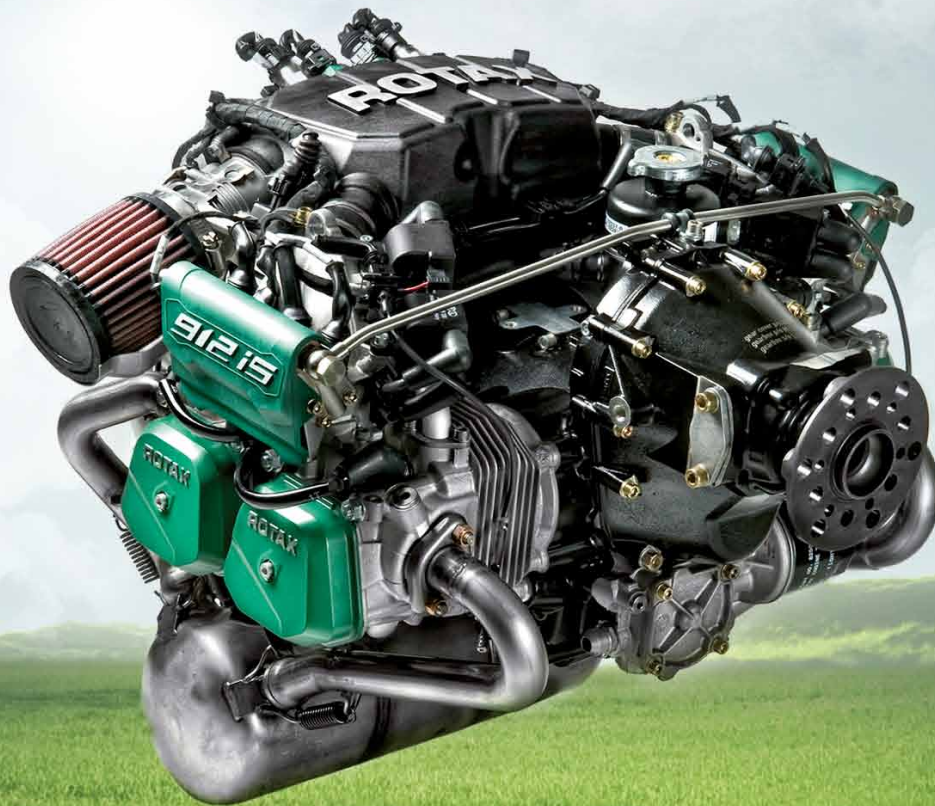


MAINTENANCE MANUAL

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



**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!

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Other product names in this documentation are used purely for ease of identification and may be trademarks of the respective company or owner.

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

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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
List of effective pages	Chapter LEP
Table of amendments	Chapter TOA
General note	Chapter 00-00-00
Airworthiness Limitations	Chapter 04-00-00
Maintenance	Chapter 05-00-00
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Chapter: TOA
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0	INTRO	all	01 01 2012				
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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

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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.

Subject	Page
General note	Page 3
Abbreviations and terms used in this Manual	Page 5
Conversion table	Page 8
Safety notice	Page 9
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Use for intended purpose	Page 16

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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.

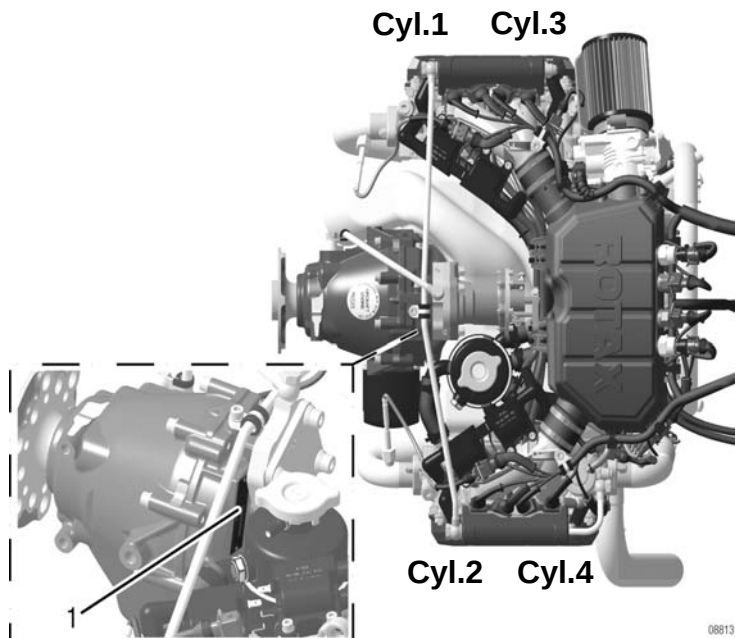


Fig. 1

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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 Temperatur
EMS	Engine Management System

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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

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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

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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 power: 1 kW = 1.341 hp 1 hp = 0.7457 kW 1 kW = 1.3596 PS 1 PS = 0.7355 kW									
Units of area: 1 cm ² = 0.155 sq in (in ²) 1 sq in (in ²) = 6.4516 cm ²	Units of temperature: K = °C - 273,15 °C = (°F - 32) / 1,8 °F = (°C x 1.8) + 32									
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 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									
Units of mass: 1 kg = 2.2046 lb 1 lb = 0.45359 kg	spec. fuel consumption: 1 g/kWh = 0.001644 lb/hph 1 lb/hph = 608.277 g/kWh									
Density: 1 g/cm ³ = 0.016018 lb/ft ³ 1 lb/ft ³ = 62.43 g/cm ³	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									
Units of force: 1 N = 0.224809 lbf 1 lbf = 4.4482 N	Cable cross-section: Conversion table - Wire Gauge: AWG-mm²									
Units of pressure: 1 Pa = 1N/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	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. <u>ENVIRONMENT NOTE</u> 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.

