCTITE 518 | 50 ml (0.013 gal (US)) |
| 6 | 297434 | **LOCTITE Anti-Seize 8151,**<br>for the prevention of fretting corrosion | 50 g (0.11 lb) |
| 7 | 897330 | **Lithium-base grease or Dow Corning,**<br>to prevent leakage current | 250 g (0.55 lb) |
| 8 | 897870 | **Filter oil**<br>for optimum filter efficiency and protection against moisture | 14.8 ml (0.004 gal (US)) |
| 9 | 297368 | **SILASTIC 732,**<br>multi-purpose one-component silicon-based sealing compound | 310 ml (0.082 gal (US)) |

| No. | part no. | Description, Application | Qty. |
|---|---|---|---|
| 10 | 897186 | **SILICONE HEAT CONDUCTION COMPOUND**<br>Application of the heat conduction compound will reduce heat transfer resistance. The grease-like, temperature-resistant silicon compound fills cavities between components and the cooling element (e.g.: spark plug-cylinder head), which otherwise do not contribute to heat conduction. | 150 g (0.33 lb) |
| 11 | 297711 | **PU-glue**<br>for shock absorption | 310 ml<br>(0.082 gal (US)) |
| 12 | n.a. | **Multi-purpose grease LZ**<br>Generally useable, neutrally colored multi-purpose grease, water resistant and highly adherent. Useable for temperatures from -35 °C to +120 °C (-31 °F to +248 °F) and can be subjected to mechanical loads. | |
| 13 | n.a. | **Preservation oil**<br>Requirements: The preservation oil has excellent penetrating capabilities and reaches even tiny gaps, it's highly effective additives protect against corrosion of metal surfaces. | |
| 14 | n.a. | **Very fine emery cloth SR 4600 A - very fine standard**<br>Is sold by the meter and used for manual removal of smaller rust spots or oxidation, especially for optimum ground connections. It is highly suitable for removing LOCTITE from surfaces or threads to make them metallic clean. Before re-applying LOCTITE, clean surfaces with nitro thinners or degreasing agent (CASTROL ZA 30 or OMV-SOFT SOL). When using solvents, observe the safety regulations for persons and environment regarding use and proper disposal. | |
| 15 | 898570 | **Screw securing paint**<br>Used to reduce the chance of screws vibrating loose. | 20 ml (0.005 gal (US)) |

| No. | part no. | Description, Application | Qty. |
|---|---|---|---|
| 16 | n.a. | **Cleaning agents**<br>**NOTICE** Use only approved cleaning agents (e.g. kerosine, varsol, etc.) for cleaning all metal parts.<br>Do not use lye-based cold cleaner or degreasing agents. Do not clean coolant or oil hoses with aggressive solutions. Clean off sealing compound residue with sealant remover.<br>Soak combustion chamber, piston and cylinder head with cleaning agent and remove combustion residues with a bronze brush. Very good results have been achieved with “Clenvex 2000“. It is a solvent-cold cleaner, free of halogen, on the basis of selected fuel fractions with tensides and is biologically disposable.<br>Never use caustic or corrosive cleaning agents. | |
| 17 | n.a. | **MICRONORM abrasive**<br>This abrasive is suitable for local and gradual very fine treatment of steel parts with rust film (propeller shaft). The MICRONORM abrasive contains no noxious matter, is approved by the relevant authorities and guarantees optimum cleaning. The granulates used are of sizes 40 to 60 µ. It is possible to achieve a surface roughness of 0.5 to 1µ, which represents fine processing of surfaces. | |
| 18 | n.a. | **LOCTITE 7063**<br>Degreasing fluid. For parts cleaning before applcation of adhesives and sealants. | |
| 19 | 898351 | **KLUEBER ISOFLEX TOPAS NB 5051**<br>Is a beige-coloured, homogeneous, short-fibred long-term grease for a wide service temperature range. It is a dynamically light grease consisting of synthetic hydrocarbon oil and barium complex soap. Appropriate to European-Norm the needed barium complex soap is not harmful to health.<br>ISOFLEX TOPAS NB 5051 ensures low, uniform starting and running torques. In addition, it is resistant to oxidation and ageing, and protects reliably against corrosion. | 500 g (1.1 lb) |

## 1.6) Acceptable methods, techniques and practice

**General note**

All general inspection, maintenance and repair has to be carried out in accordance with Advisory Circular AC 43.13 from FAA.

**Advisory Circular**

This Manual "Advisory Circular" AC describes maintenance methods, techniques and practice. These are recognized and authorized for inspection and repairs in non-pressurized areas for which there are no separate maintenance and repair instructions.

**Self-locking**

***NOTICE***

Self-locking nuts, cotter pins, tab washers and safety wires must be replaced each time they have been removed.

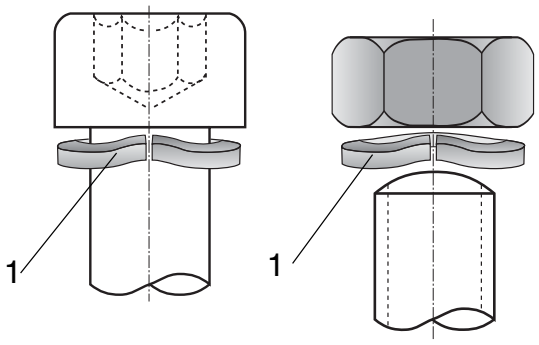
All instructions regarding the securing and lubrication of parts must be observed Adherence to specified torque values is required.

**Nut securing**

When using a self-locking nut, make sure the polyamide insert ring meets the requirements of DIN 985. Be sure that the securing elementon the nut is positioned towards the outside, in accordance with DIN 980.

**Lock washer**

NOTE: When fitting lock washers, the curved-up ends (1) must point towards the screw head or nut.

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# Chapter: 05-10-00

# TIME LIMITS

**Introduction**

The following checks are required at the times specified. This preventative maintenance is to help avoid and/or detect possible engine issues.

**Table of contents**

This chapter of the Maintenance Manual contains general information regarding TBO and time limits on components.



I

NOTES

# 1) Definition of terms

## 1.1) Operating hours

**Definition**

All of the maintenance intervals, such as the 100 hr. inspection and the engine TBO, relate to the number of operating hours of the engine.

The operating hours are defined as follows in order to prevent misunderstandings and to ensure safety:

- All time during which the engine is running is counted towards the total number of operating hours.
- The time is counted irrespective of the load factor of the engine, such as idling or take-off power.

NOTE: Maintenance and overhaul intervals are always dictated by the readings of the engine control unit (ECU).

- The planned inspections to be performed at certain intervals are based on experience from long test runs and field observations. They are intended as precautionary maintenance measures in order to ensure continued trouble-free operation of the engine.

---

## 1.2) Time limit

**Definition**

Time limits are predetermined time spans and intervals which are based either on calendar intervals or the number of engine operating hours. Once the time limits have been reached, the affected parts must either be replaced for a general overhaul, or maintenance work must be performed. These precautionary maintenance measures are designed to avoid engine malfunctions or defects and ensure continued airworthiness of the engine.

---

## 1.3) Life cycle

**Definition**

The life cycle is always specified as an exact time span and is also quoted in flight hours.

NOTE: Parts with a limited life cycle must be taken out of operation and overhauled or replaced if the specified time span or number of flight hours is reached (whichever comes first).

---

## 1.4) General overhaul (TBO)

**Definition**

The time between overhauls (TBO) for all objects (such as the engine, component assemblies, add-on components) is the approved length of operation under normal operating conditions before it becomes mandatory to send in these objects for an overhaul.

Normal operating conditions are the conditions which comply with the manufacturer's and the aviation authority's recommendations for the certification of airworthiness.

**Maintenance of operation**

The TBO values approved by the relevant authorities are based on performance tests and empirical values which have been gathered through operation of the engine and are required for the acceptance and certification of airworthiness. TBO values may be changed in response to possible upgrade/expansion programs.

**Legal obligation to keep**

TBO values for the engine are always shown in operating hours and years. The user must record the operating hours in the engine log book.

## 1.5) Purging the oil system

**General note**

Purging of the oil system is extremely important for operation and service life of the engine and therefore the procedure must be followed meticulously.
See latest installation manual Chapt. 79-00-00 "Purging the lubrication system".

## 2) Time limit

**General**

**NOTICE**

A general overhaul is due after a defined period of operation or after a specified calendar life since initial start of operation (whichever comes first).

The time limit for engine operation will be specified by the TBO.

**After reaching this time limit**

**NOTICE**

After reaching this time limit, the engine has to be shipped to an authorized ROTAX overhaul facility.

For an overhaul, the engine must be removed from the aircraft, be cleaned, preserved and all openings to be closed to prevent entering of contaminants.

**Storage period of the engine**

Observe the storage and preservation directives!

NOTE: The maximum possible storage period of the engine is limited to 24 months.

If this period is exceeded, the engine must be sent to an ROTAX authorized overhaul facility for inspection.

| Engine<br>Type description | engine affected<br>engine S/N | TBO<br>Time Between Overhaul |
|---|---|---|
| **912 iSc** | from 4,417.401 | 2000 hr. or 15 years,<br>whichever comes first (1 |
| **912 iS** | from 4,417.001 | 2000 hr. or 15 years,<br>whichever comes first (1 |

For the TBO of the specific engine type/version refer to the table below.

(1 Extension of the TBO is possible and will be specified by a Service Bulletin (SB) for the respective engine type. For extensions already effective refer to the engine log book or release certificate.

**Authorized exceeding**

Extension or exceeding of the TBO by 5 % or 6 months is allowed whichever comes first.

**Shipment**

The shipment to an authorized ROTAX overhaul facility must include the following:

| | |
|---|---|
| 1 | Engine log book. |
| 2 | Maintenance records of the engine (i.e. all maintenance check lists, and reports of operation, of maintenance, of findings and of oil analyses). |
| 3 | The engine assembly as per supply volume. Additionally all added-on parts as in the supply volume such as filters, intake silencer, fuel pump, external generator, sensors, ignition unit, electric starter, oil tank. |
| 4 | Indication of total engine operating hours (TSN) and where applicable, engine operating hours since a previous overhoul (TSO).<br>NOTE: This information must be supplied to allow the service history of components to be traced. |
| 5 | ECU incl. a statement of the number of times it has been plugged in/unplugged. |
| 6 | FUSE BOX incl. a statement of the number of times it has been plugged in/unplugged. |
| 7 | Harness incl. a statement of the number of times it has been plugged in/unplugged. |
| 8 | Data about the type of aircraft used. |
| 9 | Useful remarks and observations concerning the engine. |

## 2.1) Time limit for parts

**General note**

**NOTICE**

This time limit must be followed **independently** and **in addition** to the visual inspections (see chapt. 05-20-00 section: 3) of the respective components.

**Time limit**

The following components and systems must be replaced every 5 years:

| |
|---|
| - All rubber hoses of the cooling system |
| - All rubber hoses of the fuel system (incl. teflon hoses) |
| - All rubber hoses of the lubrication system which are part of the engine supply volume and if they are not in the maintenance schedule of aircraft manufacturer |
| - Connecting hose of the air intake system |
| - V-belt |
| - Fuel pressure regulator assy.<br>(only pressure regulator, not pressure regulator housing) |

## 2.2) Time limit for the coolant

**General note**

Coolant must be replaced as per manufacturers instructions, at the latest during overhaul or when the engine is replaced.

## 2.3) Annual inspection

**General note**

A 100 hr. inspection is to be carried out periodically after every 100 hours of operation **or every 12 months**, whichever comes first.
See chapt. 05-20-00 section: 1).

NOTES

# Chapter: 05-20-00

# SCHEDULED MAINTENANCE CHECKS

**Introduction**

The owner and/or user is primarily responsible for the maintenance and airworthiness of the engine. This includes compliance with all applicable airworthiness directives.

This inspection protocol is not intended to be all-inclusive, for no such protocol can replace the knowledge and experience of a certified aircraft mechanic. As the party primarily responsible for the maintenance and airworthiness of the engine, the owner or user should only have the maintenance work carried out by qualified engineers.

**Documentation required**

It is the responsibility of the owner and/or user to make sure that the aircraft mechanic performing the work on the engine has access to the previous Inspection Protocols and any other required documents.

**Table of contents**

This chapter of the Maintenance Manual contains general information regarding periodic maintenance and the maintenance check list.

NOTES

## 1) Scheduled maintenance checks

**Definition**

This section lists the periodic inspections which must be carried out after a specified period of operation.

**Intervals**

Periodic inspections are those which must be performed at 25, 100, 200, 600 hr. intervals in accordance with chapt. 05-20-00. section: 5.1).

This means for example that **every 100** hr. of operation a 100 hr. check must be carried out. Every 200 hr. of operation a 100 hr. and the additional checks for 200 hr. must be carried out.

| | Intervals - hours | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **25 hr** | **100 hr** | **200 hr** | **300 hr** | **400 hr** | **500 hr** | **600 hr** | **700 hr** | **to** | **2000 hr** |
| **100 hr** | X | X | X | X | X | X | X | X | | X |
| **200 hr** | | | X | | X | | X | | | |
| **600 hr** | | | | | | | X | | | |

**100 hr. check**

- In order to demonstrate continued airworthiness, an engine must be inspected after every 100 hours of operation or 12 months.
- For the intervals between maintenance work, a tolerance of ±10 hr. is permissible, but these tolerances must not be exceeded. This means that if a 100 hr. check is actually carried out at 110 hr., the next check will be due at 200 hr. ±10 hr. and not at 210 hr. ±10 hr.
- If maintenance is performed before the prescribed interval, the next maintenance check is to be done at the same interval (e.g. if first 100 hr. check is done after 87 hours of operation, the next 100 hr. check must be carried out after 187 hours of operation).
- If engine has less than 100 hours of operation during one year a 100 hr. check must be carried out. For the annual inspection a tolerance of ±2 months is given.

**Special hr. check**

NOTE: This maintenance schedule contains a column for a 50 hr. check. This check is recommended by the manufacturer but not essential, with the exception of oil change when operating with leaded AVGAS.

**25-hr. check**

- In order to demonstrate continued airworthiness, an engine must be inspected after the first 25 hours of operation.
- The checks performed at the 25 hr. inspection are the same as for the 100 hr. inspection. This applies both to newly delivered engines and to overhauled engines.

## 2) Unscheduled maintenance checks

**Operating limits exceeded**

An inspection of the engine must be performed if the operating limits of the engine have been exceeded (e.g. overspeed, excessive temperature etc.), or if unusual operating conditions have occurred during operation (e.g. lightning strike). In such cases the engine must be inspected in accordance with the applicable unscheduled maintenance checks. (See chapter 05-50-00).

**Recommends inspections**

The manufacturer also recommends the following inspections whenever maintenance is carried out (where not already prescribed by the airframe manufacturer, as possible malfunctions could have negative effects on engine operation.

| part | inspection | possible danger |
|---|---|---|
| **Engine cowling** | - for discoloring and warping. | Danger of overheating |
| **Exhaust fixation** | - re-tighten the exhaust fixation on the cylinder head after the first 2 hr. of operation. | Leakage |
| **Exhaust** | - of the exhaust unit (where necessary, replaced application of LOCTITE Anti-Seize). | Risk of fracture, wear. Smooth engine running. |
| **Fuel filter** | - of fuel filter on airframe side (for foreign bodies, sealing material and loose fragmented material). | Engine may misfire. Power loss. Engine running too lean (Engine malfunction and damage). |
| **Electr. fuel pump** | - correct function. | Insufficient fuel supply. Engine running to lean (Engine malfunction and damage). |
| **Battery** | - acid concentration for each cell<br>Observe the manufacturers instruction. | Starting problems |
| **Oil** | - for oil contamination.<br>- analyse the oil (provides additional information on the condition of the engine). | Possible engine wear |
| **Radiators, Lines** | - for damage.<br>- check for discoloration - and cracks. | Danger of overheating |
| **Propeller** | - undamaged and runs true<br>- carry out dynamically balancing including verification of propeller track. | Engine damage, unusual vibrations |

| | | |
|---|---|---|
| **Cell-side air intake system (NACA intake)** | - as specified by the cell manufacturer | See specifics of manufacturer. |
| **Cell-side attachment points of engine suspension** | - as specified by the cell manufacturer | See specifics of manufacturer. |
| **Throttle control** | - as specified by the cell manufacturer | See specifics of manufacturer. |
| **Governor** | - as specified by the cell manufacturer | See specifics of manufacturer. |

## 3) Visual inspection

| | |
|---|---|
| **General note** | The scope of a visual inspection generally includes, but is not necessarily limited to, the following. |
| **Moving parts** | Normal operating condition, accurate alignment, leak-tightness, cleanliness, ease of movement, adjustment, mechanical stress, travel, catching, extreme wear, cracks, corrosion, deformation and other visually evident damage. |
| **Parts** | Secure seating, surface condition, cleanliness, deformation, cracks in welding seams or due to material fatigue or stress, corrosion and other visually evident damage. |
| **Fuel-, Air- and Oil lines** | Cracks, dents, kinks, required flexibility, collapsed lines/hoses, abrasion, cleanliness, secure seating and other visually evident damage. |
| **Wiring** | General cleanliness; loose, corroded or broken terminals; chafed, broken or worn insulation; secure seating, heat damage and other visually evident damage. |
| **Screws and Nuts** | Surface damage, secure seating, locking wire, securing paint and other visually evident damage. |
| **Filter** | Filters and screens must be inspected for contamination and potential blockages, cleaned and replaced as required. |

NOTES

## 4) Maintenance schedule procedures (maintenance check list)

| | |
|---|---|
| **Inspections** | All stated checks are visual inspections for damage and wear, unless otherwise stated. |
| **Specified period** | All listed work must be carried out within the specified period. |
| **Maintenance check lists** | Checks are carried out as per the maintenance check lists, where type and volume of maintenance work is outlined in key words. See chapter 05-20-00 section 5.1).<br>- The lists must be photocopied and filled out for each maintenance check. |
| **Extra inspections** | - The respective check (e.g. 100 hr. check) must be noted on the top of each page of the maintenance check list.<br>- All the maintenance work carried out must be initialled in the "signature" area by the aircraft mechanic performing the task. |
| **Maintenance records** | After maintenance, the completed check lists must be entered in the maintenance records. The maintenance must be confirmed in the log book. |
| **Discrepancies/remedial action** | All discrepancies and remedial action must be recorded in a report of findings to be generated and maintained by the company authorized to carry out maintenance work. It is the responsibility of the aircraft operator to store and keep the records. |
| **Replacement of equipment** | Replacement of equipment (e.g. governor....) and execution of SB (LTA) must be entered in the engine log book, stating<br>S/N, TSN and date. |

NOTES

## 5) Check List/Maintenance Schedule

| Identification | |
|---|---|
| **AIRCRAFT** | |
| Registration number | |
| Aircraft make | |
| Aircraft model and S/N | |
| Time since new | |
| Propeller brand | |
| Propeller model and S/N | |
| Governor brand | |
| Governor model and S/N | |
| **ENGINE** | |
| Engine type | |
| Engine S/N | |
| ECU S/N | |
| FUSE BOX | |
| TSN (**t**ime **s**ince **n**ew) | |
| TSO (**t**ime **s**ince **o**verhaul) | |
| Used operating fluids: | |
| coolant | |
| - mixture ratio | |
| fuel | |
| oil | |
| **AIRCRAFT OPERATOR** | |
| Name | |
| Contact | |
| Address | |
| | |
| | |
| Telephone/Fax/E-mail | |
| | |

| **Identification** | | | | | | |
|---|---|---|---|---|---|---|
| **MAINTENANCE FACILITY** | | | | | | |
| Maintenance workshop | | | | | | |
| Address | | | | | | |
| | | | | | | |
| | | | | | | |
| Telephone/Fax/E-mail | | | | | | |
| | | | | | | |
| Certificate | | | | | | |
| | | | | | | |
| This check is applicable (circle on) | 25 hr. | 50 hr. (1 | 100 hr. | 200 hr. | 500 hr. | 1000 hr. |
| (1 leaded fuel more than 30% of operation | | | | | | |
| **Next check due at:** | _____hr. (TS_____) (engine hr.) | | | | | |
| | | | | | | |
| | | | | | | |

## 5.1) Maintenance Schedule

**General note**

Perform the following maintenance tasks at the intervals shown in the maintenance check list. See chapter 05-20-00 25 hr. check.

Legend: X = do the task
blank = no task required

NOTE: If the points 1-3 are correct of the check list then to continue with the maintenance schedule.
If one of the points 1-3 is not fulfilled, the engine must be checked and repaired in accordance with the BRP-Powertrain instructions for continued airworthiness.

| Points of Inspection | Interval Operating hours | | Chapter Reference | Signature |
|---|---|---|---|---|
| | as indicated | 100 hr. | | |
| **1.) Visual inspection of the engine** | | | | |
| General visual inspection of the engine for damage or abnormalities.<br>Check cooling air duct and cooling fins of the cylinders for obstruction, cracks, wear and good condition.<br>Take note of changes caused by temperature influence. | recommended 50 hr. | X | 12-20-00 sec. 2) | |
| Visual inspection of the ECU and FUSE BOX. | | X | | |
| Inspect all coolant hoses for damage, including leakage, hardening from heat, porosity, loose connections and secure attachment. Verify routing is free of kinks and restrictions. | | X | 12-20-00 sec. 3) | |
| Carry out visual inspection of leakage bore at the base of the water pump for signs of leakage. | | X | 12-20-00 sec. 3) | |
| Inspect the expansion tank for damage and abnormalities. Check coolant level, replenish as necessary.<br>Inspect radiator cap.<br>Inspect protection rubber on expansion tank base for correct fit. | | X | 12-20-00 sec. 10.4) | |
| Inspect the overflow bottle for damage and abnormalities.<br>Verify coolant level, replenish as necessary.<br>Inspect line from expansion tank to overflow bottle for damage, leakage and clear passage.<br>Inspect venting bore in cap of overflow bottle for clear passage. | | X | 12-20-00 sec. 10.5) | |
| | | | | |
| | | | | |

<table>
<tr><th>Points of Inspection</th><th colspan="2">Interval<br>Operating hours</th><th>Chapter<br>Reference</th><th>Signature</th></tr>
<tr><th></th><th>as<br>indicated</th><th>100 hr.</th><th></th><th></th></tr>
<tr><td>Inspect all oil lines for damage, leakage, hardening from heat, porosity, security of connections and attachments. Verify routing is free of kinks and restrictions.</td><td></td><td>X</td><td>12-20-00<br>sec. 3)</td><td></td></tr>
<tr><td>Inspect all fuel lines for damage, leakage, hardening from heat, porosity, security connections and attachments. Verify routing is free of kinks and restrictions. Check steel fuel lines for any cracks and/or scuffing marks.</td><td></td><td>X</td><td>12-20-00<br>sec. 11.3)</td><td></td></tr>
<tr><td>Inspect the wiring (wiring harness) and its connections for secure fit, damage and signs of wear.</td><td></td><td>X</td><td>12-20-00<br>sec. 15.1)</td><td></td></tr>
<tr><td colspan="5">2.) Magnetic plug</td></tr>
<tr><td>Check the magnetic plug.</td><td></td><td>X</td><td>12-20-00<br>sec. 13)</td><td></td></tr>
<tr><td colspan="5">3.) Compression check</td></tr>
<tr><td>Check the compression by the differential pressure method.<br>Test pressure_____hPa (psi)<br><br><table><tr><th colspan="5">Pressure drop (% or fraction)</th></tr><tr><th>Cyl #</th><th>1</th><th>2</th><th>3</th><th>4</th></tr><tr><th>bar</th><td></td><td></td><td></td><td></td></tr></table></td><td>every 100 hr.</td><td></td><td>12-20-00<br>sec. 4)</td><td></td></tr>
<tr><td colspan="5">4.) Checking the engine suspension</td></tr>
<tr><td>Inspect engine suspension and fasteners for secure fit, including damage from heat, deformation, cracks.</td><td></td><td>X</td><td>12-20-00<br>sec. 2.1)</td><td></td></tr>
<tr><td colspan="5">5.) Checking the air intake system</td></tr>
<tr><td>Inspect suspension and fasteners for secure fit, including damage from heat, deformation, cracks.</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td>Check the airbox incl. air flap actuation. Inspect sensors for tight fit, damage from heat, damage and signs of wear.</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table>

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| Points of Inspection | Interval Operating hours | | Chapter Reference | Signature |
|---|---|---|---|---|
| | as indicated | 100 hr. | | |
| **6.) Engine external parts** | | | | |
| Inspect screws and nuts of all external parts for tight fit. Inspect safety wiring, replace as necessary. | | X | | |
| **7.) Engine cleaning** | | | | |
| Engine cleaning | | X | 12-20-00 sec. 1) | |
| **8.) Checking the air filter** | | | | |
| Checking the air filter. | | X | 12-20-00 sec. 9.3) | |
| **9.) Spark plug connectors** | | | | |
| Check that resistance spark plug connectors fit tightly on the spark plugs.<br>Minimum pull-off force is 30 N (7 lb). | every 200 hr. | | | |
| **10.) Spark plugs** | | | | |
| Remove all spark plugs, check the heat range designation, clean, check electrode gap and adjust if necessary. Replace as required. | | X | 12-20-00 sec. 15.2) | |
| Replacing spark plugs. | every 200 hr. | X(1 | 12-20-00 sec. 15.2) | |
| (1 use of leaded fuel more than 30% of operation. | | | | |
| | | | | |
| | | | | |
| **11.) Flushing the cooling system** | | | | |
| Flushing the cooling system where conventional coolants are used. | when replacing the coolant | | 12-20-00 sec. 10.3) | |
| **12.) Engine management** | | | | |
| Check the ECU and its mountings. | | X | 12-20-00 sec. 5.1) | |
| Read out the ECU fault memory (fault log). | | X | 12-20-00 sec. 5.2) | |
| Check the ECU wiring. | | X | | |
| Check the throttle valve adjustment. | | X | | |
| | | | | |
| **13.) FUSE BOX** | | | | |
| Check the FUSE BOX and its mounting | | X | | |
| Check the FUSE BOX wiring. | | X | | |
| Visual inspection of the fuses | | X | | |
| | | | | |

| Points of Inspection | Interval Operating hours | | Chapter Reference | Signature |
|---|---|---|---|---|
| | as indicated | 100 hr. | | |
| **14.) Engine displays** | | | | |
| Check all temperature sensors. | | X | | |
| Check all pressure sensors. | | X | | |
| Check both exhaust gas temperature sensors. | | X | | |
| Check all speed sensors. | | X | | |
| Check the throttle control sensor | | X | | |
| Check the knock sensor | | X | | |
| **15.) Fuel filter (air frame side)** | | | | |
| Check the fuel filter | | X | See MM of the aircraft manufacturer. | |
| **16.) Checking the propeller gear box** | | | | |
| Gearboxes of series 3 (with overload clutch) and use of leaded fuel more than 30% of operation. Inspect overload clutch. | every 500 hr. | | 05-50-00 sec. 2) | |
| Checking the propeller gearbox. | every 1000 hr. | | 12-20-00 sec. 16.1) | |
| | | | | |
| **17.) Oil change** | | | | |
| Drain oil from oil tank. | every 50 hr.(1 | X | 12-20-00 sec. 12.2), 12.6) | |
| Check the oil tank and clean the oil tank if contaminated. | every 200 hr.(1 | X | 12-20-00 sec. 12.2), 12.6) | |
| Remove old oil filter from engine and install new oil filter. | every 50 hr.(1 | X | 12-20-00 sec. 12.3), 12.4) | |
| Cut old oil filter without producing any metal chips and inspect filter mat. Findings:_____ _____ | every 50 hr.(1 | X | 12-20-00 sec.12.5) | |
| Refill oil tank with approx. 3 litres of oil. For oil quality, see Operators Manual and SI-912 i-001, latest edition. | every 50 hr.(1 | X | 12-20-00 sec. 12.6) | |
| (1 In the case more than 30% of operation with leaded fuel e.g.: AVGAS 100 LL | | | 12-20-00 sec. 12.2) | |
| | | | | |
| | | | | |
| | | | | |

| Points of Inspection | Interval Operating hours | | Chapter Reference | Signature |
|---|---|---|---|---|
| | as indicated | 100 hr. | | |
| **18.) Oil level check** | | | | |
| Verify oil level, replenish as necessary. | | X | 12-10-00 sec. 4.1) | |
| **19.) Checking the V-belt tension** | | | | |
| On configurations with auxiliary generator, check the attachment and the V-belt tension. | | X | 12-20-00 sec. 8) | |
| **20.) Electric fuel pump** | | | | |
| Check the electric fuel pump. | every 1000 hr. | | 12-20-00 sec. 11.5) | |
| **21.) Fuel system** | | | | |
| Inspect the fuel system for leaks. | | X | 12-20-00 sec. 12.2) | |
| Inspect the fuel system for damages. | | X | | |
| **22.) Engine test run** | | | | |
| Observe the safety instructions! | | | | |
| Start the engine and run to operating temperature.<br>Limits see Operators Manual 912 i Series.<br>Ignition check at _____ rpm engine speed.<br>Speed drop without LANE:<br>A (Off)_____rpm<br>B (Off)_____rpm<br>A/B (difference)_____rpm<br>After engine test run, re-tighten the oil filter by hand (only at cold engine).<br>Checks for leaks. | | X | 12-20-00 sec. 7) | |
| **General note** | | | | |
| All Service Bulletins are complied with. | | X | | |
| | | | | |
| | | | | |
| | | | | |

| Points of Inspection | Interval Operating hours | | Chapter Reference | Signature |
|---|---|---|---|---|
| | as indicated | 100 hr. | | |
| **Returning engine to service**<br>On the engine identified as per point 5, on the _____ the_____hr.<br>Check at_____hr. (TSN___, TSO___) was carried out according to recommendations of the engine manufacturer and was recorded in the Engine Log book.<br><br>Location, Date_____<br><br>Inspector_____<br><br>Aircraft mechanic_____<br><br>Certificate No._____ | | | | |

# Chapter: 05-50-00

# UNSCHEDULED MAINTENANCE CHECKS

**Introduction**

***NOTICE***

In the course of special checks specify if **additional checks** for components (e.g. hydraulic governor) is applicable.
After each special check/repair work, an engine test run and a leakage check must be carried out.

***NOTICE***

Observe without fail all the specified instructions.

Special checks must be carried out immediately in the event of an engine fault (e.g. abnormal operation as defined in the Operators Manual) which impairs the airworthiness of the engine.

**Table of contents**

This chapter of the Maintenance Manual contains general information regarding unscheduled maintenance checks and their associated procedures.

NOTES

## 1) Engine check after propeller strike incidents

**Definition**

A propeller strike is:

- Any incident while the engine is stationary or running which makes it necessary to perform repairs on the propeller.

See SL-912-015 current edition.

### 1.1) Propeller gearbox with integrated overload clutch

**General note**

After any propeller strike the following inspections must be performed before operation can continue.

| Step | Procedure |
|---|---|
| 1 | Inspect the engine for damage. If any damage is detected, inspect, repair or overhaul the whole engine in accordance with the relevant Manual. Inspect all systems for correct functioning. |
| 2 | Inspect add-on components e.g. propeller governor, vacuum pump, external alternator. Observe the manufacturers instruction(s). |
| 3 | Observe all relevant directives from the aircraft manufacturer. |
| 4 | Remove the fuel pump and gearbox. Perform a crankshaft out- of roundness inspection on PTO side. See chapter 72-00-00 Heavy Maintenance. If measuring up is inside the value 0.08 mm continue and also perform a crankshaft distortion inspection see chapter 72-00-00. If distortion is inside the value of 2 degree, continue as following: |
| 5 | Remove and replace the roller bearing in crankcase for propeller shaft. See chapter 72-00-00 Heavy Maintenance. |
| 6 | Remove the crankshaft gear for NDT inspection. See chapter 72-00-00 Heavy Maintenance. |
| 7 | Inspect, repair and perform overhaul of the whole gearbox in accordance with chapter 72-00-00 Heavy Maintenance. |
| 8 | Perform NDT inspection upon housing and metal parts e.g. propeller shaft and gear set. |
| 9 | Re-install crankshaft gear and check the crankshaft for out-of roundness. See chapter 72-00-00 Heavy Maintenance. |
| 10 | Re-install the overhauled gearbox. See chapter 72-00-00 Heavy Maintenance. |
| 11 | Perform an engine test run in accordance with chapter 12-20-00. |
| 12 | Release back to service and make a note in engine log book work carried out. |

NOTES

## 2) Checking of the overload clutch

**General note**

In the event of lead deposits and/or if slipping is suspected, it will be necessary to check the overload clutch.

NOTE: Slipping of overload clutch is apparent if at engine speed rise, the propeller speed does not increase at the same rate.

NOTE: The engine should be run for a short time just prior to the test, otherwise there is the risk of the clutch “drying out“, resulting in a higher torque.

| Step | Procedure |
|---|---|
| 1 | Remove the propeller as per manufacturers instruction. |
| 2 | Lock the crankshaft. See chapt. 12-20-00 section: 6) |
| 3 | **NOTICE** Danger of damage to the engine suspension! Depending on the engine installation (e.g. in the case of extremely lightweight engine suspension), the gearbox must be removed and the test carried out on a suitable mounting attachment.<br>A specially prepared lever (e.g. length 3 m (9.9 ft.), see Fig.1) is fitted on the propeller flange and the breakaway torque measured with a suitable measuring tool. |

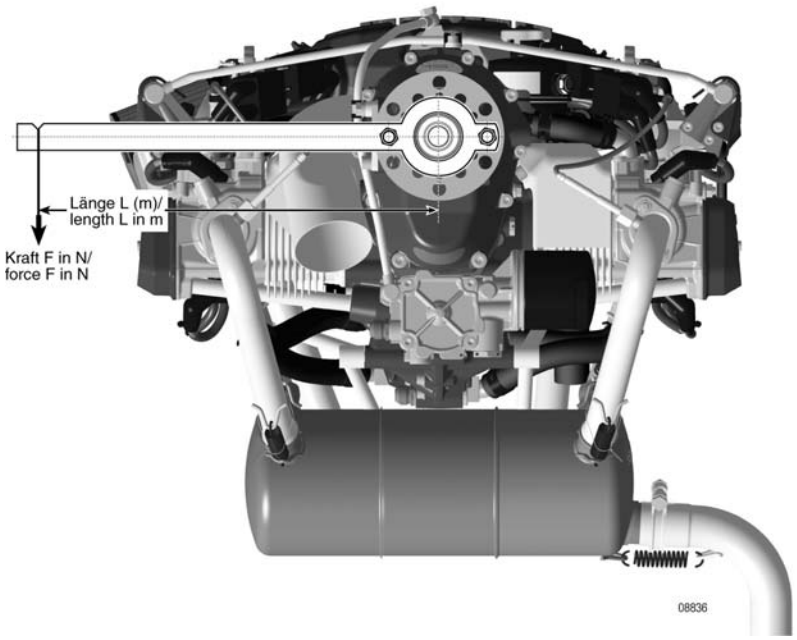


*Fig. 1*

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**Measurement**

Repeat the measurement several times to get a stable value.

The breakaway torque is calculated on the basis of the force (F) measured in N and the length of the lever arm (L) used at the normal distance from it in m (N x m = Nm).

**Obtained value**

**NOTICE** Do not exceed 800 Nm (590 ft.lb) otherwise gearbox damage can occur.

The value determined must be between 600 and 800 Nm (442 and 590 ft.lb.).

If the value is greater or smaller than the limit values, the overload clutch must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness.

| Step | Procedure |
|---|---|
| 4 | Release the crankshaft, see chapt. 12-20-00 section: 6). |

## 3) Examination after engine failure

**General note**

In order to find possible causes of the failure, it is important to pass on all available data. Observations on the aircraft and the engine suspension can also be of help. It is important to pay particular attention to any of the following engine phenomena to facilitate troubleshooting.

**Engine**

| Engine runs erratically and misfires | |
|---|---|
| **part** | **possible cause** |
| Fuel system | fuel supply<br>vapour locks<br>contamination |
| Ignition system (shorting cable, charging coil, ECU, FUSE BOX)<br>Spark plug | malfunction<br>grounding defect<br>wrong spark plug connection<br>loose connection |

**Rough running**

| Rough running engine | |
|---|---|
| **part** | **possible cause** |
| Ignition | wiring (assignment fault) |
| Engine | engine temperature too low<br>wrong intake air |

**Engine stoppage**

**NOTICE**

Should one of the above mentioned items occur even for a short time then a detailed check of the engine is necessary. The fault needs to be located and corrected.

| Unintended engine stoppage by seizing | |
|---|---|
| **part** | **possible cause** |
| Oil system | oil pressure too low or no oil pressure<br>oil shortage<br>contamination<br>incorrect venting |
| Oil pump | defect |
| Camshaft bearings/Conrod bearings | rather consequential damage wear (low oil pressure) |
| **NOTICE** The entire assembly must be dismantled, inspected and repaired. | |

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- The whole engine must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness.
- Inspect all systems for correct functioning.
- Detailed inspection of affected engine components.

**Cylinder head**

A rise in cylinder head temperature above normal operating limits (see Operators Manual) is a clear signal for a failure in the cooling system.

| **Cylinder head temperature too high** | |
|---|---|
| **part** | **possible cause** |
| Cooling system | not enough coolant<br>bad venting |
| Return valve, pressure relief valve | malfunction |
| Radiator | contaminated<br>sealing of intercooler to cowling<br>poor cooling flow |
| Radiator cap | leaking |
| Water pump | malfunction |

## 3.1) Returning engine to service after submerging in water

**General note**

**NOTICE**

The engine must be marked clearly “Engine submerged in water“. Define if it was fresh water or salt water.

An engine which has been submerged in water must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness.

---

**Inspection**

- Inspect all systems for correct functioning.

NOTE: Prior to the detailed inspection, all parts should be cleaned and inspected for corrosion. For accessories (e.g. vacuum pump, fuel filter etc.) the instructions and specifications of the corresponding manufacturer must be followed.

| Complete inspection of these components: | |
|---|---|
| voltage supply | cooling system |
| gearbox | valve train system |
| suspension system | engine management |
| fuel system | exhaust system |
| units of power | lubrication system |
| ignition system | start system |
| cylinder unit | |

In most cases an overhaul is necessary, in this regard send the engine without delay to an authorized ROTAX overhaul facility for inspection.

If an engine was submerged into water, all electrical components (e. g.: electric fuel pumps, ignition coils, stators, spark plugs, spark plug connectors, electronic modules, sensors, ECU, wiring harness) must be replaced.

NOTE: Signs of submerging in water could be discoloration or corrosion.

---

## 3.2) Inspection in extreme climatic conditions

**General note**

**NOTICE** Every 25 hr. checks of air filter, coolant radiator and oil cooler are necessary.

Flying in deserts or areas with heavily contaminated or dusty air causes increased wear on all components. For this reason, shorter maintenance intervals are recommended.

Flying in areas with extreme climatic conditions or in extreme altitudes requires adjustment of the cooling system. To do this, it is necessary to contact the aircraft manufacturer and an authorized ROTAX distributor.

## 3.3) Diminished functional capability of ECU

**General note**

NOTE: The diminished functional capability of ECU must be entered by the pilot into the engine log book, stating duration extant of diminished functional capability of ECU and all pertinent details.

- Perform engine inspection.

Read out the ECU data memory and check the data for details of diminished functional capability of ECU. Perform the corresponding inspections/ repairs depending on the functional defects found.

## 3.4) Returning engine to service after influence by fire

**General note**

An engine after influence by fire must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness.

**Inspection**

- Inspect all systems for correct functioning.

NOTE: Prior to the detailed inspection, all parts should be cleaned and inspected for weld penetration or melted materials.

If an engine was influenced by fire, first a visual inspection of all parts has to be done and then a hardeness test of all mechanical parts must be performed (e. g.: crankcase, cylinder, cylinder heads etc.).

In most cases an overhaul is necessary, in this regard send the engine without delay to an authorized ROTAX overhaul facility for inspection.

## 3.5) Exceeding of max. admissible engine RPM

**General note**

**NOTICE**

Any exceeding of the max. admissible engine RPM must be entered by the pilot into the engine log book stating duration extent of overspeeding and pertinent detail.

Read out the ECU data memory and check the data for details of increased engine speed. Perform the corresponding inspections/repairs depending on the functional defects found.