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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.

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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.

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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.

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

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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.

NOTES: 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

no.	chapter	page	date of change	remark for approval	date of approval from authorities	date of issue	signature
0	04-00-00	all	01 01 2012				

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 described 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.

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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.

Subject	Page
Maintenance	Page 3
General note	Page 3
Authorized personnel	Page 4
Procedure notes	Page 6
Trouble shooting	Page 8
Consumable materials	Page 9
Acceptable methods	Page 12

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1) Maintenance

1.1) General note

Safety notice



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.

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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 - Formal instruction from a BRP-Powertrain authorized training facility or - 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. - Use the required tools and fixtures as outlined in the ROTAX Maintenance Manual. - Ensure reasonable and prudent maintenance practices are utilized. - 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.

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1.3) Procedure notes

General note



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

Ignition "OFF"



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"



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



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.

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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.

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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.

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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 , medium-duty screw securing agent	10 ml (0.003 gal (US))
3	899788	LOCTITE 648 green , high strength screw securing agent	5 ml (0.001 gal (US))
3	899789	LOCTITE 603 green , oil-tolerant grouting product, high-strength	10 ml (0.003 gal (US))
4	898241	LOCTITE 480 black , instant adhesive increased flexibility	20 ml (0.005 gal (US))
5	899791	LOCTITE 5910 black , surface sealing compound, can be used instead LOCTITE 574 and LOCTITE 518	50 ml (0.013 gal (US))
6	297434	LOCTITE Anti-Seize 8151 , for the prevention of fretting corrosion	50 g (0.11 lb)
7	897330	Lithium-base grease or Dow Corning , to prevent leakage current	250 g (0.55 lb)
8	897870	Filter oil for optimum filter efficiency and protection against moisture	14.8 ml (0.004 gal (US))
9	297368	SILASTIC 732 , multi-purpose one-component silicon-based sealing compound	310 ml (0.082 gal (US))

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No.	part no.	Description, Application	Qty.
10	897186	SILICONE HEAT CONDUCTION COMPOUND 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 for shock absorption	310 ml (0.082 gal (US))
12	n.a.	Multi-purpose grease LZ 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 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 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 Used to reduce the chance of screws vibrating loose.	20 ml (0.005 gal (US))

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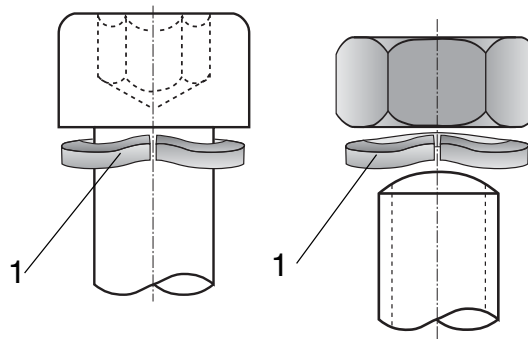
No.	part no.	Description, Application	Qty.
16	n.a.	Cleaning agents NOTICE Use only approved cleaning agents (e.g. kerosine, varsol, etc.) for cleaning all metal parts. Do not use lye-based cold cleaner or degreasing agents. Do not clean coolant or oil hoses with aggressive solutions. Clean off sealing compound residue with sealant remover. 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. Never use caustic or corrosive cleaning agents.	
17	n.a.	MICRONORM abrasive 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 1 µ, which represents fine processing of surfaces.	
18	n.a.	LOCTITE 7063 Degreasing fluid. For parts cleaning before application of adhesives and sealants.	
19	898351	KLUEBER ISOFLEX TOPAS NB 5051 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. 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)

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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 element on 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 rubber components.

Subject	Page
Definition of terms	Page 3
Operating hours	Page 3
Time limit	Page 3
Life cycle	Page 3
General Overhaul (TBO)	Page 4
Time limit	Page 5
Time limit for rubber parts	Page 7
Time limit for the coolant	Page 7
Annual inspection	Page 7

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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".
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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.

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Engine Type description	engine affected engine S/N	TBO Time Between Overhaul
912 iSc	from 4,417.401	2000 hr. or 15 years, whichever comes first ⁽¹⁾
912 iS	from 4,417.001	2000 hr. or 15 years, 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 overhaul (TSO). 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 rubber 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

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](#)).

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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.

Subject	Page
Scheduled maintenance checks	Page 3
Unscheduled maintenance checks	Page 5
Visual inspection	Page 7
Maintenance schedule procedures	Page 9
Check list/Maintenance schedule Maintenance schedule	Page 11 Page 13

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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								to	2000 hr
	25 hr	100 hr	200 hr	300 hr	400 hr	500 hr	600 hr	700 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.

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**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.
-

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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 too lean (Engine malfunction and damage).
Battery	- acid concentration for each cell Observe the manufacturers instruction.	Starting problems
Oil	- for oil contamination. - analyse the oil (provides additional information on the condition of the engine).	Possible engine wear
Radiators, Lines	- for damage. - check for discoloration - and cracks.	Danger of overheating
Propeller	- undamaged and runs true - carry out dynamically balancing including verification of propeller track.	Engine damage, unusual vibrations

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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.

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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.

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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). - 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. - 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 S/N, TSN and date.

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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 (time since new)	
TSO (time since overhaul)	
Used operating fluids:	
coolant	
- mixture ratio	
fuel	
oil	
AIRCRAFT OPERATOR	
Name	
Contact	
Address	
Telephone/Fax/E-mail	

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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.)					

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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. Check cooling air duct and cooling fins of the cylinders for obstruction, cracks, wear and good condition. 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. Inspect radiator cap. 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. Verify coolant level, replenish as necessary. Inspect line from expansion tank to overflow bottle for damage, leakage and clear passage. Inspect venting bore in cap of overflow bottle for clear passage.		X	12-20-00 sec. 10.5)	

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Points of Inspection	Interval Operating hours		Chapter Reference	Signature															
	as indicated	100 hr.																	
Inspect all oil lines for damage, leakage, hardening from heat, porosity, security of connections and attachments. Verify routing is free of kinks and restrictions.		X	12-20-00 sec. 3)																
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.		X	12-20-00 sec. 11.3)																
Inspect the wiring (wiring harness) and its connections for secure fit, damage and signs of wear.		X	12-20-00 sec. 15.1)																
2.) Magnetic plug																			
Check the magnetic plug.		X	12-20-00 sec. 13)																
3.) Compression check																			
Check the compression by the differential pressure method. Test pressure_____hPa (psi)	every 100 hr.		12-20-00 sec. 4)																
<table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th colspan="5" style="text-align: center;">Pressure drop (% or fraction)</th> </tr> <tr> <th style="width: 10%;">Cyl #</th> <th style="width: 10%;">1</th> <th style="width: 10%;">2</th> <th style="width: 10%;">3</th> <th style="width: 10%;">4</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">bar</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Pressure drop (% or fraction)					Cyl #	1	2	3	4	bar								
Pressure drop (% or fraction)																			
Cyl #	1	2	3	4															
bar																			
4.) Checking the engine suspension																			
Inspect engine suspension and fasteners for secure fit, including damage from heat, deformation, cracks.		X	12-20-00 sec. 2.1)																
5.) Checking the air intake system																			
Inspect suspension and fasteners for secure fit, including damage from heat, deformation, cracks.		X																	
Check the airbox incl. air flap actuation. Inspect sensors for tight fit, damage from heat, damage and signs of wear.		X																	

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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. 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		

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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)	

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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. Limits see Operators Manual 912 i Series. Ignition check at _____ rpm engine speed. Speed drop without LANE: A (Off) _____ rpm B (Off) _____ rpm A/B (difference) _____ rpm After engine test run, re-tighten the oil filter by hand (only at cold engine). Checks for leaks.		X	12-20-00 sec. 7)	
General note				
All Service Instructions and Service Bulletins are complied with.		X		

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Points of Inspection	Interval Operating hours		Chapter Reference	Signature
	as indicated	100 hr.		
Returning engine to service On the engine identified as per point 5, on the _____ the _____ hr. Check at _____ hr. (TSN____, TSO____) was carried out according to recommendations of the engine manufacturer and was recorded in the Engine Log book. Location, Date _____ Inspector _____ Aircraft mechanic _____ Certificate No. _____				

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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.

Subject	Page
Engine check after propeller strike incidents	Page 3
Propeller gearbox with integrated overload clutch	Page 3
Checking of the overload clutch	Page 5
Examination after engine failure	Page 7
Returning engine to service after submerging in water	Page 9
Inspection in extreme climatic conditions	Page 10
Diminished functional capability of ECU	Page 10
Exceeding of max. admissible engine RPM	Page 11
Exceeding of max. coolant temperature	Page 12
Exceeding the max. permissible oil temperature	Page 14
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Hard to turn over	Page 21
Lightning strike	Page 22
Reporting	Page 23

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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.

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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. 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.