**up to 6500 rpm max. 1 min.**

**If the limit was exceeded for max. 1 minute up to 6500 rpm**

| Step | Procedure |
|---|---|
| 1 | Check that the push-rods are straight. |

**max. 6500 rpm more than 1 min.**

**If the limit was exceeded for more than 1 minute**

| Step | Procedure |
|---|---|
| 1 | The whole engine must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness. |
| 2 | Check that the push-rods are straight. |
| 3 | Inspect the crankshaft for out-of-roundness. See chapter 72-00-00 of the latest Heavy Maintenance Manual. |
| 4 | Inspect all systems for correct functioning. |
| 5 | Detailed inspection of affected engine components. |

**more than 6500 rpm**

**If the speed of 6500 rpm was exceeded**

| Step | Procedure |
|---|---|
| 1 | The whole engine must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness. |
| 2 | Check that the push-rods are straight. |
| 3 | Check differential pressure |
| 4 | Replace the crankshaft. Check the drive gear on roundness and torsion. See chapter 72-00-00 of the Heavy Maintenance Manual. |
| 5 | Check if piston had contact with valve. |
| 6 | Check roundness of valves. |
| 7 | Inspect all systems for correct functioning. |
| 8 | Detailed inspection of affected engine components. |

## 3.6) Exceeding of max. coolant temperature

**General note**

**NOTICE**

If the maximum coolant temperature is exceeded, other limits are also often exceeded, e.g. oil temperature. Please observe the relevant instructions.

NOTE: Any exceeding of the max. admissible coolant temperature must be entered by the pilot into the engine log book, stating duration, extent of excess temperature and pertinent detail.

**Graphic**

Overview and proceed:

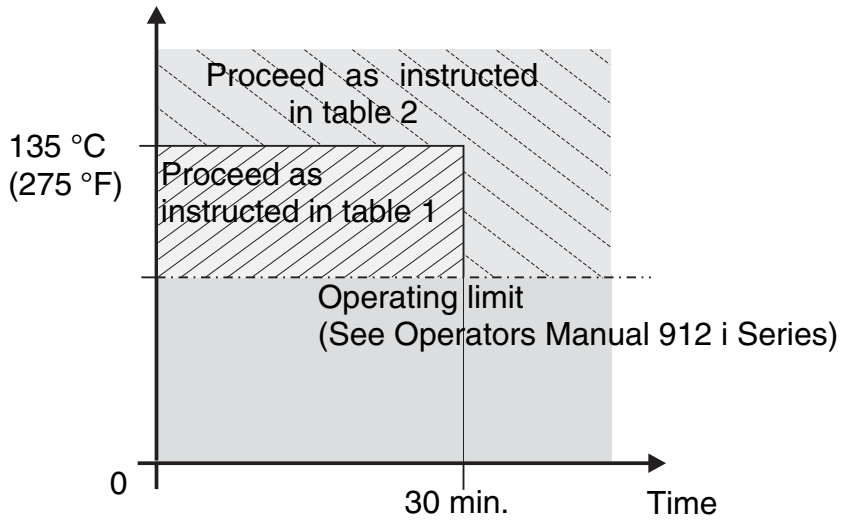


*Fig. 2* 07140

**Temperature exceeded briefly**

Table 1.

| Temperature exceeded - briefly | |
|---|---|
| **Step** | **Procedure** |
| 1 | The whole cooling system must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness. |
| 2 | Inspect all further systems for correct functioning. |
| | Carry out detailed inspection of the affected engine components such as.<br>- Leakage check on the cooling system.<br>- Check that the cylinder head attachment is fitted securely. If any of the cylinder head nuts are loose, proceed as instructed in sec. “Excess temperature of over 180 °C (356 °F) and/or for longer than 30 min.“<br>- Check all coolant fittings (feed/outflow) for secure fit. |

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**Exceeded for longer than 30 min.**

Table 2.

| Excess temperature for longer than 30 min. | |
|---|---|
| **Step** | **Procedure** |
| 1 | The whole cooling system must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness. |
| 2 | Inspect all further systems for correct functioning. |
| 3 | Carry out detailed inspection of the affected engine components. |
| 4 | Check compression by carrying out a differential pressure check. |
| 5 | All cylinder heads and cylinders must be removed and subjected to a detailed check including hardness testing.<br>See chapt. 72-00-00 of the Heavy Maintenance Manual. |

## 3.7) Non compliance with the coolant specification

**General note**

***NOTICE*** Use only coolant as recommended in the current Operators Manual and SI-912 i-001 “Selection of suitable operation fluids“, current issue.

| Non compliance with the coolant specification | |
|---|---|
| **Step** | **Procedure** |
| 1 | When a different coolant as the former one (conventional coolant) is used, then the coolant system has to be flushed.<br>See chapt. 12-20-00 section: 10.3) |
| 2 | Fill in with new coolant<br>See chapt. 12-10-00 section: 3.1). |
| 4 | Re-install the radiator cap. |
| 5 | NOTE: Run engine for a minute and replenish as required. |

## 3.8) Exceeding the max. permissible oil temperature

**General note**

**NOTICE**

If the max. permissible oil temperature is exceeded, other limits are often exceeded, too, e.g. the cylinder head temperature. Please observe the relevant instructions.

NOTE: Any exceeding of the max. admissible oil temperature must be entered by the pilot into the engine log book, stating duration extant of excessive temperature and pertinent detail.

Read out the ECU data memory and check the data for details of increased oil temperature. Perform the corresponding inspections/repairs depending on the functional defects found.

**Graphic**

Overview and proceed;

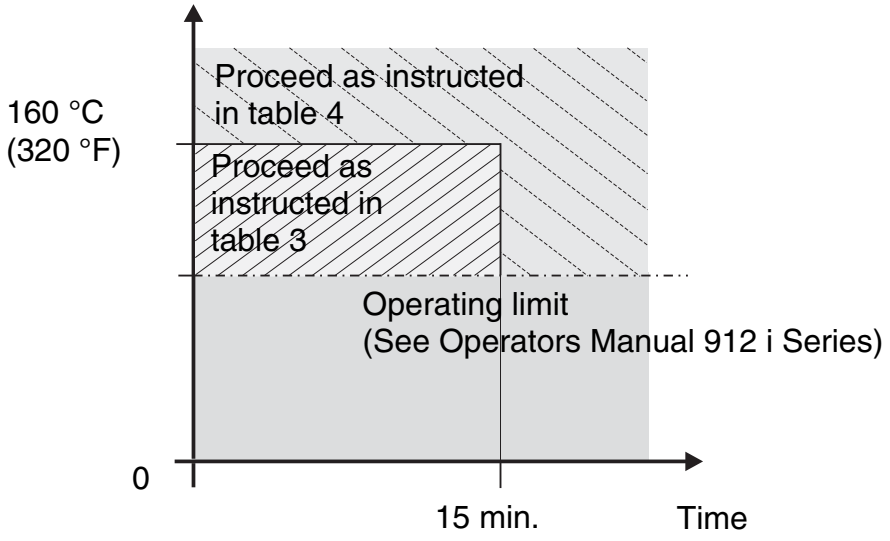


*Fig. 3* 07140

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**Exceeding up to max. 160 °C (320 °F)**

Table 3.

| Excess temperature up to max. 160 °C (320 °F) max. 15 min. | |
|---|---|
| **Step** | **Procedure** |
| 1 | The whole oil system must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness. |
| 2 | Inspect oil level in the oil tank. |
| 3 | Inspect oil cooler for contamination and check the entire oil circuit for correct functioning. |
| 4 | Check that oil lines are routed correctly and undamaged. |
| 5 | Cut oil filter housing and inspect filter mat for foreign matter. |
| 6 | Carry out oil change. |
| 7 | Inspect all further systems for correct functioning. |

**Exceeding over 160 °C (320 °F)**

Table 4.

| Excess temperature over 160 °C (320 °F) for longer than 15 min. | |
|---|---|
| **Step** | **Procedure** |
| 1 | The whole engine must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness. |
| 2 | Inspect all further systems for correct functioning. |
| 3 | Carry out detailed inspection of the affected engine components. |
| 4 | The whole oil system (oil cooler, oil lines) must be inspected. |
| 5 | Cut oil filter housing and inspect filter mat for foreign matter. |
| 6 | Carry out oil change. |

## 3.9) Oil pressure below minimum value

**General note**

**NOTICE**

If the oil pressure falls below the minimum value, other limits are often exceeded, e.g. the oil temperature. Please observe the relevant instructions.

NOTE: Any exceeding of the min. admissible oil pressure must be entered by the pilot into the engine log book, stating duration extent of excessive pressure and pertinent details.

**Graphic**

Overview and instruction

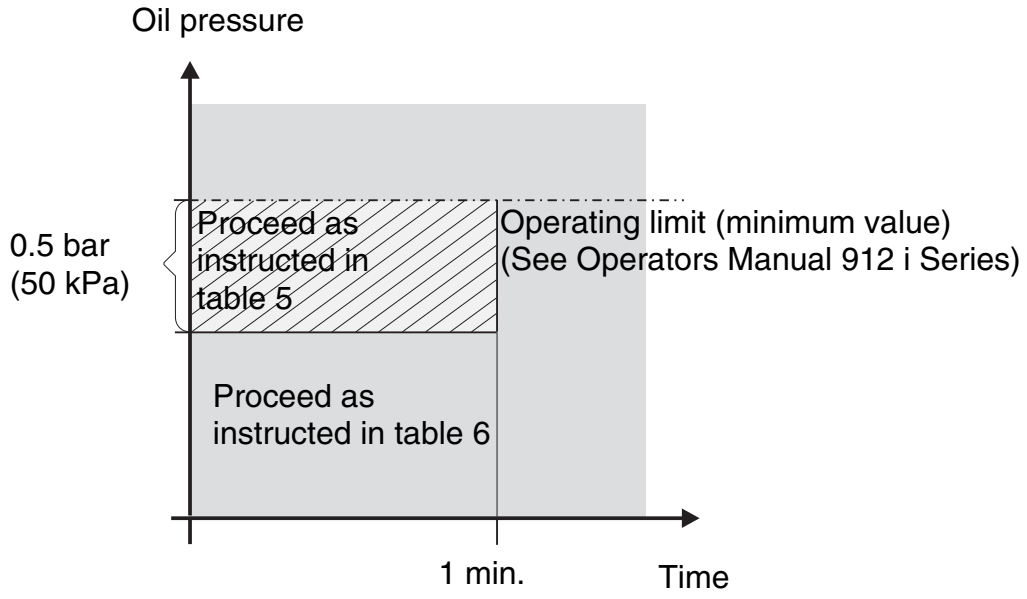


*Fig. 4* 07188

**Minimum oil pressure on the ground**

**Oil pressure below minimum oil pressure on the ground**

If noticed **on ground**, immediately stop the engine and determine the cause.

- Inspect the complete lubrication system, trace cause and rectify. See SI-912-005, latest issue.

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**Minimum oil pressure falls below 0.5 bar (50 kPa) max. 1 min. in flight**

If the oil pressure falls below the minimum value up to max. 0.5 bar (50 kPa) and for max. 1 min., the cause must be determined. Table 5.

| Oil pressure below minimum permissible oil pressure up to max. 0.5 bar (50 kPa) max. 1min. in flight | |
|---|---|
| **Step** | **Procedure** |
| 1 | Inspect all oil lines for restrictions and clear passage. |
| 2 | Verify oil quantity. |
| 3 | Inspect pressure sensor. |
| 4 | Inspect indicating instrument to specifications of the manufacturer, replace as required. |
| 5 | Inspect crankcase pressure (See Installation Manual 912 i Series, latest issue.) |
| 6 | If no cause for the low oil pressure is found after the above checks, carry out an oil change. |
| 7 | If after the previous checks and oil change the oil pressure is still too low, repair or overhaul the engine in accordance with the BRP-Powertrain instructions for continued airworthiness. |
| 8 | Inspect all systems for correct functioning. |
| 9 | Carry out detailed inspection of the affected engine components. |

***NOTICE***

When re-installing the oil cooler and oil lines, the complete lubrication system (inclusive oil tank) must be flushed.

**Minimum oil pressure in flight more then 0.5 bar (50 kPa)**

Consequent damage can be expected if the oil pressure falls below the minimum value more than 0.5 bar (50 kPa). Table 6.

| Oil pressure below minimum permissible value more than 0.5 bar (50 kPa) in flight | |
|---|---|
| **Step** | **Procedure** |
| 1 | The whole cooling system must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness.<br>- The crankshaft must be replaced. |
| 2 | Carry out detailed inspection of the affected engine components. |
| 3 | Cut oil filter housing and inspect filter mat for foreign matter. |
| 4 | Inspect all further systems for correct functioning. |

## 3.10) Oil specification not respected

**General note**

NOTE: An entry by the pilot in the engine log book of all pertinent details is required.

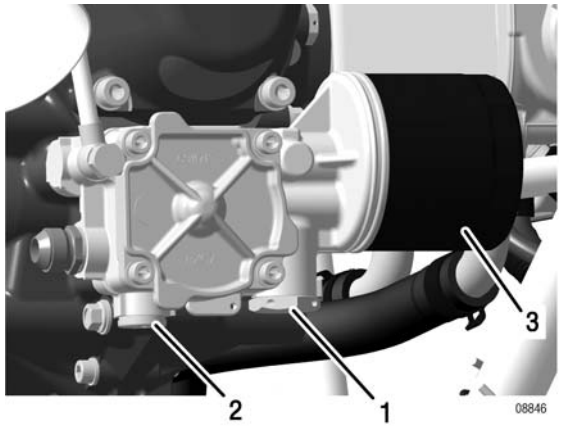
If by error engine was serviced with oil, which does not correspond with oil specification in the Operators Manual and the engine has been in operation for **less than 5 hours**, the following measures must be taken:

**less than 5 hr.**

| Oil specification not respected | |
|---|---|
| **Step** | **Procedure** |
| 1 | Oil change. |
| 2 | Remove the lowest positioned banjo screw (1) (banjo bolt, plug screw or screw socket) and drain the remaining oil from the crankcase. Screw in banjo bolt or plug screw.<br>Tightening torque see Installation Manual 912 i Series. |
| 3 | Replace oil filter. |
| 4 | Drain oil completely from oil cooler. |
| 5 | Drain oil from oil tank. |
| 6 | Refill oil tank with oil as specified, refer to Operators Manual. |
| 7 | Purge air from oil system. See chapt. 12-20-00, section: 12.5). |
| 8 | Run engine for approx. 1 hour and replace oil and oil filter once more, as stated above. |

**Graphic**

Position of the plug screw




| Part | Function |
|---|---|
| 1 | plug screw M22x1,5 |
| 2 | plug screw M16x1,5 |
| 3 | oil filter |

*Fig. 5*

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**longer than 5 hr.**

If the engine has been operated **longer than 5 hours** with engine oil not corresponding with specification in the Operators Manual the following work is required.

| Oil specification not respected | |
|---|---|
| **Step** | **Procedure** |
| 1 | Remove propeller gearbox. |
| 2 | The gearbox must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness. |
| 3 | Carry out detailed inspection of the affected engine components. |
| 4 | Oil change. |
| 5 | Remove the lowest positioned banjo screw (banjo bolt, plug screw or screw socket) and drain the remaining oil from the crankcase. Screw in banjo bolt or plug screw.<br>Tightening torque see Installation Manual 912 i Series. |
| 6 | Replace oil filter. |
| 7 | Control of the contact surfaces camshaft / hydraulic valve tappet |
| 8 | Drain oil completely from oil cooler. |
| 9 | Drain oil from oil tank. |
| 10 | Refill oil tank with oil as specified, refer to Operators Manual. |
| 11 | Purge air from oil system. See chapt. 12-20-00, section: 12.5). |
| 12 | Run engine for approx. 1 hour and replace oil and oil filter once more, as stated above. |

## 3.11) Spark plug not in accordance with specification

**General note**

If by error any of the spark plugs were installed which are not according to specification of the engine manufacturer and/or not genuine ROTAX parts, the following verification will be necessary.

| Spark plug not in accordance with specification | |
|---|---|
| **Step** | **Procedure** |
| 1 | Mark position of the spark plugs (e.g. cyl. 1 top) and remove all spark plugs. |
| 2 | Inspect the spark plugs for damage (formation of melt beads, burn off). At heavy melt beads or bad burn off, inspect the piston dome and cylinder wall by periscope. If parts are damaged, the engine must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness. |
| 3 | Inspect all systems for correct function. |
| 4 | Detailed inspection of affected engine components. |
| 5 | Inspect spark plug thread for damage (especially at bad burn off). |
| 6 | Differential pressure check. See chapt. 12-20-00 section: 4). |
| 7 | Change oil and oil filter. |

## 3.12) Non compliance of fuel quality

**General note**

With the use of unsuitable fuel quality (e.g. low octane fuel), depending on the operating condition the knock control would activate itself. This control should prevent damage by knocking combustion.
The use of unsuitable fuel quality has to be entered in the engine log book.

| Non compliance with fuel quality | |
|---|---|
| **Step** | **Procedure** |
| 1 | Visual inspection of engine |
| 2 | Empty the fuel system according to the instructions of cell manufacturer |
| 3 | Replace fuel filter |
| 4 | Flush fuel system |
| 5 | Check differential pressure |
| 6 | Engine test run |

## 3.13) Smooth performance of the engine

**General note**

See Fig. 6.

**⚠WARNING** Risk of electric shock!
Ignition “OFF“ and system grounded! Disconnect negative terminal of aircraft battery.

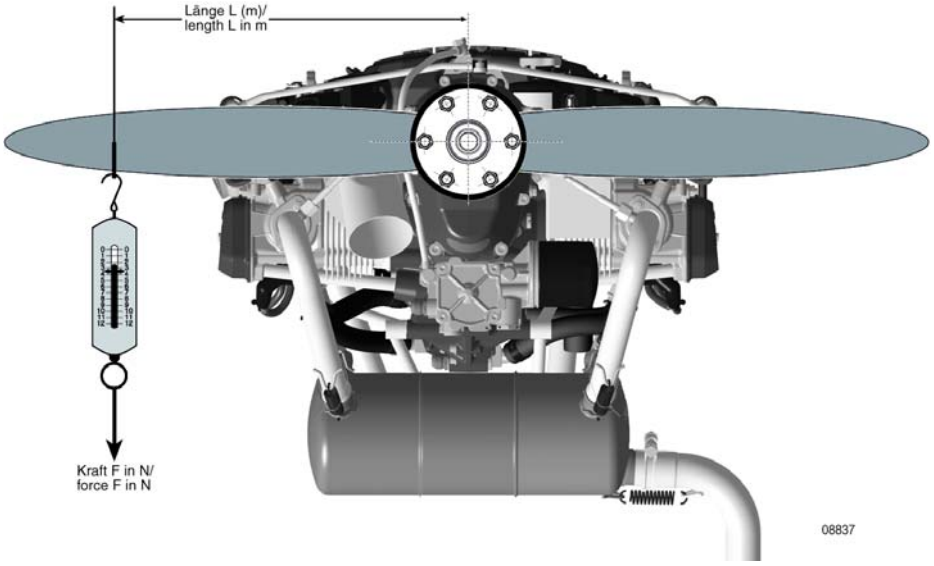
**Inspection**

Inspection of smooth performance of the engine should be performed at a temperature about 0 °C to 60 °C.

| Engine runs sluggishly | |
|---|---|
| **Step** | **Procedure** |
| 1 | Remove spark plug connector and remove 1 spark plug from each cylinder. |
| 2 | Torque must be determined with a suitable jig.<br>To do this, determine the maximum occurring torque on the propeller shaft necessary to move the whole crank drive.<br>The torque must be max. 150 Nm (110.64 ft.lb).<br>If the maximum torque is exceeded, perform the following inspections:<br>- Carry out detailed inspection of the affected gearbox components<br>- Carry out detailed inspection of crank drive |

**Graphic**

Measuring torque required to turn crank drive




NOTE: Always use protection of propeller edge when doing this test.

*Fig. 6*

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## 3.14) Lightning strike

**General note**

An indirect lighting strike is a strike on the aircraft fuselage, the wings or propeller. A direct lighting strike is a strike which acts directly on the engine.

Different types of damage can be caused depending on the type of lightning strike.

**Indirect lightning strike**

Read out the ECU data memory and check the data for details of increased oil temperature. Perform the corresponding inspections/repairs depending on the functional defects found.

| Indirect lighting strike | |
|---|---|
| **Step** | **Procedure** |
| 1 | Inspect FUSE BOX |
| 2 | Inspect the condition of the engine. |
| 3 | Inspect the mechanical actuation systems in the engine. |
| 4 | Inspect the harness. |
| 5 | Crank the engine and check that it rotates freely. |
| 6 | Perform an engine test run. |

**Heat damage due to indirect lightning strike:**

Detailed findings will need to be obtained for affected components. Always replace components if visible signs of damage are evident or if you are in any doubt.