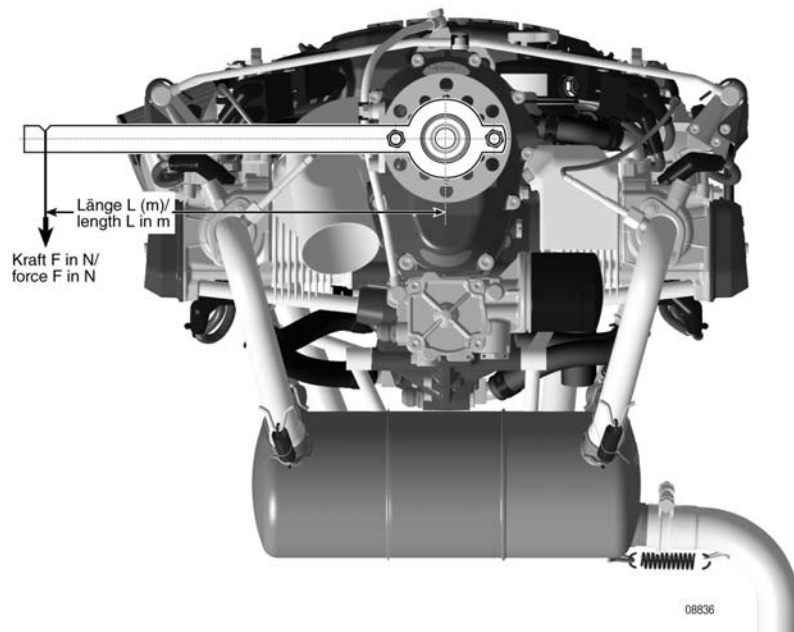


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Measurement Repeat the measurement several times to get a stable value.
The breakaway torque is calculated on the basis of the force (F) measured in N and the length of the lever arm (L) used at the normal distance from it in m ($N \times m = Nm$).

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).

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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 vapour locks contamination
Ignition system (shorting cable, charging coil, ECU, FUSE BOX) Spark plug	malfunction grounding defect wrong spark plug connection loose connection

Rough running

Rough running engine	
part	possible cause
Ignition	wiring (assignment fault)
Engine	engine temperature too low 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 oil shortage contamination 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 bad venting
Return valve, pressure relief valve	malfunction
Radiator	contaminated sealing of intercooler to cowling 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 gearbox suspension system fuel system units of power ignition system cylinder unit	cooling system valve train system engine management exhaust system lubrication system start system

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 hardness 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.

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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:

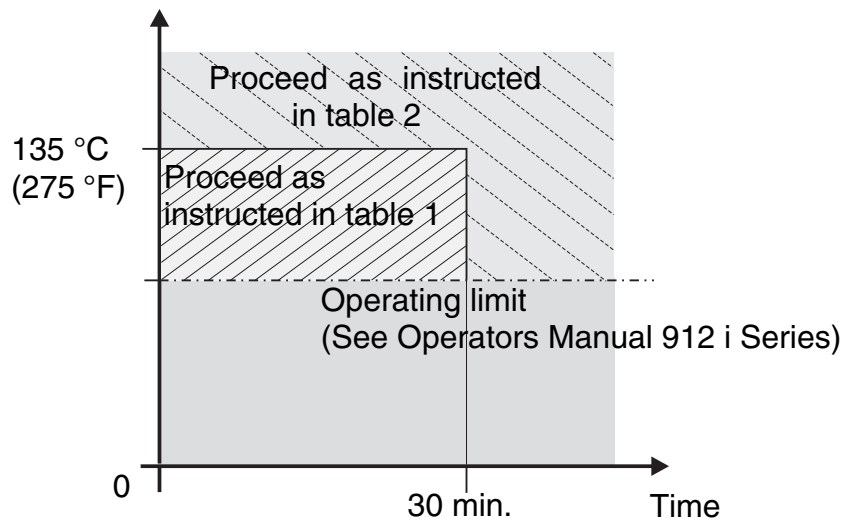


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Temperature exceeded briefly

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. - Leakage check on the cooling system. - 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." - 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. 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. See chapt. 12-20-00 section: 10.3)
2	Fill in with new coolant 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.

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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;

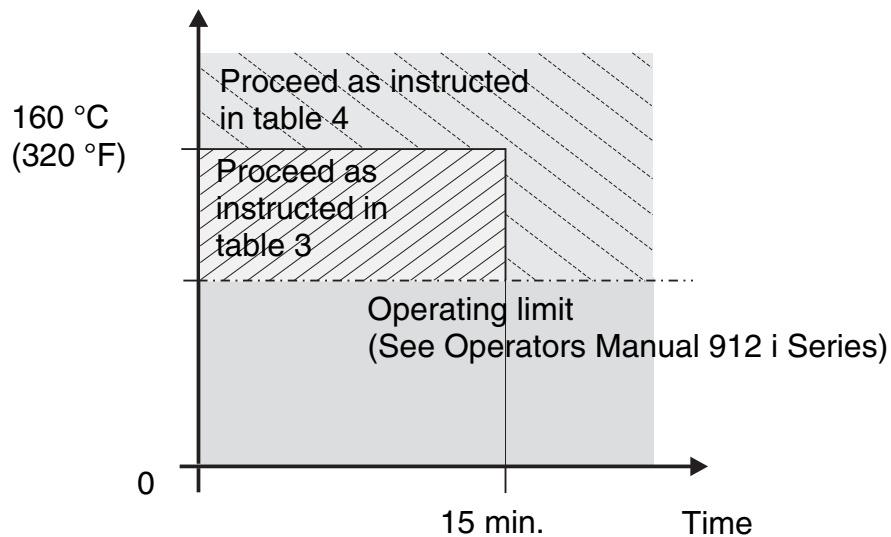


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**Exceeding up to
max. 160 °C
(320 °F)**

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.