**Electrical and magnetic damage due to indirect lightning strike:**

Detailed findings will need to be obtained for affected components. Always replace components if visible signs of damage are evident or if you are in any doubt.

**Direct lightning strike**

Send the engine without delay to an authorized ROTAX overhaul facility for inspection.

## 3.15) Reporting

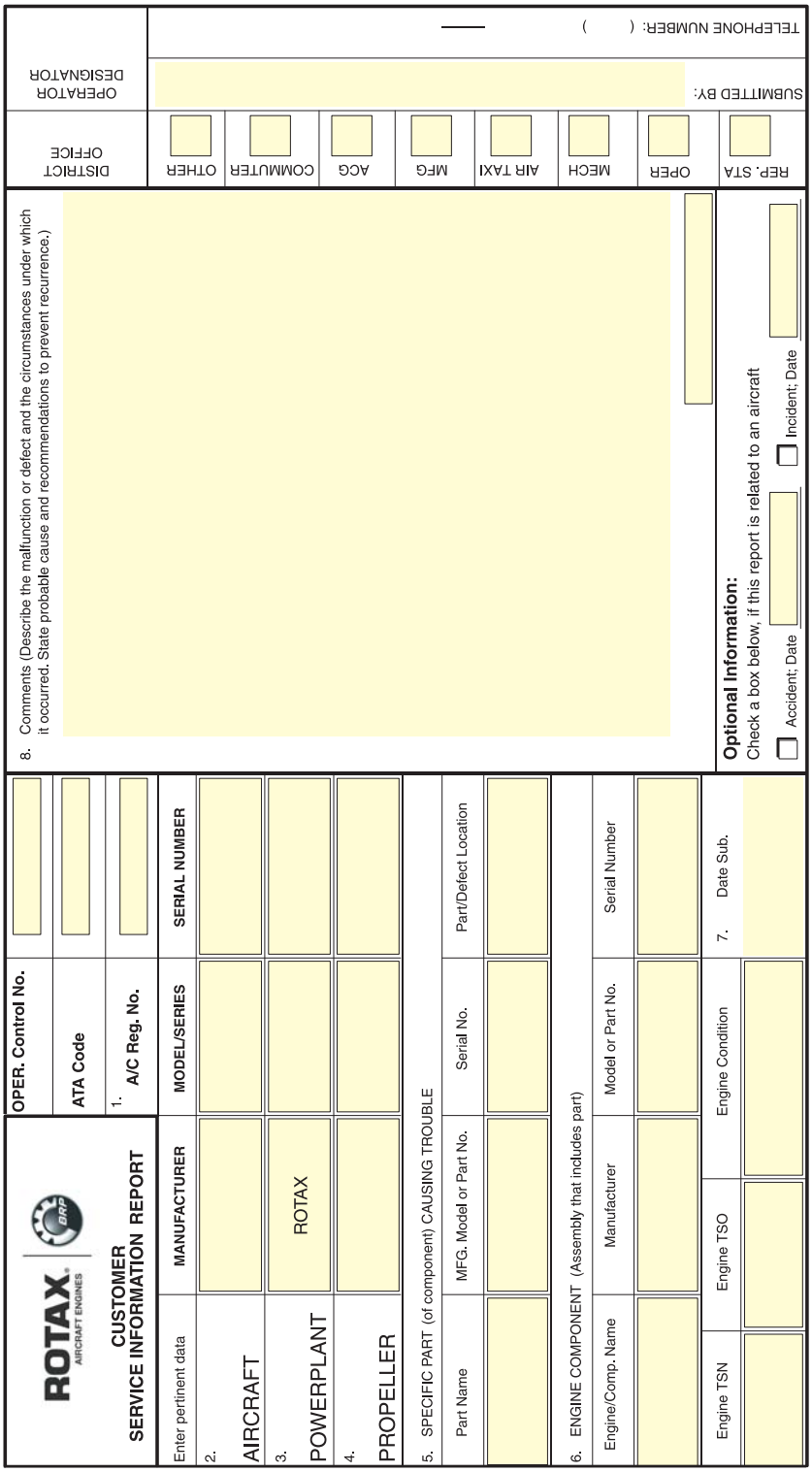
**General note**

According to the regulation of EASA part 21A.3 / FAR 21.3 the manufacturer shall evaluate field information and report to the authority. In case of any relevant occurrences that may involve malfunction of the engine, the form on the next page should be filled out and sent to the responsible authorized ROTAX aircraft engines distributor.

NOTE: The form is also available from the official ROTAX AIRCRAFT ENGINES Website in electronic version.

**www.FLYROTAX.com**

**Form**



ROTAX AIRCRAFT ENGINES

CUSTOMER SERVICE INFORMATION REPORT

OPER. Control No.

ATA Code

1. A/C Reg. No.

| Enter pertinent data | MANUFACTURER | MODEL/SERIES | SERIAL NUMBER |
|---|---|---|---|
| 2. AIRCRAFT | | | |
| 3. POWERPLANT | ROTAX | | |
| 4. PROPELLER | | | |

5. SPECIFIC PART (of component) CAUSING TROUBLE

| Part Name | MFG. Model or Part No. | Serial No. | Part/Defect Location |
|---|---|---|---|
| | | | |

6. ENGINE COMPONENT (Assembly that includes part)

| Engine/Comp. Name | Manufacturer | Model or Part No. | Serial Number |
|---|---|---|---|
| | | | |

| Engine TSN | Engine TSO | Engine Condition | 7. Date Sub. |
|---|---|---|---|
| | | | |

8. Comments (Describe the malfunction or defect and the circumstances under which it occurred. State probable cause and recommendations to prevent recurrence.)

**Optional Information:**
Check a box below, if this report is related to an aircraft
☐ Accident; Date ☐ Incident; Date

DISTRICT OFFICE

REP. STA ☐ OPER ☐ MECH ☐ AIR TAXI ☐ MFG ☐ ACG ☐ COMMUTER ☐ OTHER ☐

OPERATOR DESIGNATOR

SUBMITTED BY:

TELEPHONE NUMBER: ( ) —

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# Chapter: 12-00-00

# MAINTENANCE OF THE SYSTEMS

**Introduction**

The section “Maintenance of the systems“ is associated with other sections. It serves only as a supplement to and further explanation of the maintenance check list (See 05-20-00).

NOTE: For reasons of clarity, only headlines and keywords are listed in the Maintenance Schedule. Please refer to the following pages for further explanation if needed.

As far as possible, the content has been arranged according to system.

**Table of contents**

This chapter of the Maintenance Manual contains the most common maintenance procedures.

NOTES

# Chapter: 12-10-00

# REPLENISHING OPERATING FLUIDS

**Introduction**

The engine should always be in a horizontal position before checking the fill levels.

**ENVIRONMENT NOTE**

All operating materials and cleaning products endanger the environment by improper disposal.
Dispose of the operating materials in an environmentally sound way!

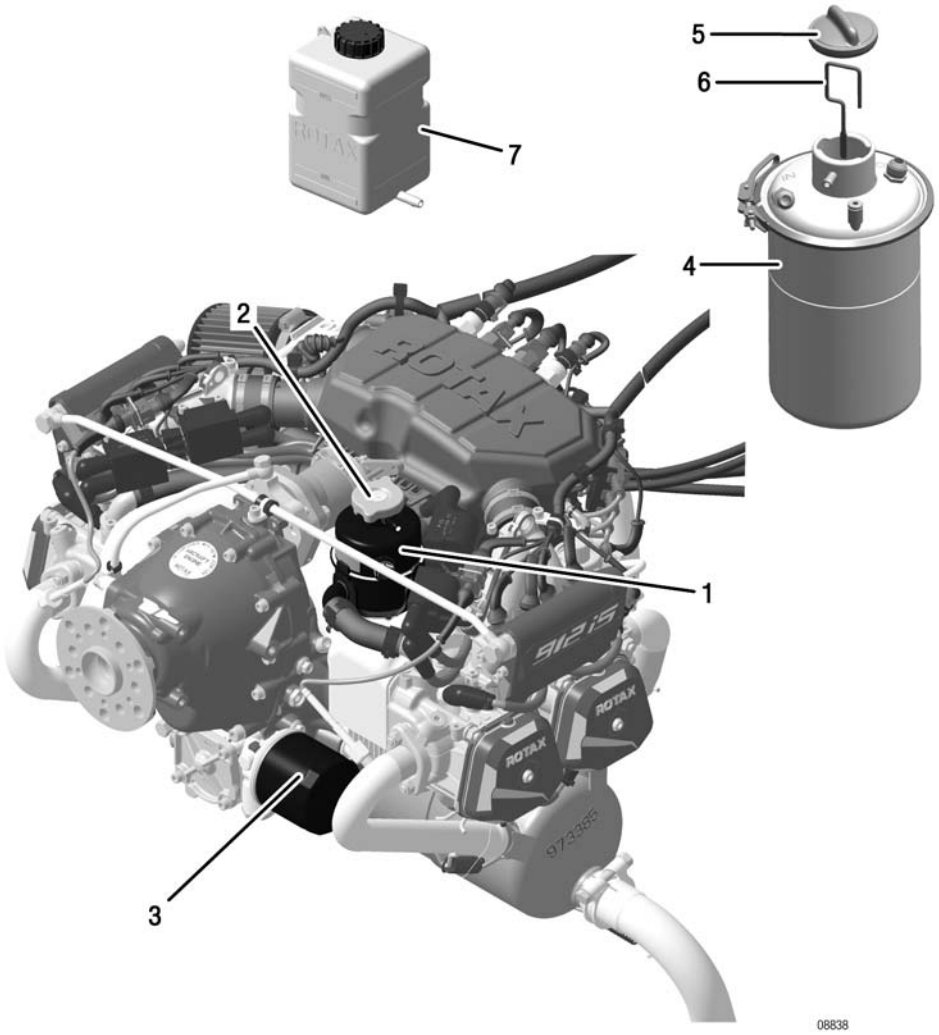
**Table of contents**

This chapter covers the steps required to replenish all operating fluids on the engine and also provides an overview of the fill capacities.

NOTES

# 1) General

**Servicing points on the engine**




| Part | Function |
|---|---|
| 1 | Expansion tank |
| 2 | Radiator cap |
| 3 | Oil filter |
| 4 | Oil tank |
| 5 | Oil tank cover |
| 6 | Oil dipstick |
| 7 | Overflow bottle |

*Fig. 1*

NOTES

## 2) Fluid capacities

**General note**

**CAUTION** The operation of the engine may be adversely affected if non-approved or contaminated fuel, oil or coolant are used. Any mixing of different manufacturers and types should be avoided. The use of additives may result in damage.

**System**

Overview

| System | Fill capacity | Details about the operating fluids |
|---|---|---|
| Fuel system | Refer to the relevant specifications provided by the aircraft manufacturer. | Refer to the corresponding chapter in the Flight Manual. |
| Cooling system | Approx. 1.5 l (0.4 US gal.) | Refer to the corresponding chapter in the Operators Manual. |
| Oil system | MIN mark corresponds to 2.5 l (0.66 US gal.) and MAX mark corresponds to 3.0 l (0.8 US gal.) | Refer to the corresponding chapter in the Operators Manual. |

NOTES

# 3) Cooling system

## 3.1) Coolant check/replenish

**General note**

**⚠WARNING**

Risk of Burns!
Hot engine parts!
Always allow engine to cool down to ambient temperature before start of any work.

**⚠WARNING**

Risk of Burns!
Never open the radiator cap when the cooling system is hot. For safety's sake, cover cap with a rag and open slowly. Sudden opening of the cap could provoke the escape of boiling coolant and result in scalding.

**ENVIRONMENT NOTE**

Coolant and mixtures of coolant and water have to be treated as hazardous waste!

For accomplishment the following special tool is required.

| Part number | Description |
|---|---|
| n.a. | (1) Densimeter |
| n.a. | (2) Glycol tester |

**Graphic**

Special tool


*Fig. 2* *05908,05909*

**Instruction**

See Fig. 3.

To refill the coolant the following steps are necessary.

| Step | Procedure |
|---|---|
| 1 | Open the radiator cap (1) on the expansion tank (2). |
| 2 | Check the coolant level. The coolant level must be filled up to the top (see Sketch). |

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| Step | Procedure |
|---|---|
| 3 | Inspect coolant with densimeter or glycol tester. Strongly discolored or thickened coolant must be replaced. |
| 4 | **CAUTION** Use only coolant as recommended in the current Operators Manual.<br><br>If necessary, replenish with coolant of same composition. |
| 5 | Tighten the radiator cap by hand.<br>NOTE: The radiator cap must be tightened until the stop lug is contacted. |

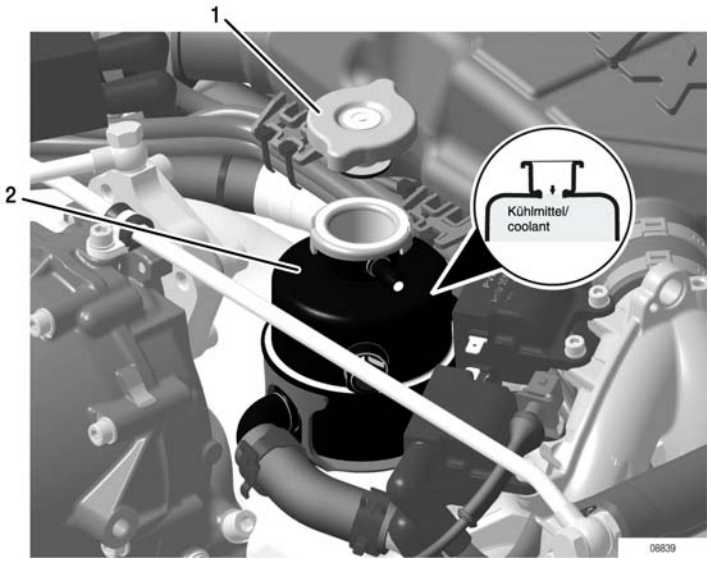
**Engine test run**

Engine test run is necessary:

| Step | Procedure |
|---|---|
| 1 | Operate the engine until the temperatures have stabilized for a period of 5 min. (engine oil temperature between 50 to 70 °C (122 - 160 °F). |
| 2 | Switch the engine OFF. |
| 3 | Allow the engine to cool down. |
| 4 | Check for leaks. |
| 5 | Check the coolant level and top up with coolant as required. |

**Graphic**

Coolant check/replenish




| Part | Function |
|---|---|
| 1 | Radiator cap |
| 2 | Expansion tank |

*Fig. 3*

*d05030.fm*

# 4) Lubrication system

## 4.1) Oil level check/Replenish

**General note**

**⚠WARNING**

Risk of Burns!
Hot engine parts!
Always allow engine to cool down to ambient temperature before start of any work.

**⚠WARNING**

Risk of electric shock!
Ignition “OFF“ and system grounded! Disconnect negative terminal of aircraft battery.

**ENVIRONMENT NOTE**

Be careful that no oil enters the sewerage system or the soil -
Risk of contamination of drinking water!
Collect waste oil and take it to the recycling center.

**Preparatory tasks**

Before checking the oil level, make sure that there is no residual oil in the crankcase.

**Instruction**

See Fig. 4.

For checking and before replenish proceed as follows.

| Step | Procedure |
|---|---|
| 1 | Prior to oil level check, turn the propeller several times by hand in direction of engine rotation to pump all the oil from the engine to the oil tank. |
| 2 | This process is completed when air flows back to the oil tank. This air flow can be perceived as a murmur (gurgling) when the oil tank cover (1) of the oil tank is removed. |
| 3 | Pull out the oil dipstick (2). |
| 4 | The oil level in the oil tank should be between the two marks (max./min.) on the oil dipstick, but must never fall below the min. mark. |
| 5 | ***CAUTION*** For longer flights replenish oil to max. mark to warrant more oil reserve.<br><br>During standard engine operation, the oil level should be mid-way between the max. and min. marks, as at higher oil level (over servicing), oil will escape via the venting passage see also SI-27-1997, “oil level check“, latest issue. Difference between “max.“ and “min“. - mark = 0.45 l (0.95 liq.pt) |
| 6 | Replenish oil as required.<br>***CAUTION*** Only use brand name oil in accordance with the latest Operators Manual and SI-912 i-001, “Selection of suitable operating fluids“ latest issue. |

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| Step | Procedure |
|---|---|
| 7 | Check oil level - Marks on the oil dipstick. |
| 8 | Fit the oil dipstick and tighten the oil tank cover (1) by hand. |

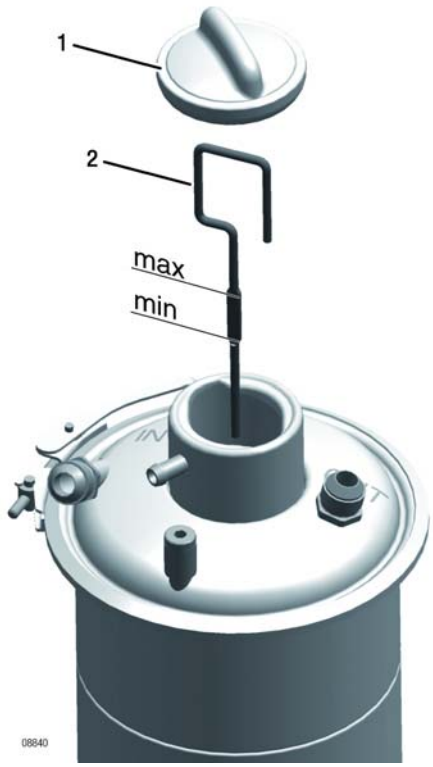
**Engine test run**

Engine test run is necessary:

| Step | Procedure |
|---|---|
| 1 | Check the oil level and top up with oil as required. |
| 2 | Operate the engine until the temperatures have stabilized for a period of 5 min (engine oil temperature between 50 to 70 °C (122 - 160 °F). |
| 3 | Switch the engine OFF. |
| 4 | Allow the engine to cool down. |
| 5 | Check for leaks. |

**Graphic**

Oil level check/Replenish




| Part | Function |
|---|---|
| 1 | Oil tank cover |
| 2 | Oil dipstick |

*Fig. 4*

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# Chapter: 12-20-00

# SCHEDULED MAINTENANCE

**Introduction**

This chapter relates in particular to the maintenance work mentioned in the Maintenance Schedule for the various engine systems and covers the work in more detail.

**Table of contents**

This chapter contains information which is required to perform scheduled servicing on the engine.

## 1) Engine cleaning

**General note**

**ENVIRONMENT NOTE**

When cleaning the engine, the dissolved residues of fuel, oil and other environment-contaminating agents are rinsed off. Collect the residual liquids and dispose of it in an environmentally sound way

**NOTICE** Do not use flammable liquids or caustic cleaning agents for cleaning the engine.

---

**Cleaning agents**

Use of a commercially available cold cleaning agent for the engine is recommended. See chapt. 05-00-00 section: 1.5).

---

**Cleaning**

**NOTICE** Never clean an engine with a high pressure cleaner. This is detrimental to the electrical installations and shaft seals. Oxidation of the various components and their potential failure may occur.

**NOTICE** Before cleaning, all openings through which cleaning agents and/or dirty water could enter the engine must be closed off. Failure to do this may result in engine damage!

NOTE: Always clean engine in cold state.

The engine must always be cleaned with due care and attention to detail. Repair leaks as required before cleaning.

---

**After each cleaning**

After each cleaning procedure, dry all electrical components such as

- Battery
- Ignition unit
- Spark plug connector
- Clamp connections etc.

by use of compressed air to prevent leakage current.

---

NOTES

## 2) Visual inspection

**General note**

General visual inspection of the engine for damage or abnormalities. For definition and scope of visual inspection (See chapt. 05-20-00 section: 3).

**Abnormalities**

Take note of changes caused by temperature influence.

During a visual inspection you should focus on the following points in particular:

- Exhaust system
- Airbox
- Engine suspension frame
- Heat shrink sleeve
- Sensor technology
- Oil cooler
- Coolant hoses
- Venting hoses (oil tank)
- FUSE BOX
- ECU
- Fuel lines
- Fuel pump module
- Wiring harness
- Cooler

### 2.1) Checking the engine suspension

**General note**

**NOTICE**

Exactly observe the tightening torques for screws and nuts. Overtightening or too loose of a connection could cause serious engine damage.