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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

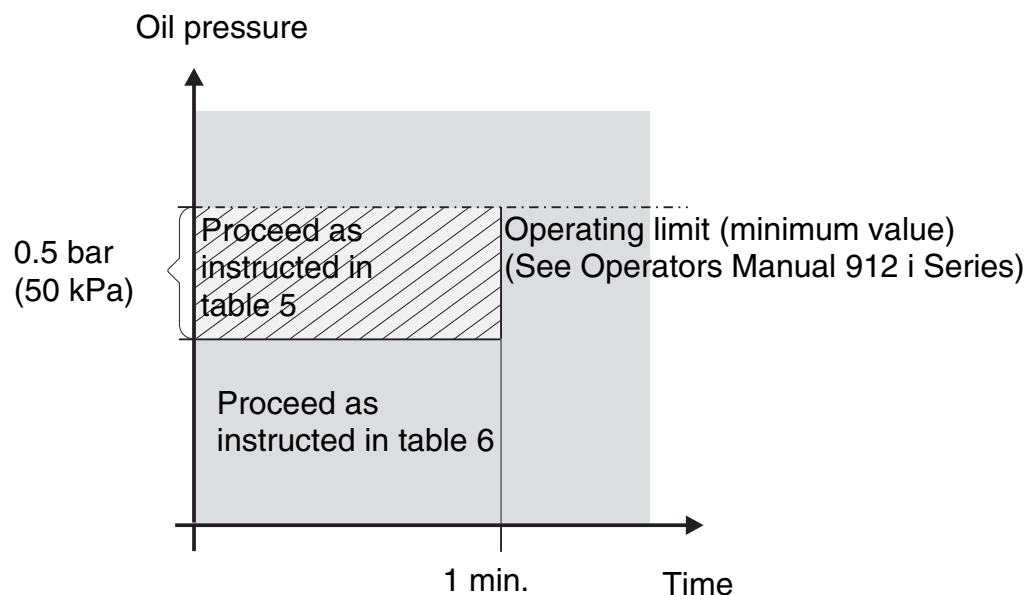


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Minimum oil pressure on the ground

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 than 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. - 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.

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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.

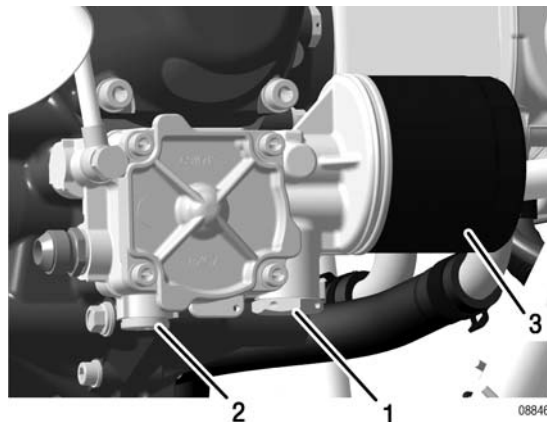
If by error engine was serviced with oil, which does not correspond with oil specification in the Operators Manual and the engine has been in operation for **less than 5 hours**, the following measures must be taken:

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. 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

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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. 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.

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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

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3.13) Hard to turn over

General note See Bild 6.



WARNING

Risk of electric shock!

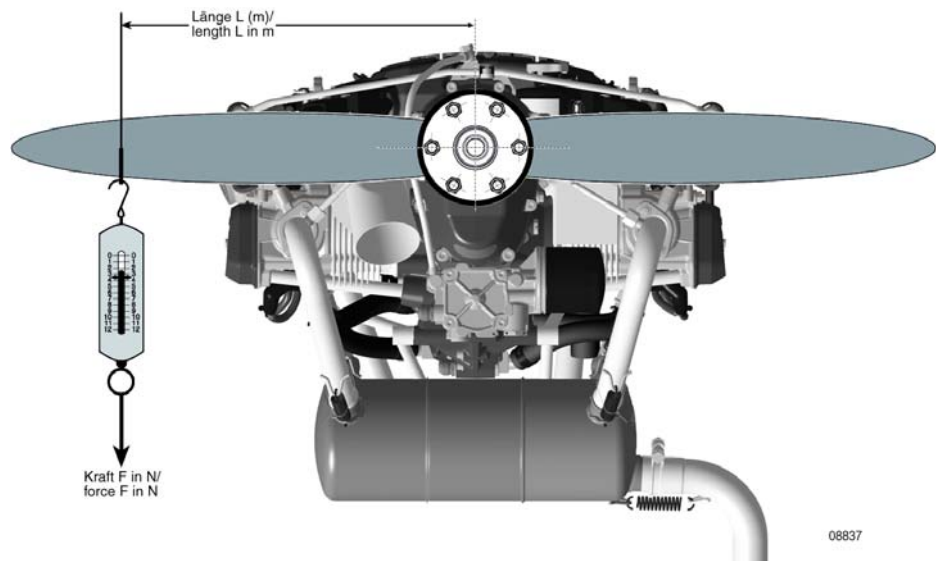
Ignition "OFF" and system grounded! Disconnect negative terminal of aircraft battery.