**Checking the engine suspension**

| Step | Procedure |
|---|---|
| 1 | Verify the engine suspension points on the crankcase for tight fit and damage including cracks. |
| 2 | Inspect the surroundings of engine attachment on crankcase and gearbox. If there is discoloration of the crankcase around the attachment points (black ring), there may be loose attachments. |
| 3 | Inspect engine isolating mounts including for heat damage, wear and cracks. |
| 4 | Inspect engine suspension frame. |

## 2.2) Corrosion

**Definition**

Corrosion is a natural process which attacks and potentially damages metals via an electro-chemical reaction. For more detailed information about different types of corrosion and corresponding methods for dealing with corrosion refer to the FAA Advisory Circular AC 43.13.
See chapter “AC 43.13-1B Maintenance and Repair“.

## 3) Leakage check

**General note**

**NOTICE** Leaking connections can lead to engine problems or engine failure!

Visual inspection of the whole engine for leaks. If leaks are visible, locate the cause and remedy the fault.

**Instruction**

NOTE: If a leak is suspected, the following steps must be taken:

| Step | Procedure |
|---|---|
| 1 | Cleaning the engine. |
| 2 | Operate the engine until the temperatures have stabilized for a period of 5 min (engine oil temperature between 50 to 70 °C (122 - 160 °F). |
| 3 | Switch "**OFF**" ignition and secure engine against unintentional operation. Secure aircraft against unauthorized operation. |
| 4 | After shut down of engine no liquid must drip down. |

**Water pump**

Checking water pump for leaks.

If the leakage bore, located at the base of the ignition housing, is dripping oil, the oil seal on the water pump shaft may be defective and must be replaced. In the case of coolant drips at the leakage bore, the coolant mechanical seal must be replaced (inspect the quality of the coolant).

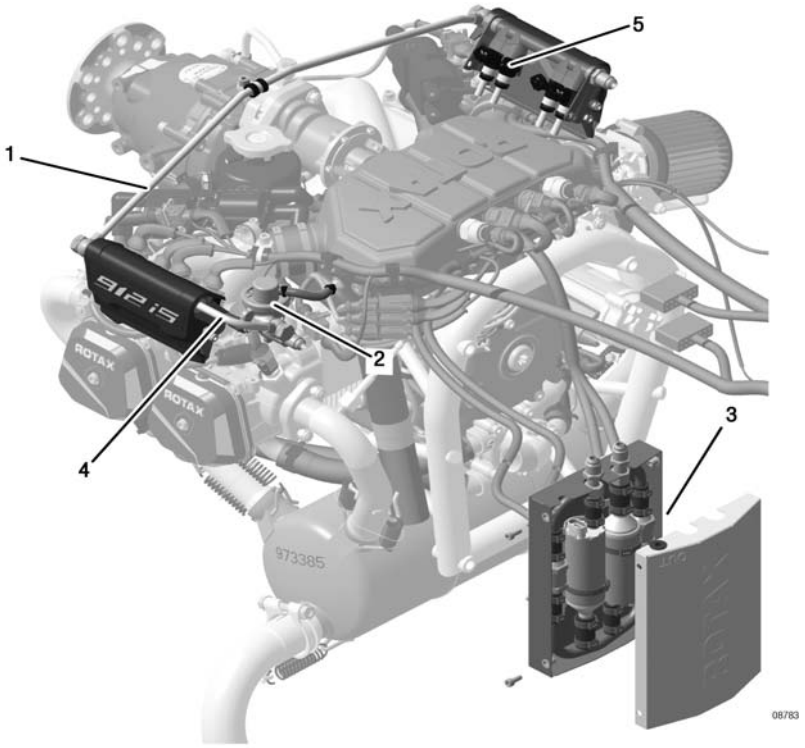
**Fuel lines**

Inspect fuel lines, their connections and screw fasteners. Look for scuffing marks or other damage.

**NOTICE** Avoid overstretching the fixing elements. Always comply with the specified torque!

Complete a detailed visual inspection. When checking steel fuel lines (1), pay attention to the connection areas (2). Look for leaks and cracks. See Fig. 1.

**Graphic** Connections and fuel lines




| Part | Functions |
|---|---|
| 1 | Fuel line (Steel) |
| 2 | Connections |
| 3 | Electric fuel pump module |

*Fig. 1*

**Fuel pump** Inspect isolating flange of fuel pump for leaks.

**Coolant hoses** Check coolant hoses and connections and fittings for leakage. Examine the surrounding area to see if there are any leaks!

**Oil lines** Inspect all oil feed lines from the oil tank to the oil cooler and to the engine. Also inspect the oil return line from the crankcase to the oil tank. Check the pressure oil line from the oil pump to the governor flange of the governor.

**Hose clamps, kinks** Check all hoses, particularly in the area of the hose clamps and hose connections, for porosity, damage and kinks. If damage is detected, replace hose immediately.

## 4) Checking the compression

**General note**

See Fig. 2.

**⚠WARNING** Risk of electric shock!
Ignition "**OFF**" and system grounded!

**Special tools**

To measure the compression pressure the following special tools and equipment are necessary.

| Part number | Description |
|---|---|
| n.a. | Compressed air approx. 6 bar (600 kPa). |
| n.a. | 2 pressure gauges. |
| n.a. | Orifice jet*, of 1mm (0.04 in) inner diameter and 3 mm (0.12 in) length.<br>* or equivalent e.g. orifice diameter 0.040 in., long 0.0250 in., 60° degree approach angle according to AC43.13, latest issue. |
| n.a. | Adapter to spark plug thread. |
| n.a. | Connect line. |

**Instruction**

Testing is carried out using the **differential pressure test procedure**.

| Step | Procedure |
|---|---|
| 1 | Operate the engine until the temperatures have stabilized for a period of 5 min (engine oil temperature between 50 to 70 °C (122 - 160 °F). |
| 2 | Starting with cylinder head 1 move piston to TDC position. |
| 3 | Remove the upper spark plugs. Prevent dirt or other foreigner particles from penetrating the engine (**A**). |
| 4 | Screw adaptor (1) into the spark plug thread and connect up the two pressure gauges (2) with the orifice jet (3) between them (**B**). |
| 5 | Now put constant pressure, between 5.5-6 bar (550-600 kPa) on the line and take readings at pressure gauge (**C**). |
| 6 | Repeat this proceeding at all 4 cylinder heads. |

**Value**

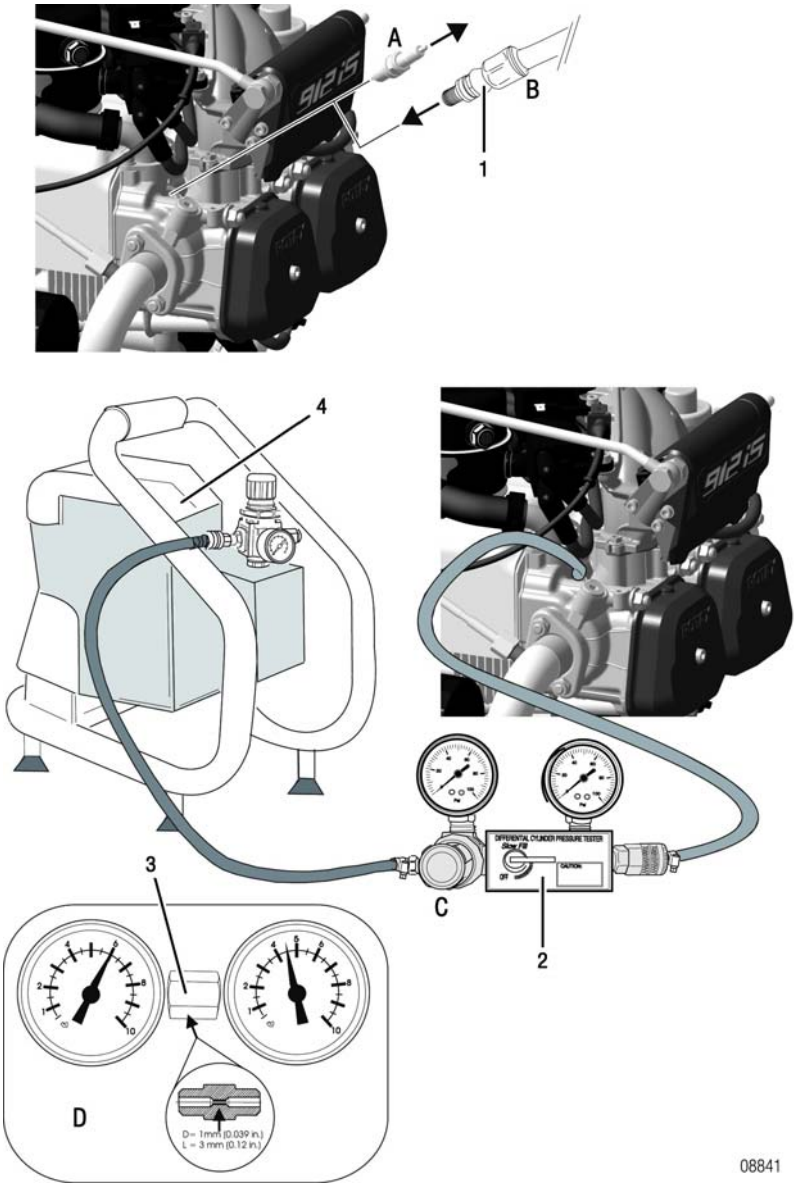
The maximum permissible pressure drop is 25 %, e.g. from 6 to 4.5 bar (600 kPa to 450 kPa) (**D**).

If the pressure loss is less than 25% then the valve seats and piston rings are working properly. The spark plug has to be installed according to chapt. 12-20-00 section: 14.2).

If the value is over 25% inspection, repair or overhaul must be carried out in accordance with the BRP-Powertrain instructions for continued airworthiness.

- Detailed inspection of affected engine components.

**Graphic** Checking the compression.




| Part | Function |
|---|---|
| 1 | Adaptor |
| 2 | Manometer/Test gauges set |
| 3 | Orifice jet |
| 4 | Compressor |

*Fig. 2*

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## 4.1) Compression check for fault-tracing

**General note**

In the course of fault-tracing a **compression check** can also be performed.

A compression tester is required to check compression. The compression should be between 9 and 12 bar (900 kPa and 1200 kPa).

**⚠WARNING** Keep the propeller area clear!
All LANE select switches must be "**OFF**".

**Instruction**

Compression check for fault-tracing.

| Step | Procedure |
|---|---|
| 1 | Operate the engine until the temperatures have stabilized for a period of 5 min (engine oil temperature between 50 to 70 °C (122 - 160 °F). |
| 2 | Unscrew and remove top spark plugs. |
| 3 | Press compression tester (1) over the spark plug hole and use the starter to turn the engine over with open throttle until maximum pressure is reached. |
| 4 | Successively take readings on all four cylinders and compare results. |

**Measurement**

Individual readings for the cylinder must not differ by more than 2 bar (200 kPa).

If the value is below 6 bar (600 kPa), inspection, repair or overhaul must be carried out in accordance with the BRP-Powertrain instructions for continued airworthiness.

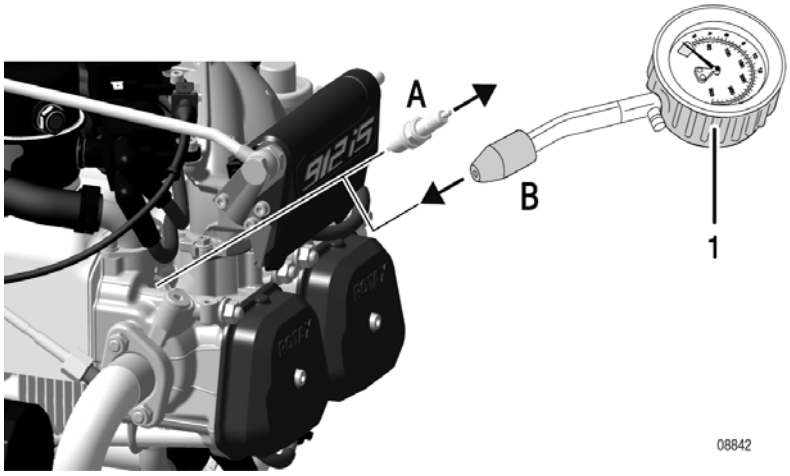
- Detailed inspection of affected engine components.

**Special tools**

For accomplishment the following special tool is required.

| Part number | Description |
|---|---|
| n.a. | Compression tester |

**Graphic** Compression check for fault-tracing




| Part | Function |
|---|---|
| 1 | Compression tester |

*Fig. 3*

## 5) Engine management ECU

**Safety notice**

See Fig. 4.

**⚠WARNING**

Non-compliance can result in serious injuries or death!
When working on the ECU, the general safety instruction must be observed.
See chapt. „INTRO“.

### 5.1) Checking ECU

**Instruction**

For checking proceed as follows:

| Step | Procedure |
|---|---|
| 1 | Inspect the ECU (1) and ECU mounts (2) for secure attachment and damage. |
| 2 | Inspect the ECU wiring for wear, chafing and other damage, and make sure that the connectors are securely attached. |

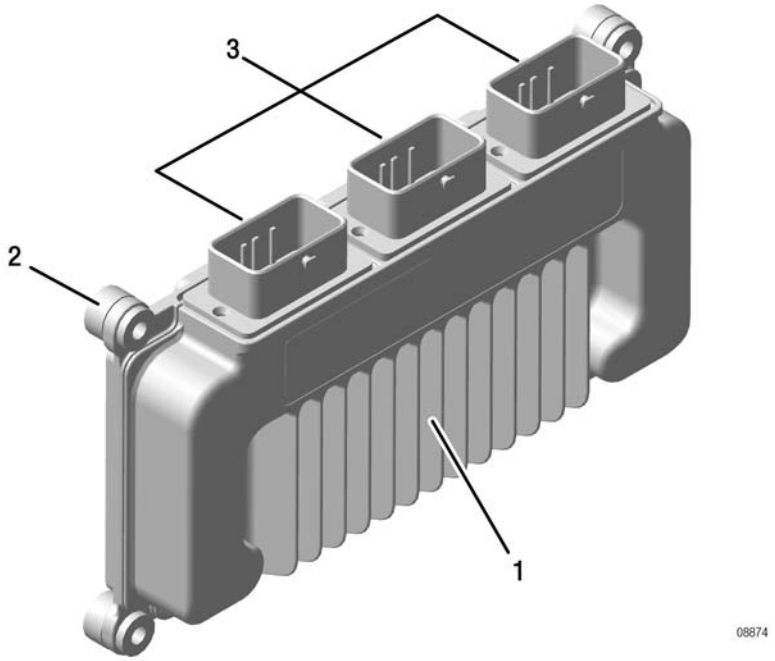
### 5.2) Read out the ECU data memory

**Instruction**

For read out the ECU data memory proceed as follows:

| Step | Procedure |
|---|---|
| 1 | Decoding unit (Dongle) with data cable ECU to connect to computer. |
| 2 | Select the menu item BUDS in the maintenance software and print out the report. |

**Graphic** Engine management ECU.




| Part | Function |
|---|---|
| 1 | ECU |
| 2 | Grounding clip |
| 3 | Socket for APM-connector |

*Fig. 4*

## 6) Locking/Loosen of the crankshaft

**General note**

See Fig. 5. and Fig. 6

NOTE: The thread bolt for crankshaft locking is part of the standard tool kit supplied with each engine.

**Locking the crankshaft**

**⚠WARNING**

Risk of Burns!
Hot engine parts!
Always allow engine to cool down to ambient temperature before start any work.

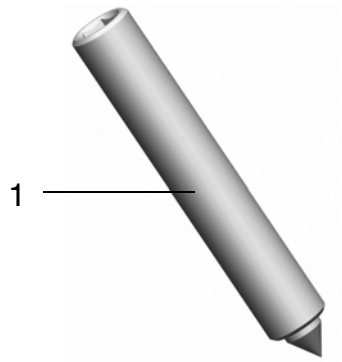
**Special tools**

For accomplishment the following special tool is required.

| Part number | Description |
|---|---|
| part no. 240880 | (1) Thread bolt |

**Graphic**

Special tool




| Part | Function |
|---|---|
| 1 | Thread bolt |

*Fig. 5* 05910

**Instruction**

The following work procedures are to be accomplished:

| Step | Procedure |
|---|---|
| 1 | Remove the plug screw (1) M8x20 and sealing ring from the crankcase half (cyl. 2/4). |
| 2 | Turn crankshaft/propeller shaft until the piston of cyl. no. 1 and no. 2 are in TDC position and lock crankshaft in this position with the thread bolt (2) part no. 240880.<br>NOTE: The required recess position of the crankshaft can be additionally verified by looking through the crankcase recess (3) with a flash light. |
| 3 | Screw the thread bolt (2) into the crankcase. While doing so, move the crankshaft to and fro slightly with the ring spanner until the locking screw engages in the recess of the crankshaft, and tighten to 10 Nm (88.48 in.lb). |

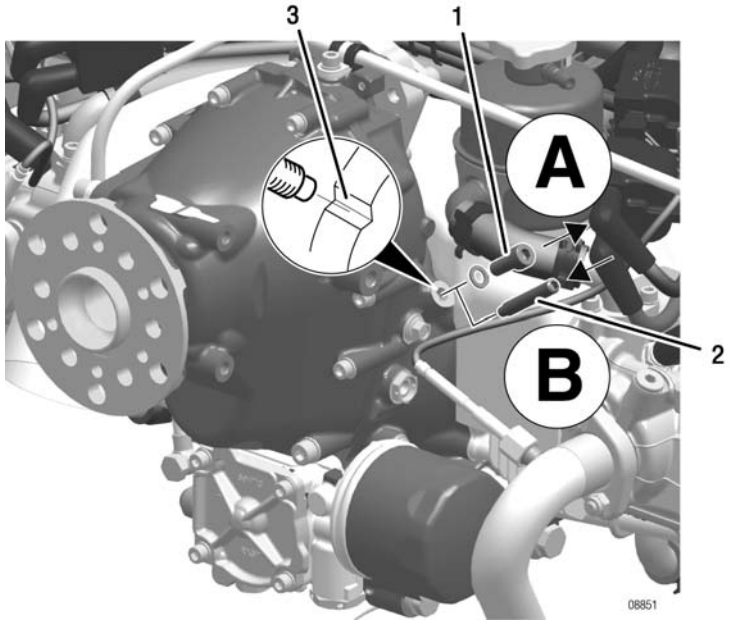
**Loosen the crankshaft**

After completion of work/check:

| Step | Procedure |
|---|---|
| 1 | Remove the thread bolt (2) and refit crankshaft plug screw M8x20 (1) along with a new sealing ring with a torque of 15 Nm (133 in.lb). |

**Graphic**

Locking/Loosen of the crankshaft




| Part | Function |
|---|---|
| 1 | Plug screw M8x20 |
| 2 | Thread bolt |
| 3 | Crankshaft |

*Fig. 6*

## 7) Test run of engine

**General note**

**⚠WARNING** Danger of life threatening injuries caused by the propeller, rotating and stressed parts of the engine! Always observe the engine from a safe place while it is running. Check that the cockpit is occupied by a competent operator.

**Preparation**

Preparation of the engine for test run:

- Ensure that all the operating fluids (engine oil, coolant, fuel) are replenished to the specified level.
- Make sure that no loose objects (e.g. tools) are left in the engine compartment.
- Inspect tight fit of the propeller.
- Anchor the aircraft suitably to the ground and fix wheel chocks. Ensure that the propeller zone is clear and safe before starting the engine.

**Test run**

Test run as follows:

| Step | Procedure |
|---|---|
| 1 | Establish fuel supply (open fuel cock). |
| 2 | Throttle lever to idle position. |
| 3 | Master switch “**ON**“. |
| 4 | Throttle valve approx. 10% to take-off position. |
| 5 | Ignition for both ignition circuits “**ON**“ (LANE A and LANE B). |
| 6 | Press starter switch for max. 10 sec. (followed by a cooling period of 2 min.). |
| 7 | After engine start, observe oil pressure. Oil pressure has to be built up within 10 sec. |
| 8 | Let engine run for approx. 2 min. at 2000 rpm. Then first use the throttle lever to bring the engine to approx. 2500 rpm and then run through warming up period, until the oil temperature reaches 50 °C (122 °F). |
| 9 | Check temperatures and oil pressure: At a steady oil temperature above 50 °C (122 °F) and oil pressure above 2 bar (200 kPa) engine speed may be increased. |
| 10 | Ignition check as per the current Operators Manual. |
| 11 | Conduct a short full throttle run and check that the engine reaches the max. full power speed. Consult the pilot’s operating handbook for maximum speed, as it depends on the propeller used. |

| Step | Procedure |
|---|---|
| 12 | After full-load run, conduct a short cooling run to prevent formation of vapour lock in cylinder heads. This is necessary to prevent steam locks in the cooling and fuel system after shut-down. |
| 13 | Shut engine down.<br>NOTE: On switching off the engine switch off ignition and withdraw the ignition key. |

**Engine oil and coolant**

**⚠WARNING**

Risk of Burns!
Never open the radiator cap when the cooling system is hot. For safety's sake, cover cap with a rag and open slowly. Sudden opening of the cap could provoke the escape of boiling coolant and result in scalding.

Replenish engine oil and coolant as required once engine has cooled down.

**Oil filter**

***NOTICE***

If the oil filter has been replaced, re-tighten by hand after the trial run on a cold engine.

**Check of leaks**

Inspect the engine for oil, fuel or coolant leaks and repair as necessary.

## 8) Checking the V-belt tension

**General note**

See Fig. 7 and Fig. 8.

In the case of configurations with additional auxiliary generator, inspect attachment and V-belt tension.

**Checking the V-belt tension**

Inspect V-belt tension as per drawing below.

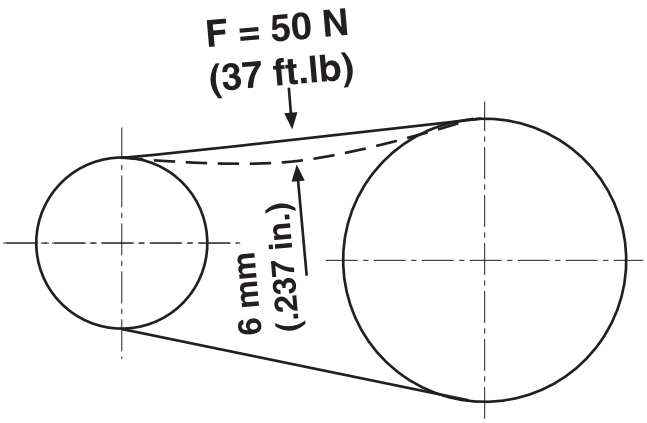



*Fig. 7* 08663

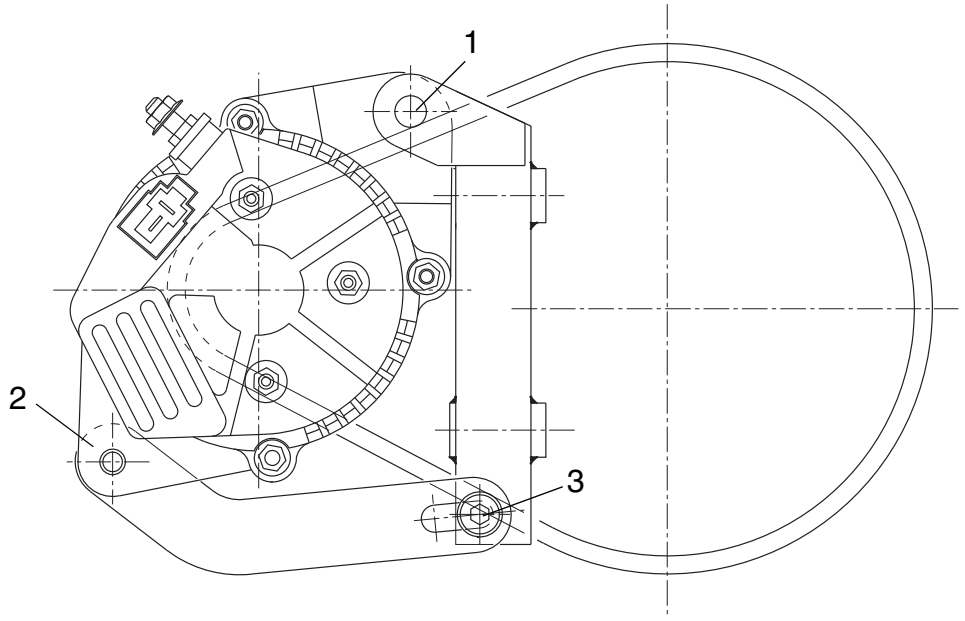
## 8.1) Belt tension adjustment

**Belt tension**

To adjust the belt tension:

| Step | Procedure |
|---|---|
| 1 | Loosen the hex. screw (1) M10 and the two M8 allen screw (2) and (3). |
| 2 | Press the alternator upwards and tighten allen screw (3). |
| 3 | Then tighten hex. screw (1) M10 with tightening torque 40 Nm (30 ft.lb) and allen screw M8 (2) with tightening torque 22 Nm (195 in.lb). |

**Graphic**




| Part | Function |
|---|---|
| 1 | Hex. screw M10 |
| 2, 3 | Allen screw M8 |

*Fig. 8* 00353

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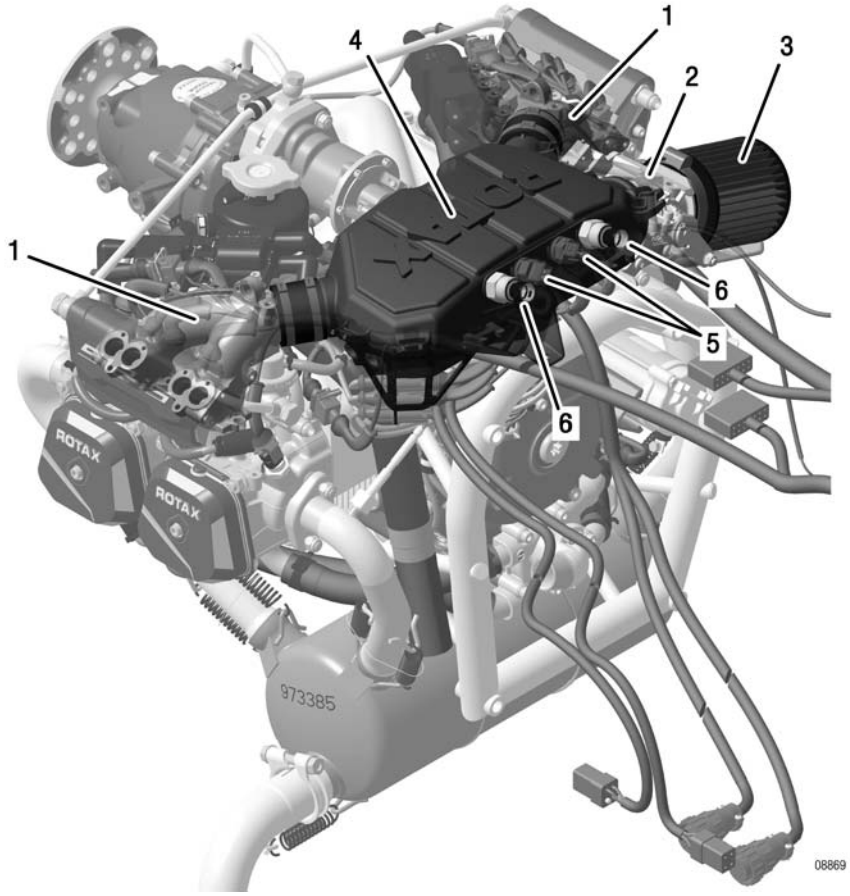
# 9) Air intake system

## 9.1) General note

**Overview**




| Part | Function |
|---|---|
| 1 | Intake manifold |
| 2 | Throttle body socket |
| 3 | Air filter |
| 4 | Airbox |
| 5 | Temperature sensor |
| 6 | Pressure sensor |

*Fig. 9*

## 9.2) Checking air intake system

**General note**

**NOTICE** In the event of dust formation, clean air filter at correspondingly shorter intervals. If filter mat is damaged, replace air filter.

**NOTICE** A dirty filter insert will not only reduce the engine performance but might also promote premature wear of the engine.

Carry out visual inspection of dry air filter after prescribed maintenance interval. Clean dirty air filter as described in aircraft manufacturers Maintenance Manual.

**Instruction**

To check the air intake system the following steps are necessary:

| Step | Procedure |
|---|---|
| 1 | Visual inspection of the air filter. |
| 2 | Visual inspection of the airbox for mechanical damage, cracks, leaks, contamination and secure attachment. |
| 3 | Inspect the intake hoses and molded hoses for damage, cracks, breaks, chafing and wear. |
| 4 | Check the gaskets. |
| 5 | Check both pressure sensors and their plugs. |

## 9.3) Cleaning the dry air filter

**General note**

**NOTICE** Never use gasoline, steam, caustic liquids, strong detergents, particle cleaning agents or high pressure cleaners during this step.

**NOTICE** Do not dry over open flame, with compressed air or with hot air gun.

**Cleaning**

To clean the dry filter the following steps are necessary:
See Fig. 10 and Fig. 11.

| Step | Procedure |
|---|---|
| 1 | Lightly tap and brush off surface dirt (**A**). |
| 2 | Spray K&N filter cleaner onto filter surface and leave to soak for approx. 10 min. (**B**). |
| 3 | Rinse air filter with low pressure water from inside to outside and let element dry naturally (**C**). |

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**Graphic**

Cleaning of the filter

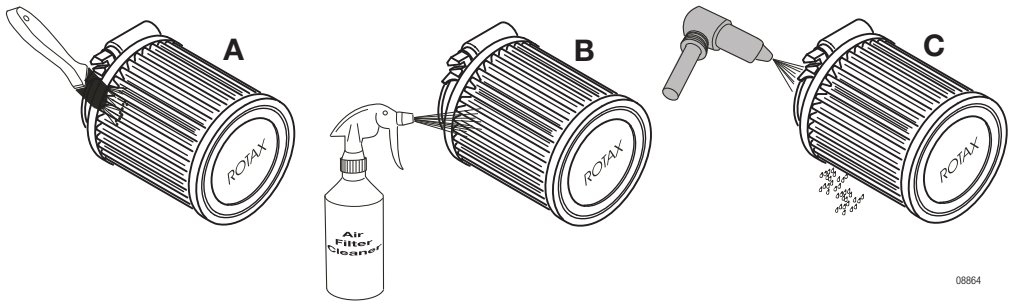



*Fig. 10*

**After cleaning**

**NOTICE** Never use gear oil, diesel or engine oil, as they attract humidity.

NOTE: Each filter pleat must be sprayed with oil.

After 5 to 10 min. the filter will be soaked with oil, noticeable by the uniform red coloring.

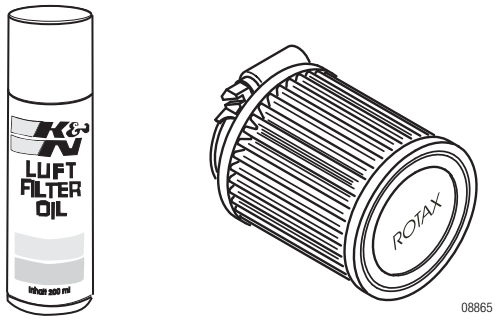



*Fig. 11*

## 9.4) Replacing the dry air filter

**General note**

See Fig. 12.

**NOTICE**

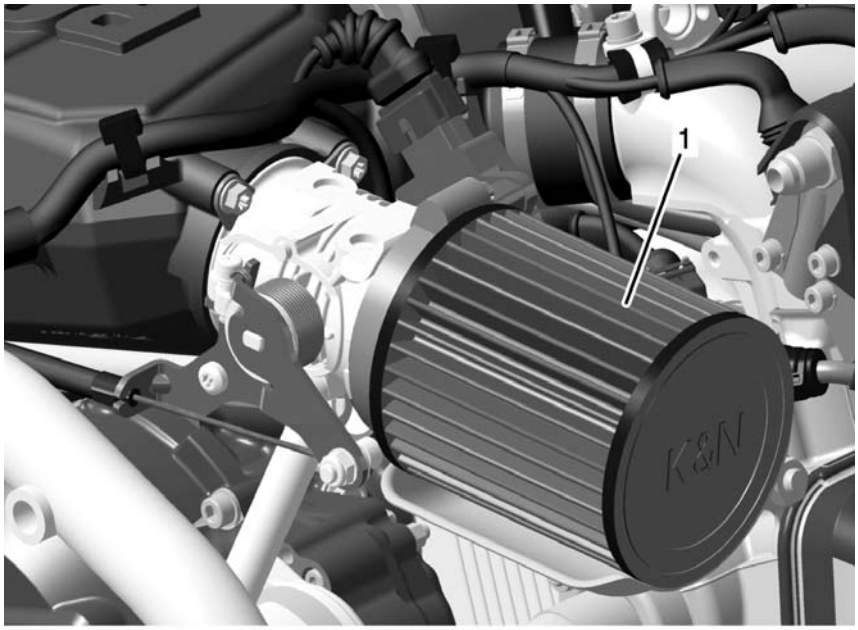
Each air filter must be secured by clamp attachment and a wire securing element. See chapt. 05-00-00 section: 1.6). Filter connection must be free of oil.

**NOTICE**

Attach new air filter, free of grease, at connection faces, and wire-secure against loss.

**Graphic**

Only use dry type air filters which are specified by the aircraft manufacturer and from ROTAX.



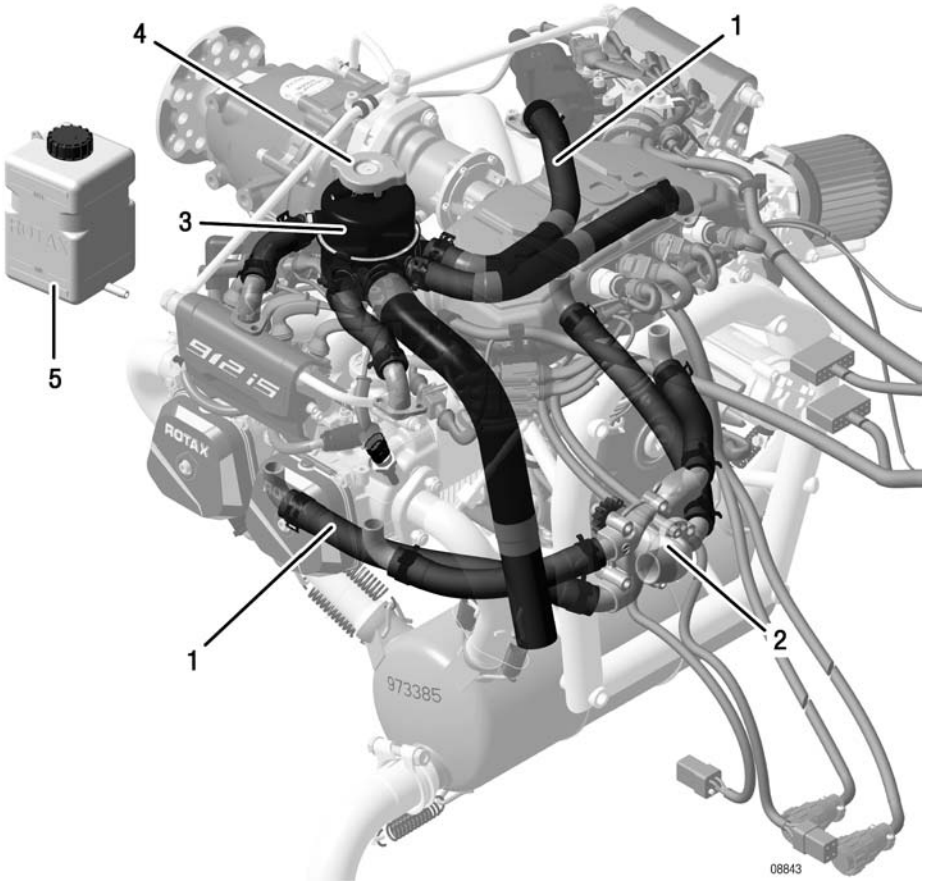

| Part | Function |
|---|---|
| 1 | Air filter |

*Fig. 12*

# 10) Cooling system

## 10.1) Checking the cooling system

**Overview**




| Part | Function |
|---|---|
| 1 | Coolant hoses |
| 2 | Water pump |
| 3 | Expansion tank |
| 4 | Radiator cap with gasket |
| 5 | Overflow bottle |

*Fig. 13*

**General note**

**⚠WARNING**

Risk of Burns!
Hot engine parts!
Always allow engine to cool down to ambient temperature before start of any work.

See Fig. 13.

**Coolant hoses**

Carry out visual inspection of all coolant hoses (1) for damage, leaks, hardening as a result of heat and porosity.

**Water pump**

Inspect all connections on the top and bottom of the cylinder head and on the water pump (2).

**Expansion tank**

Inspect expansion tank (3) for damage. Inspect protection rubber at the bottom of the tank for tight fit.

**Radiator cap**

Inspect the gasket of the radiator cap (4) and check the pressure release valve and return valve for proper operation.

See chapt. 12-20-00 section: 10.4).

## 10.2) Replacing the coolant

**General note**

**⚠WARNING**

Risk of Burns!
Never open the radiator cap when the cooling system is hot. For safety's sake, cover cap with a rag and open slowly. Sudden opening of the cap could provoke the escape of boiling coolant and result in scalding.

***NOTICE***

Use only coolant as recommended in the current Operators Manual.

**ENVIRONMENT NOTE**

Coolant and mixtures of coolant and water have to be treated as hazardous waste!

**Procedure**

To replace the coolant the following steps are necessary:

| Step | Procedure |
|---|---|
| 1 | Open the radiator cap on the expansion tank. |
| 2 | Remove the bottom attachment screw (1) (with sealing ring) of water pump (2). |

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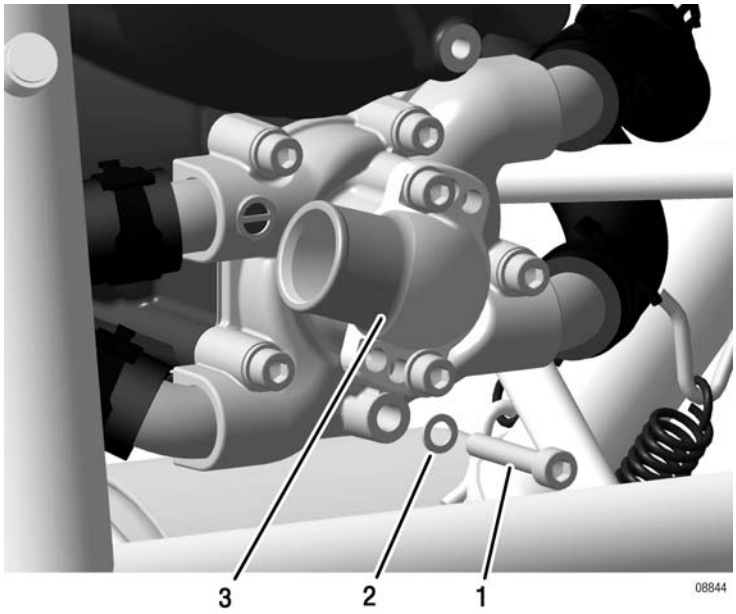
| Step | Procedure |
|---|---|
| 3 | Drain the engine coolant.<br>NOTE: If the radiator is located below the engine, also detach the lowest positioned coolant hose. |
| 4 | Fit attachment screw (stainless steel) along with a new sealing ring. Tighten to 10 Nm (90 in.lb). |
| 5 | If the coolant is being replaced with a different type, (conventional coolant, waterless coolant) the cooling system must be flushed. See chapt. 12-20-00 section: 10.3). |
| 6 | Refill newly mixed coolant into the expansion tank (highest point of the cooling system). See chapt. 12-10-00 section: 3.1). |
| 7 | Fit radiator cap. |
| 8 | NOTE: Run the engine briefly and replenish with clean coolant as required. |

**Graphic**

Replacing the coolant




| Part | Function |
|---|---|
| 1 | Attachment screw (stainless steel) |
| 2 | Gasket ring |
| 3 | Water pump |

*Fig. 14*

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## 10.3) Flushing the cooling system

**General note**

**⚠WARNING** Hot steam can cause scalds in the face and on hands! Never open the radiator cap when the cooling system is hot. For safety's sake, cover cap with a rag and open slowly.