Inspection Carry out inspection only on cold engine and before 1st start.

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. To do this, determine the maximum occurring torque on the propeller shaft necessary to move the whole crank drive. The torque must be max. 150 Nm (110.64 ft.lb).
3	Carry out detailed inspection of the affected gearbox components.
4	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.

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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 lightning 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.

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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

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Form

 CUSTOMER SERVICE INFORMATION REPORT		OPER. Control No.							
		ATA Code							
1. A/C Reg. No.									
MANUFACTURER		MODEL/SERIES		SERIAL NUMBER					
2. AIRCRAFT									
3. POWERPLANT									
4. PROPELLER									
5. SPECIFIC PART (of component) CAUSING TROUBLE									
Part Name		MFG. Model or Part No.		Serial No.					
6. ENGINE COMPONENT (Assembly that includes part)		Model or Part No.		Serial Number					
Engine/Comp. Name		Manufacturer		Model or Part No.					
Engine TSN		Engine TSO		Engine Condition					
7. Date Sub.									
Optional Information: Check a box below, if this report is related to an aircraft ☐ Accident; Date ☐ Incident; Date									
8. Comments (Describe the malfunction or defect and the circumstances under which it occurred. State probable cause and recommendations to prevent recurrence.) 						REP. STA.		☐	
						OPER.		☐	
MECH.		☐		AIR TAXI.		☐			
MFG.		☐		ACG.		☐			
COMMUTER.		☐		OTHER.		☐			
DISTRICT OFFICE		OPERATOR DESIGNATOR				SUBMITTED BY:			
TELEPHONE NUMBER: ()									

BRP-Powertrain
MAINTENANCE MANUAL

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.

Subject	Chapter
Introduction	12-00-00
Replenishing operating fluids	12-10-00
Scheduled maintenance	12-20-00

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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.

Subject	Page
General note	Page 3
Fluid capacities	Page 5
Cooling system	Page 7
Coolant check/replenish	Page 7
Lubrication system	Page 9
Oil level check/replenish	Page 9

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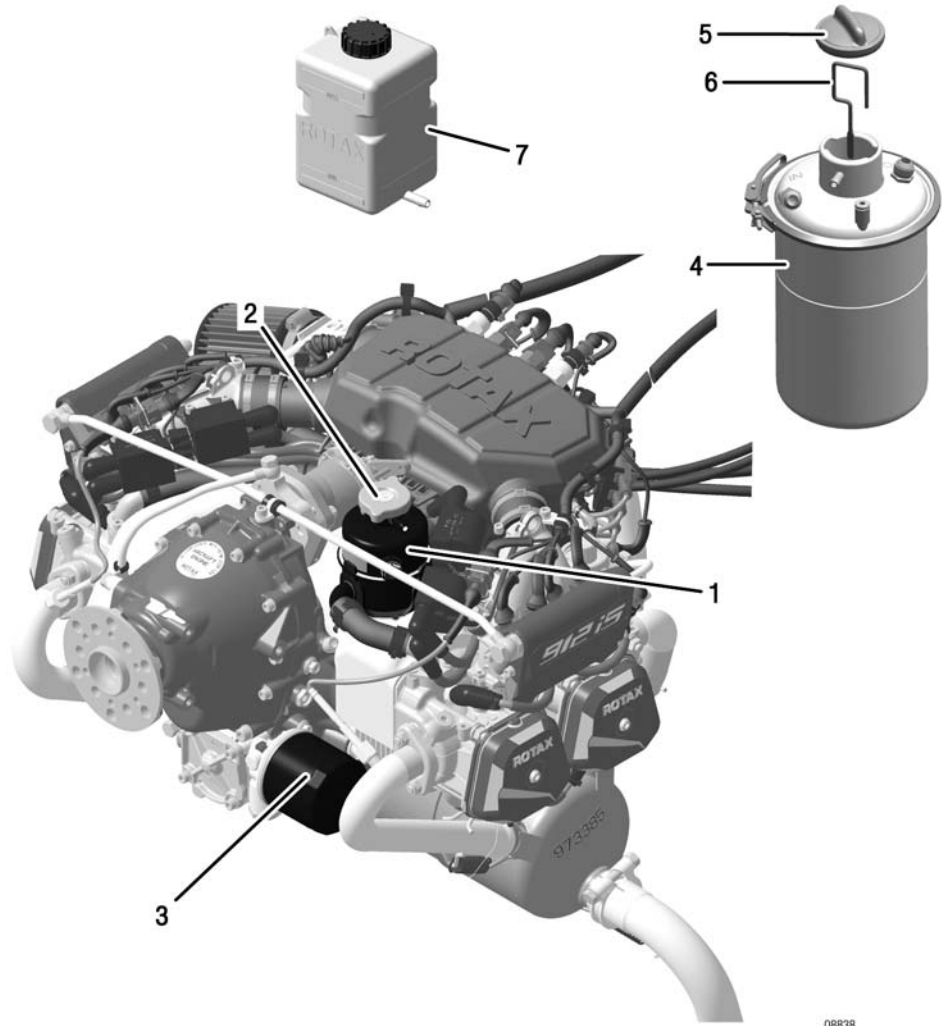
NOTES

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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

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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.

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3) Cooling system

3.1) Coolant check/replenish

General note



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



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. If necessary, replenish with coolant of same composition.
5	Tighten the radiator cap by hand. NOTE: The radiator cap must be tightened until the stop lug is contacted.

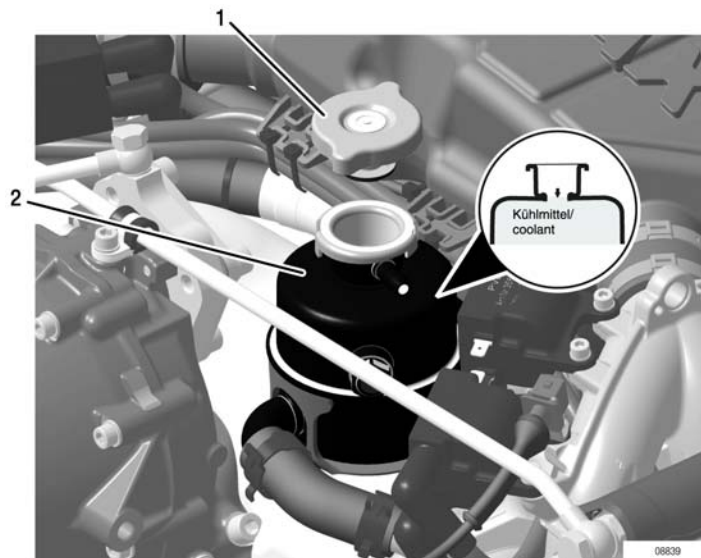
Engine test run

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. 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. 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.

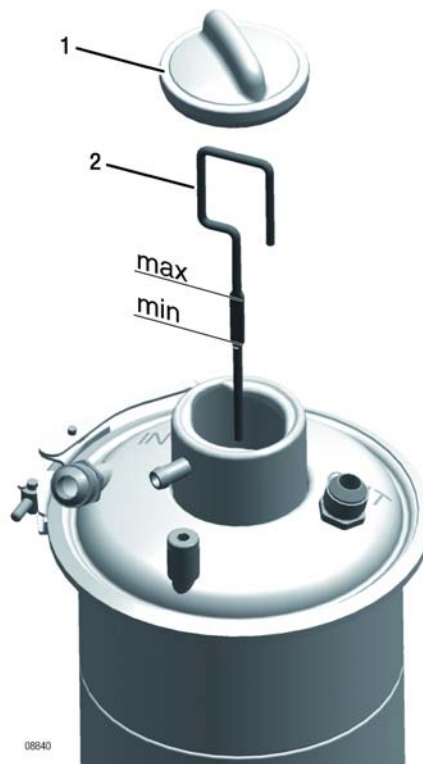
Engine test run

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.

Subject	Page
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Checking the engine suspension	Page 5
Corrosion	Page 6
Leakage check	Page 7
Checking the compression	Page 9
Checking the compression for fault-tracing	Page 11
Engine management ECU	Page 13
Checking ECU	Page 13
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Installation of spark plug	Page 51
Fuse unit (FUSE BOX)	Page 51
Propeller gearbox	Page 53
Checking the propeller gearbox	Page 53

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.

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

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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

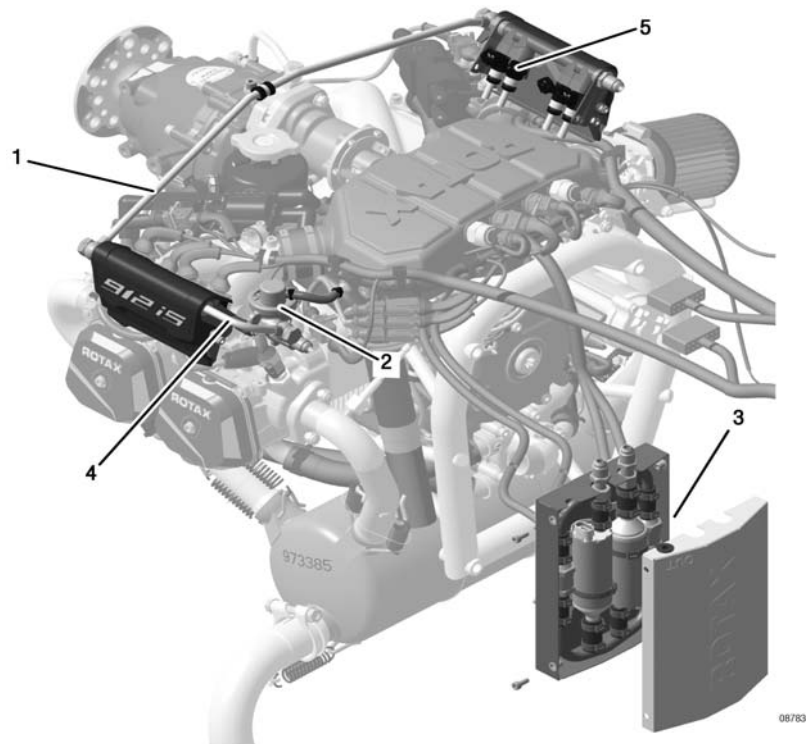
Avoid overstretching the fixing elements. Always comply with the specified torque!