**Procedure**

To flush the coolant the following steps are necessary:

| Step | Procedure |
|---|---|
| 1 | The system is flushed using pure water at a pressure of 2 bar (200 kPa).<br>***NOTICE*** Where water-free coolant is used, the cooling system must be drained of water correspondingly after flushing. The residual water must not exceed the max. permissible limit prescribed by the coolant manufacturer.<br>NOTE: For the flushing, open the lowest located coolant hose (either at water pump or radiator). |
| 2 | Refill newly mixed coolant into the expansion tank (highest point of the cooling system). See chapt. 12-10-00 section: 3.1). |
| 3 | Fit radiator cap. |
| 4 | NOTE: Run the engine for a minute and replenish coolant as required. |

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## 10.4) Expansion tank, radiator cap

**General note**

See Fig. 15.

To equalize pressure in the cooling system, an expansion tank is required. If the pressure in the system rises above 1.2 bar (120 kPa) as the coolant warms up, the pressure relief valve (1) opens and the coolant can flow into the expansion tank via the line (5). When the coolant cools down, the return valve (2) opens and the coolant is sucked back.

**Radiator cap**

Inspect the rubber seal (3), the pressure spring (4) and the two valves incorporated in the radiator cap for damage and leaks. If necessary, replace with a new original radiator cap with 1.2 bar (120 kPa) (6) opening pressure.

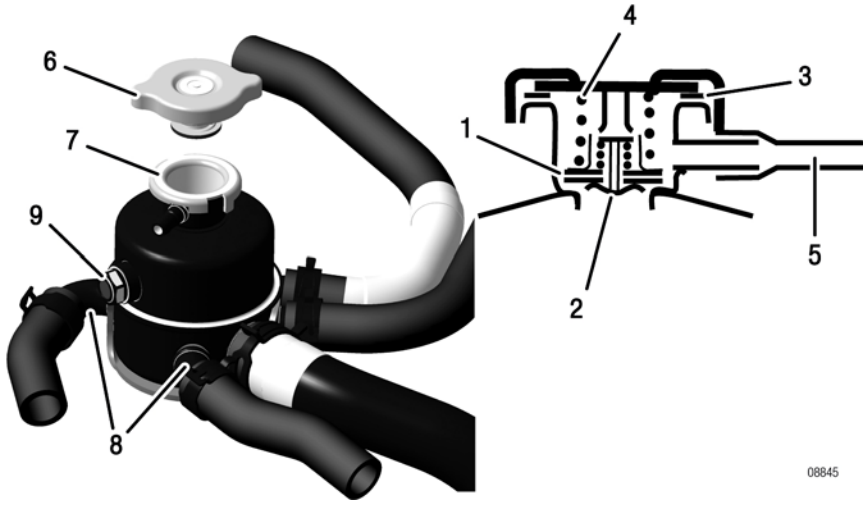
NOTE: The radiator cap must be tightened fully on the expansion tank.

**Expansion tank**

Inspect sealing surface (7) and tube connection (8) of the expansion tank. Carry out visual inspection of tank for damage and scuffing marks.

**Graphic**

Checking Expansion tank, radiator cap.




| Part | Function |
|---|---|
| 1 | Pressure relief valve |
| 2 | Return valve |
| 3 | Rubber seal |
| 4 | Pressure spring |
| 5 | Connection to overflow bottle |
| 6 | Opening pressure of the radiator cap |

| Part | Function |
|---|---|
| 7 | Sealing surface |
| 8 | Tube connections |
| 9 | Sight glass |

*Fig. 15*

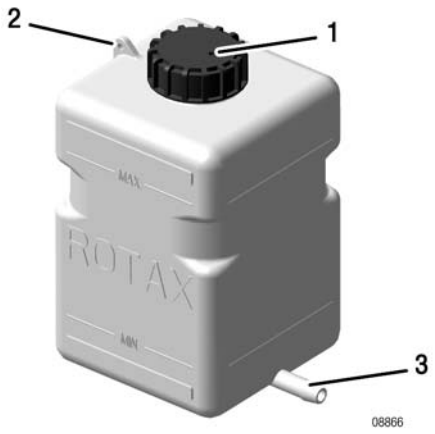
## 10.5) Overflow bottle

**General note** See Fig. 16.

**Procedure** Checking overflow bottle.

| Step | Procedure |
|---|---|
| 1 | Inspect the bottle for damage. |
| 2 | Check the venting bore (1) in the screw cap. |
| 3 | Inspect bracket (2) for the safety wire. |
| 4 | Check hose connection (3). |

**Graphic** Overflow bottle




| Part | Function |
|---|---|
| 1 | Venting bore |
| 2 | Bracket for the safety wire |
| 3 | Hose connection |

*Fig. 16*

## 10.6) Accessories (including radiator, radiator hoses, hose clamps, cooling air ducts)

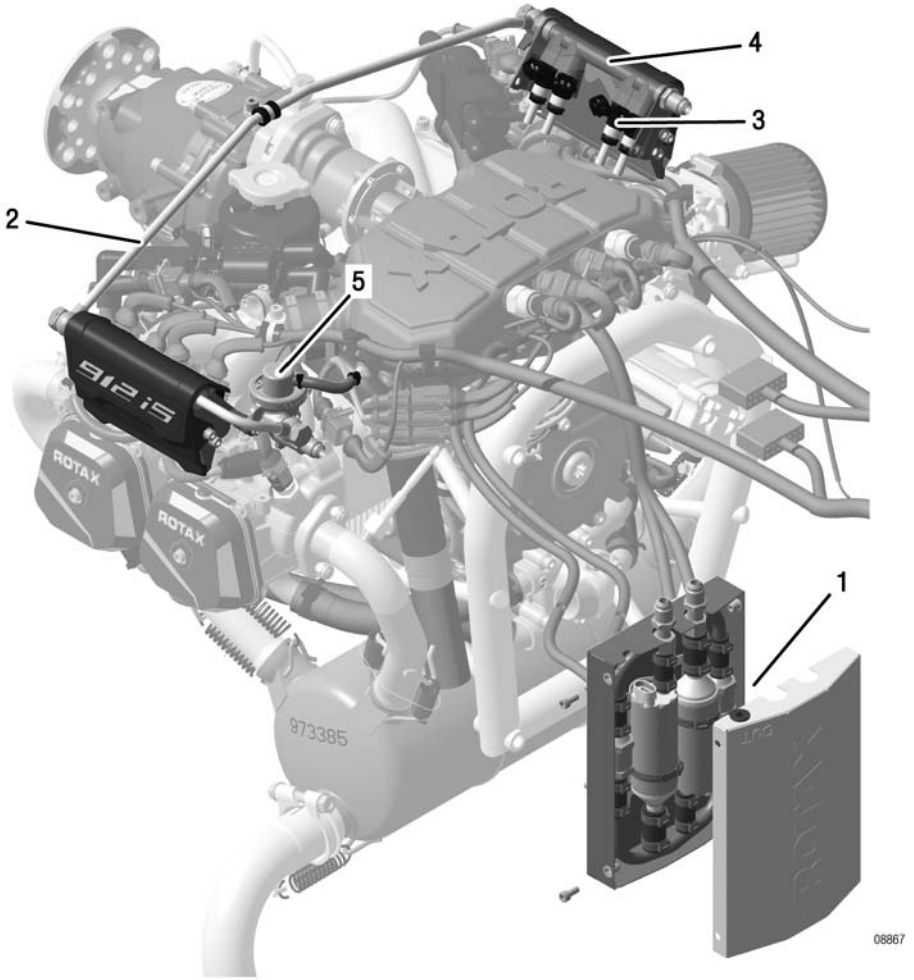
**General note**

**NOTICE** Equipment is to be inspected in accordance with the Maintenance Manual of the aircraft manufacturer.

# 11) Fuel system

## 11.1) General note

**Overview**




| Part | Function |
|---|---|
| 1 | Fuel pump |
| 2 | Fuel line |
| 3 | Fuel injector |
| 4 | Fuel rail |
| 5 | Fuel pressure regulator |

*Fig. 17*

## 11.2) Leak tests

**General note**

**NOTICE** Avoid over-tightening the fastening elements. Use a suitable torque wrench for all work.

**Procedure**

To check the following steps are necessary:

| Step | Procedure |
|---|---|
| 1 | Inspect all fuel lines, their connections and unions. |
| 2 | Inspect the fuel lines for sign of chafing. |
| 3 | Check the insulating flange on the fuel pump for leaks. |
| 4 | Check the color markings for damage. |

## 11.3) Checking the fuel lines

**General note**

See Fig. 17.

**NOTICE** All rubber parts must be replaced after a maximum of 5 years.
See chapt. 05-10-00 section: 2.1).

**Procedure**

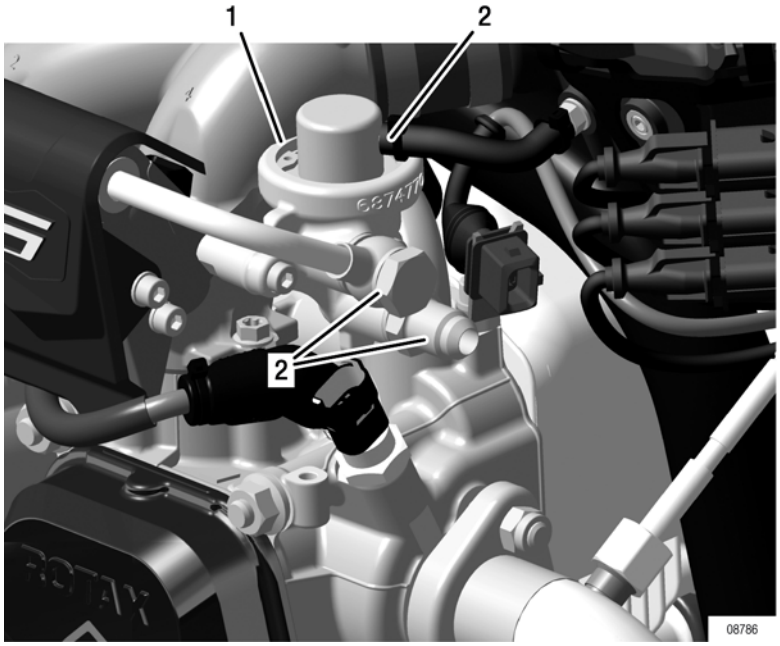
| Step | Procedure |
|---|---|
| 1 | Inspect all hoses for porosity and other damage in particular at the hose clamps and connections and replace as required. |
| 2 | Check fuel line. (of steel) |

## 11.4) Checking the fuel line pressure

**General note**

| Step | Procedure |
|---|---|
| 1 | Check the fuel pressure regulator (1) for damages and inspect the general condition. |
| 2 | Measure the fuel pressure in accordance with the aircraft manufacturers specifications. |
| 3 | Perform a leak test. |
| 4 | Inspect all connections (2) for secure attachment. |

**Graphic** Fuel pressure regulator




| Part | Function |
|---|---|
| 1 | Fuel pressure regulator |
| 2 | Connections |

*Fig. 18*

## 11.5) Fuel pumps

**General note** Inspect the fuel pumps in accordance with the manufacturers instructions or the aircraft manufacturers.

- Remove the housing
- Visual inspection of lines and connections

## 11.6) Check valves

Check for leaks.

## 11.7) Fuel injection

**General note** Check for leaks.

## 11.8) Fuel rail

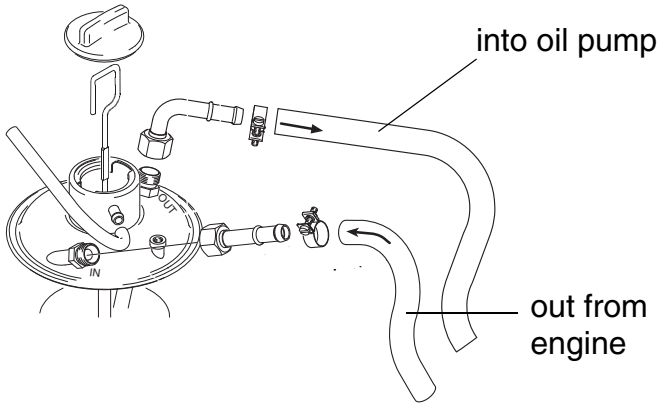
**General note** Check for leaks.

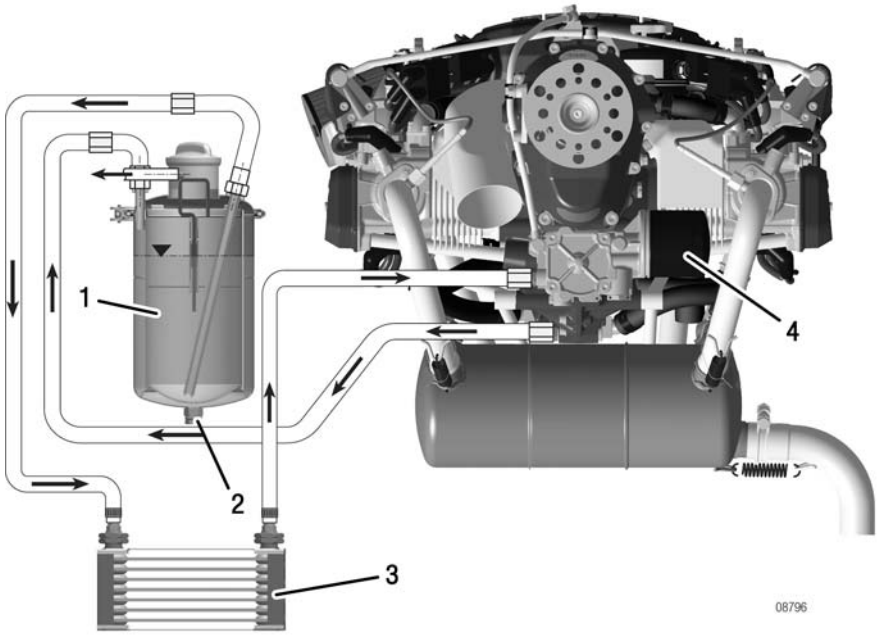
NOTES

# 12) Lubrication

## 12.1) General

**Overview**




| Part | Function |
|---|---|
| 1 | Oil tank |
| 2 | Drain screw M12x12 |
| 3 | Oil cooler |
| 4 | Oil filter |

*Fig. 19*

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**General note**

For detailed information see SI-912 i-0XX “oil change“, latest issue, and Fig. 19.

**⚠WARNING** Risk of Burns from hot engine parts!
Always allow engine to cool down to ambient temperature before start of any work.

**⚠WARNING** Risk of electric shock!
Switch off ignition and remove key! Disconnect negative terminal of aircraft battery.

NOTE: It is advisable to check the oil level prior to an oil change as it informs about oil consumption.
See chapt. 12-10-00 section: 4.1).

---

**Observe!**

***NOTICE*** Observe the following to prevent possible unintentional voiding of the oil system and damage to the valve drive:

- Draining the suction lines, oil cooler and return line is not necessary and must be avoided, as it results in air entering the oil system. Otherwise SI-912-018 must be accomplished. See chapt. 12-20-00 section: 12.5).
- Replacement of the oil filter and the oil change should be effected quickly and without interruption to prevent a draining of the oil system and the hydraulic tappets.

---

**Oil lines, Oil connections**

Oil lines and other oil connections are not normally removed.

---

## 12.2) Oil change

**Procedure**

NOTE: Run engine to warm oil before beginning oil change procedure.

To change the oil the following steps are necessary:

| Step | Procedure |
|---|---|
| 1 | Crank engine by hand to transfer the oil from the crankcase.<br>See chapt. 12-10-00 section: 12.5). |
| 2 | Remove safety wire and oil drain screw from the oil tank, drain the used oil - see environment note. |
| 3 | Replace oil filter at each oil change and inspect the filter insert.<br>See chapt. 12-20-00 section: 12.3) 12.3.2). |
| 4 | Dispose of oil filter according to environmental regulations. |
| 5 | Install oil drain screw with safety wire. |

**NOTICE**

Only use brand name oil in accordance with the latest Operators Manual and SI-912 i-001, “Selection of suitable operating fluids“ latest issue.

**NOTICE**

The engine must not be cranked when the oil system is open. Attention must also be paid to this before first commissioning (e.g. when assembling the propeller after correct venting of the oil system).

**NOTICE**

Compressed air must not be used to blow through the oil system (or oil lines, oil pump housing, oil bores in the housing).

**ENVIRONMENT NOTE**

Be careful that no oil enters the sewerage system or the soil - Risk of contamination of drinking water!
Collect waste oil and take it to the recycling center.

| Step | Procedure |
|---|---|
| 6 | Install new oil filter |
| 7 | Pour in approx. 3 l (0.8 gal (US)) of fresh oil. |
| 8 | After carrying out the oil change, the engine should be cranked by hand in the direction of engine rotation (approx. 20 turns) to completely refill the entire oil circuit. |

## 12.3) Oil filter replacement

**General note**

**⚠WARNING**

Risk of Burns!
Hot engine parts!
Always allow engine to cool down to ambient temperature before start of any work.

***NOTICE***

To ensure correct functioning of the oil circuit and the forced flow lubrication, use GENUINE- ROTAX oil filter only. Only these filters will ensure correct pressure in the by-pass valve.

At every oil change, unscrew the oil filter and cut open using special tool taking care not to produce chips.

**Special tool**

To carry out the procedure the following steps are necessary:

| part number | Description |
|---|---|
| part no. 877620* | (1) Oil filter wrench |
| part no. 877670* | (2) Cutting tool |
| * or equivalent | |

**Graphic**

Special tool

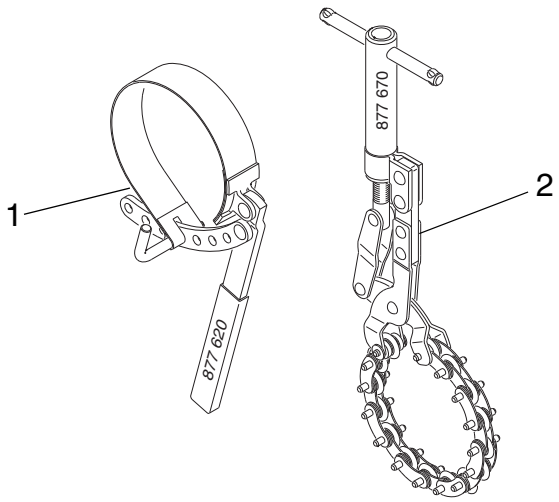


*Fig. 20* 02734

### 12.3.1) Install oil filter

**General note**

See Fig. 21.

***NOTICE***

After test run, check that the oil filter is secure.

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**Procedure**

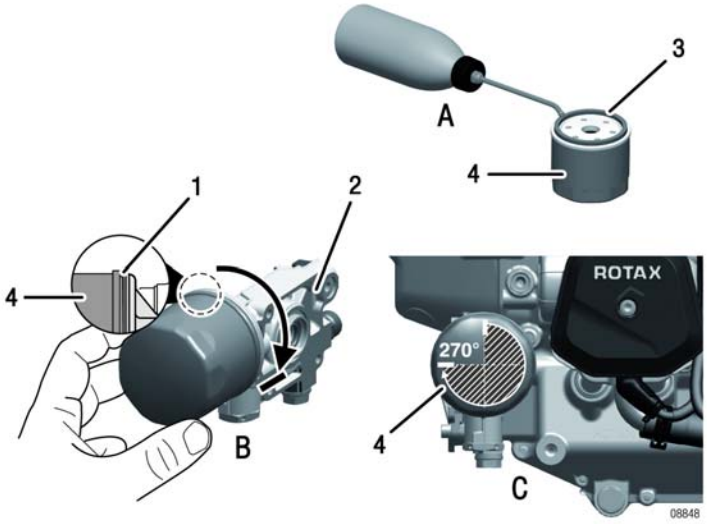
To mount the oil filter the following steps are necessary:

| Step | Procedure |
|---|---|
| 1 | Unscrew the oil filter with the oil filter wrench |
| 2 | Clean the contact surface (1) of the oil pump housing (2) with a clean cloth. |
| 3 | Apply thin film engine oil on the gasket (3) of the oil filter (4). |
| 4 | Install the oil filter on the engine. |
| 5 | Screw on oil filter until oil filter gasket is seated solidly.<br>NOTE: Mark 270° - check mark on oil pump housing to control tightening of oil filter. |
| 6 | Tighten oil filter with 3/4 turn (270°). |
| 7 | Inspection of the used oil filter. See chapt. 12-20-00 section: 12.3.2). |

Inspect all systems for correct function.

**Graphic**

Install oil filter.




| Part | Function |
|---|---|
| 1 | Contact surface |
| 2 | Oil pump housing |
| 3 | Gasket |
| 4 | Oil filter |

*Fig. 21*

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## 12.3.2) Inspection of the filter insert

**General note**

**NOTICE** The filter insert must be inspected carefully for metal chips.

This inspection is important as it allows conclusions to be drawn regarding the internal condition of the engine and provides information about the possible cause of any damage.

**Procedure**

To carry out the procedure the following steps are necessary:

| Step | Procedure |
|---|---|
| 1 | Oil filter cut open using special tool taking care not to produce chips. |
| 2 | Remove filter insert. |
| 3 | Cut top and bottom edges off the mat with a knife. |
| 4 | Remove filter mat, fold up and press remaining oil out. |
| 5 | Unroll and inspect it for metal chips, foreign matter, contamination and abrasion. |
| 6 | Pass over mat with a clean magnet and inspect for metal. |

**Possible foreign matter**

**Possible foreign matter:**

- Steel chips
- Bronze chips
- Aluminium chips
- Sliver of bearing material
- Remains of sealing compound

**Increased foreign matter**

If an increased amount of metal particles is found, such as brass or bronze chips or sliver from bearing abrasion, repair or overhaul the engine in accordance with the BRP-Powertrain instructions for continued airworthiness. If the filter mat is clogged by foreign matter, the lube oil reaches the bearing points unfiltered via the by-pass valve in the oil filter.

**Unclear findings**

In the case of unclear findings:

| Step | Procedure |
|---|---|
| 1 | Flush the oil circuit. |
| 2 | Fit a new oil filter. |
| 3 | Engine test run. See chapt. 12-20-00 section: 7). |
| 4 | Inspect the oil filter once more. |

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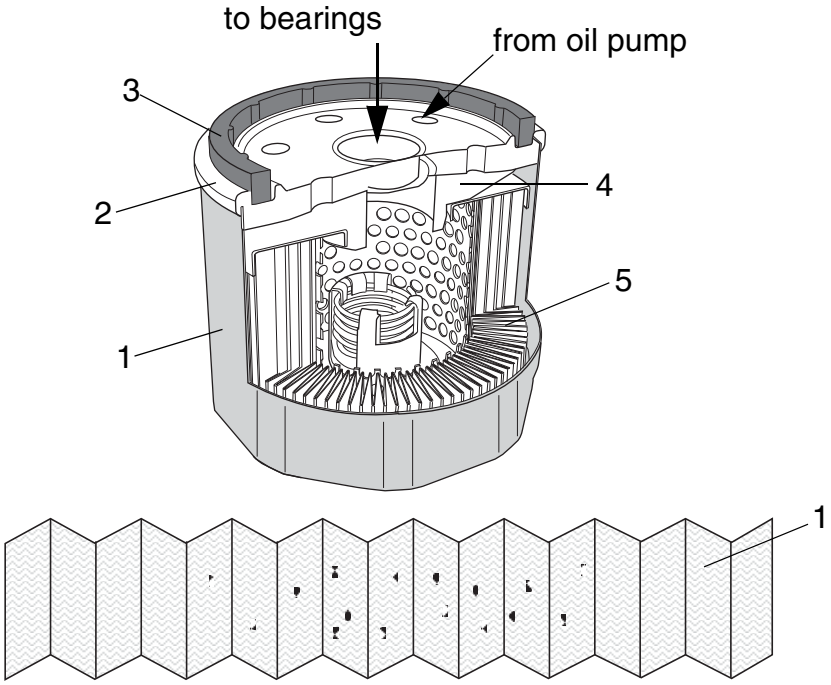
**Contaminated**

**NOTICE**

If the oil circuit is contaminated, replace the oil cooler and flush the oil circuit. See chapt. 12-20-00 section: 12.6). Proper judgement requires years of experience in repair of piston engines.

**Graphic**

Oil filter




| Part | Function |
|---|---|
| 1 | Filter housing |
| 2 | Filter cover |
| 3 | Gasket ring |
| 4 | Filter element |
| 5 | Filter mat |

*Fig. 22* *08427,00181*

## 12.4) Cleaning the oil tank

See Fig. 23.

**General note**

NOTE: This procedure is optional and requires purging of the oil system. See chapt. 12-20-00 section: 12.5).

If using leaded fuel it is required to clean the tank every 200 flight hours.

It is only necessary to clean the oil tank and the inner parts if there is heavy oil contamination.

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**Procedure**

Procedure to clean the oil tank:

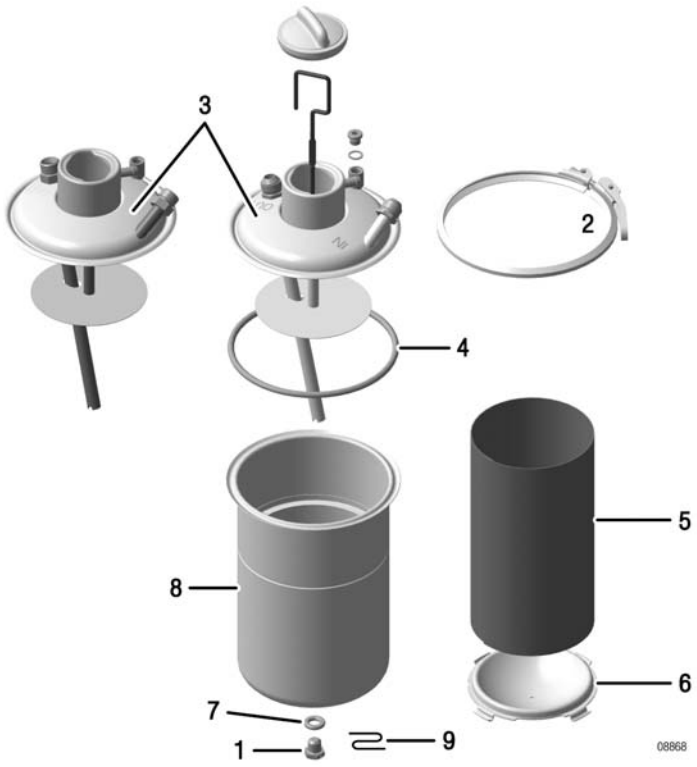
| Step | Procedure |
|---|---|
| 1 | Detach the profile clamp (2) and remove the oil tank cover (3) together with the O-ring (4) and the oil lines. |
| 2 | Remove the inner parts of the oil tank such as the baffle insert (5) and the partition (6). |
| 3 | Clean oil tank (8) and inner parts (5, 6) and check for damage. |

**NOTICE** Incorrect assembly of the oil tank components might cause engine faults or engine damage.

| Step | Procedure |
|---|---|
| 4 | Fit hex.Double ignition screw (1) M12x12 with a new gasket ring (7). Tighten to 25 Nm (18.5 ft.lb). |
| 5 | Safety wire (9). |
| 6 | Reassemble the oil tank by following the same steps in reverse order. |
| 7 | Purge the oil system. |

**Graphic**

Cleaning the oil tank




| Part | Function |
|---|---|
| 1 | Hex. screw M12x12 |

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| Part | Function |
|---|---|
| 2 | Profile clamp |
| 3 | Oil tank cover |
| 4 | O-ring |
| 5 | Baffle insert |
| 6 | Partition |
| 7 | Gasket ring |
| 8 | Oil tank |
| 9 | Safety wire |

*Fig. 23*

## 12.5) Purging the oil system

**General note**

**NOTICE**

Purging of the oil system is extremely important for operation and service life of the engine and therefore the procedure must be followed meticulously.
See latest Installation Manual Chapt. 79-00-00 “Purging the lubrication system“.

**Purging the oil system**

Purging the oil system is necessary:

- with initial installation of new engine
- after reinstallation (e.g. after overhaul)
- after maintenance work during which the lubrication system was opened and voided (e.g. removal of the oil tank or oil cooler, replacement of oil lines).

## 12.6) Flushing the oil circuit

**General note**

**⚠WARNING**

Risk of electric shock!
Switch off ignition and remove key! Disconnect negative terminal of aircraft battery.

**Oil lines**

Dismantle and flush oil lines as per instructions of the aircraft manufacturer.

**Oil tank**

Clean the oil tank.

**Temporary oil lines**

Temporary oil lines (only for flushing) must be fitted so that the oil cooler is not connected. The return line is routed into a separate, clean receptacle and not back to the oil tank.

NOTE: This is done to prevent metal chips and other debris from entering the radiator or oil tank.

**Filling**

Fill the oil tank with approx. 3 l (0.8 gal (US)) of engine oil.

**Procedure**

The following steps have to be carried out after refilling:

***NOTICE***

The oil level in the tank must not drop below the end of suction pipe, otherwise air will be sucked in again.

| Step | Procedure |
|---|---|
| 1 | Turn engine by hand in direction of engine rotation to return the oil from the oil from the oil tank into the engine and into the collection container. The procedure is complete when no more contamination can be discovered. |
| 2 | Control the oil captured during the rinsing process. The rinsing process is complete when no more contamination can be discovered. |
| 3 | Re-install cleaned oil lines and oil cooler according to the manufacturers instruction. |
| 4 | Install new oil filter and refill with oil. |

Reconnect negative terminal of aircraft battery.

Purging of the oil system, see chapt. 12-20-00 section: 12.5).

**Equipment**

***NOTICE***

Inspect all the equipment in accordance with the Maintenance Manual of the aircraft manufacturer.

## 13) Inspecting the magnetic plug

**General note**

See Fig. 24.

NOTE: The magnetic plug is located on the crankcase between cylinder 2 and gearbox.

This inspection is important because it allows conclusions to be drawn on the internal condition of the gearbox and engine and reveals information about possible damage.

**Procedure**

Remove the magnetic plug and inspect it for accumulation of chips.

**Steel chips in low numbers**

Steel chips in low numbers as depicted in Fig. 24 can be tolerated if the accumulation is below 3 mm (0.125 in).

**Steel chips in larger numbers**

If there are larger accumulations of metal chips on the magnetic plug, the engine must be repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness.

**Unclear findings**

In the case of unclear findings:

| Step | Procedure |
|---|---|
| 1 | Flush the oil circuit. |
| 2 | Fit a new oil filter. |
| 3 | Engine test run. See chapt. 12-20-00 section: 7). |
| 4 | Inspect the oil filter once more. |

**Contamination**

**NOTICE**

If the oil circuit is contaminated, replace the oil cooler and flush the oil circuit.
See chapt. 12-20-00 section: 12.6). Detailed inspection of affected engine components.

Trace the cause and remedy.

**Graphic**

Inspecting the magnetic plug.

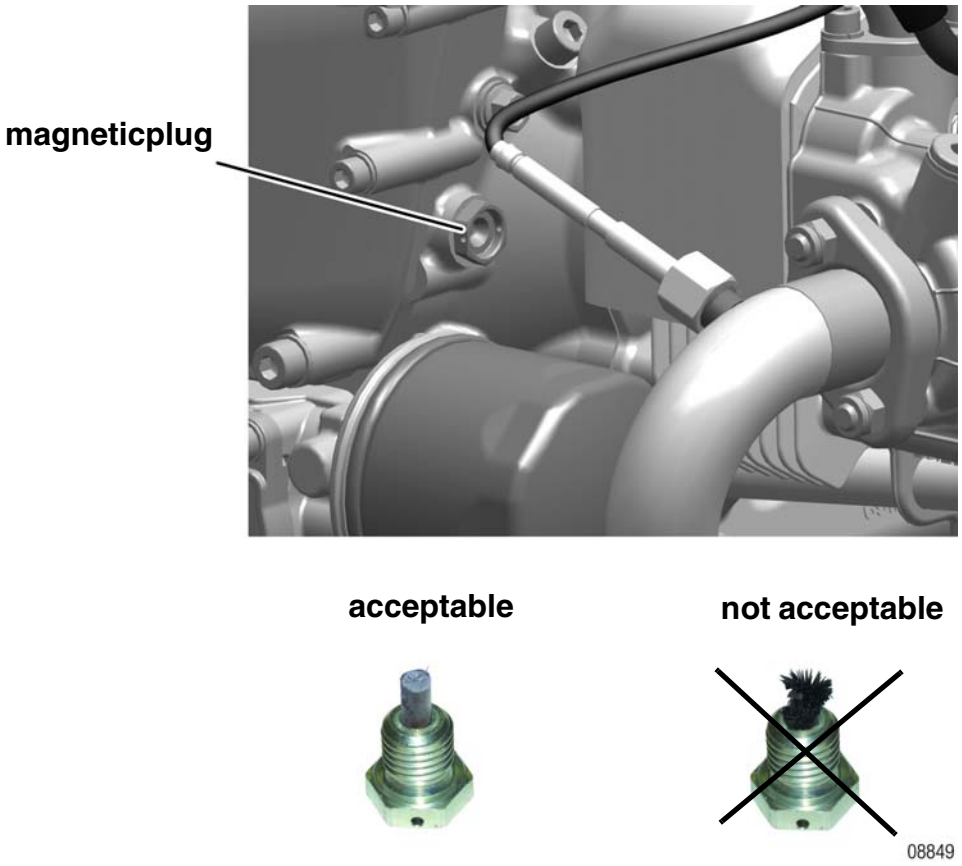



*Fig. 24*

## 13.1) Installation of the magnetic plug

**Install**

The following steps are necessary:

| Step | Procedure |
|---|---|
| 1 | Clean the magnetic plug and oil tank. |
| 2 | Flush the oil circuit, see section 12.6) |
| 3 | Perform purging of the oil system, see section 12.5) |
| 4 | Install a new oil filter, see section 12.3.1) |
| 5 | Perform engine test run in accordance with section 7) |
| 6 | Remove, cut and inspect the oil filter insert in accordance with section 12.3.2) |
| 7 | Remove the magnetic plug once again for inspection. |
| 8 | If no findings, perform a new magnetic plug and internal (cut-up) oil filter inspection after 25 flight hours. |
| 9 | Make an entry in engine logbook (work carried out). |

Inspect all system for correct function. Detailed inspection of affected engine components.

## 14) Electric system

**Overview**


| Part | Function |
|---|---|
| 1 | Spark plug connectors |
| 2 | Double ignition |
| 3 | Ignition cable |
| 4 | FUSE BOX |
| 5 | Plug connectors |
| 6 | Crankshaft position sensor |

*Fig. 25*

## 14.1) Check of wiring

**General note**

**⚠WARNING** Risk of electric shock!
Switch off ignition and remove key!

**⚠WARNING** Risk of Burns!
Hot engine parts!
Always allow engine to cool down to ambient temperature before start of any work.

**Procedure**

The following steps have to be carried out:

| Step | Procedure |
|---|---|
| 1 | Inspect all cable connectors and their connections for tight fit, good contact, corrosion or damage and replace as necessary. |
| 2 | Inspect all ground connections for corrosion and damage, replace if necessary. |
| 3 | Inspect plug connections between pick-up cable, electronic module, charging and shorting cables for corrosion or damage and replace as required. |
| 4 | Inspect plug connections between electronic module and ignition coils for corrosion or damage and replace if necessary. |
| 5 | Verify plug connections on alternator cables with rectifier-regulator and connections of all cables on rectifier-regulator for good contact, tight fit, corrosion or damage and replace if necessary. |
| 6 | Inspect grounding cables for tight fit, corrosion or damage and replace if necessary. |
| 7 | Verify shielding of cable assemblies for corrosion or damage, good ground contact and tight fit, inspect the attachment of the shielding and replace if necessary. |
| 8 | Inspect all 8 ignition cables to spark plug connector for corrosion or damage and tight fit and replace if necessary. |
| 9 | Fuse unit: Check fuse plugs/relays and replace if necessary. |

## 14.2) Replacement of spark plugs

**General note**

See Fig. 26.

**NOTICE**

Use of incorrect spark plugs can result in ignition problems and pre-ignition and consequent engine damage. See chapt. 05-50-00 section: 3.11).

Because of the differing thermal load, particular spark plugs have been specified for each engine type.

In numerous tests the best possible heat range has been determined to make sure that the spark plug will burn off deposits but will not overheat.

**Renewal intervals**

NOTE: Operation with leaded fuels (e.g. AVGAS 100LL) can result in increased wear of the spark plugs. Reduce renewal intervals accordingly.

**Special tool**

Ensure that the following spark plugs corresponding to engine type are employed and that the correct spark plug socket is used:

| Engine | Part no. | Designation | Size of socket |
|---|---|---|---|
| 912 iSc | | | 16 mm (0.63 in) |
| 912 iSc | | | 16 mm (0.63 in) |

| Part no. | Designation |
|---|---|
| TNr. XXXXXX | |
| TNr. XXXXXX | FUSE BOX |

### 14.2.1) Remove the spark plugs

**Remove**

Remove the spark plugs and store them according to cylinder and position. Always replace both spark plugs of a cylinder and do not interchange spark plugs between cylinders.

## 14.2.2) Inspection of spark plugs

**Heat range**

Check heat range and adjust electrode gap correspondingly.

**Visual check**

Inspect all spark plugs for mechanical damage.

**Electrode gap**

| Electrode gap | |
|---|---|
| **New** | **Wear limit** |
| 0.6 - 0.7 mm (0.023 - 0.027 in) | 0.9 mm (0.035 in) |

NOTE: Inspect the electrode gap also on use of new spark plugs. The distance can changed by improper handling.

**Spark plug face**

Spark plug face reveals the following about the operating condition of the engine:

| Spark plug face | Information |
|---|---|
| **light coloured to brown** | plug and calibration of the engine are correct |
| **velvet black** | Possibly indicates one or more of the following:<br>- mixture too rich<br>- insufficient air intake (clogged air filter)<br>- engine operating temperature too low |
| **oily, glossy coating** | Possibly indicates one or more of the following:<br>- damaged valve stem seal<br>- misfiring<br>- too much oil in combustion chamber<br>- worn cylinder and piston rings |
| **white with formation of melt beads** | Possibly indicates one or more of the following:<br>- mixture too lean<br>- leaking valves |

### 14.2.3) Installation of spark plug

**Cleaning**

**⚠WARNING** Eyes and skin irritation!
Rinse off with water in the case of contact with eyes or skin. May be harmful if swallowed.

Before every installation, the spark plug thread and the spark plug seat at the cylinder head should be cleaned (e.g. to remove residue of heat conduction compound).

**Installation**

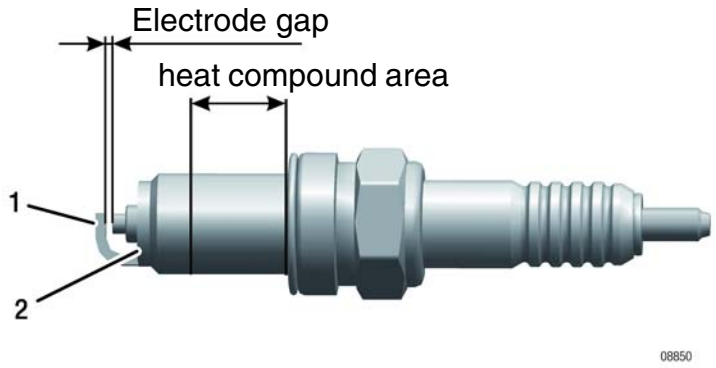
***NOTICE*** Always replace both spark plugs of a cylinder and do not interchange spark plugs between cylinders.

***NOTICE*** Heat conduction compound at the ground electrode (1) or the head area (2) can lead to ignition problems. Apply heat conduction compound sparingly and do not apply to the first three threads.

Apply small amount of heat conduction compound to spark plug thread and tighten spark plug to 20 Nm (177 in.lb) on the **cold** engine.

**Graphic**

spark plugs




| Part | Function |
|---|---|
| 1 | Ground electrode |
| 2 | Head area |

*Fig. 26*

## 14.3) Fuse unit (FUSE BOX)

**General note**

Check plug connections and fuse plugs.

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NOTES

## 15) Propeller gearbox

### 15.1) Checking the propeller gearbox

**General note**

The gearbox must be inspected, repaired or overhauled in accordance with the BRP-Powertrain instructions for continued airworthiness.

Detailed inspection of the affected gearbox components in accordance chapt. 72-00-00 in the Heavy Maintenance Manual.

Crack testing of the propeller shaft is not normally planned, but can be carried out if cracks are suspected.

NOTES

ROTAX®
AIRCRAFT ENGINES



Motornummer / Engine serial no.

Flugzeugtype / Type of aircraft

Flugzeugkennzeichen / Aircraft registration no.

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