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](#).

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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. * 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.

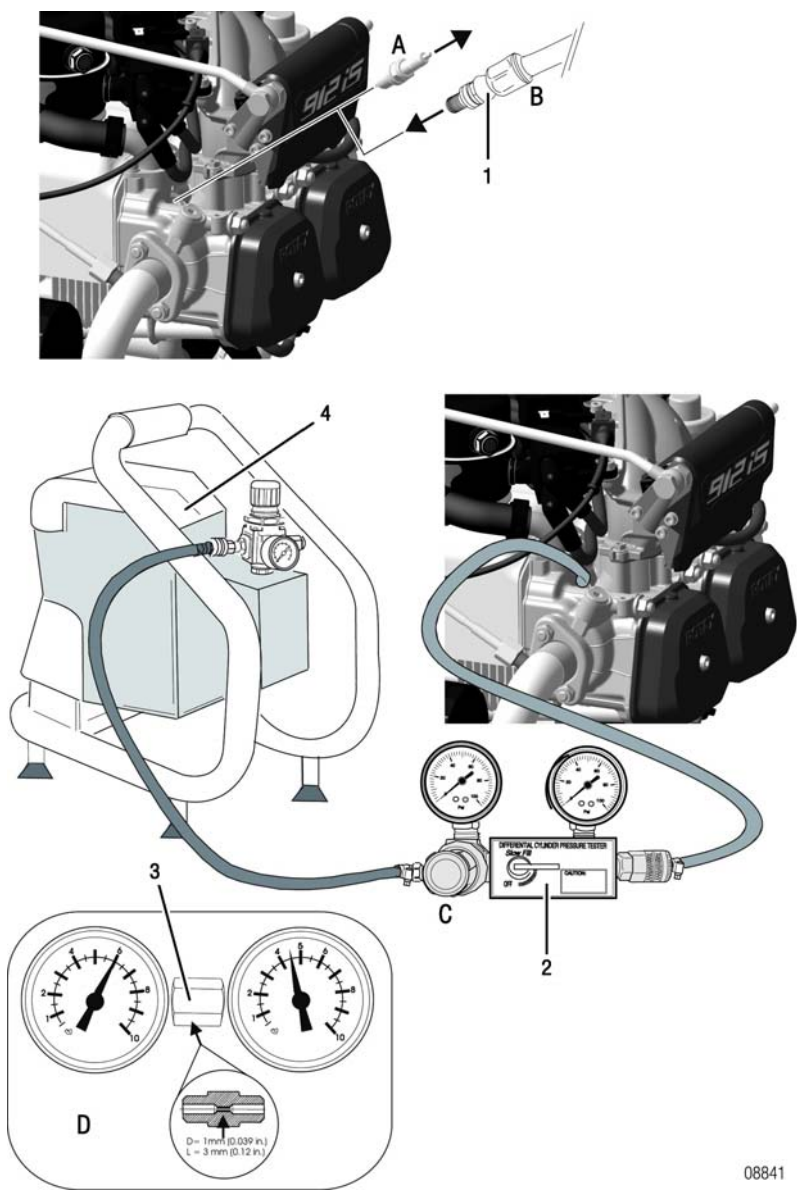
- Detailed inspection of affected engine components.

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Graphic

Checking the compression.



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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.

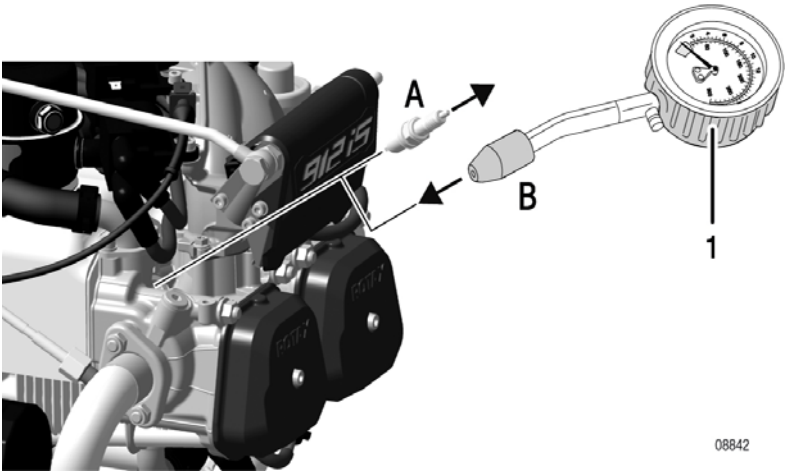
Part number	Description
n.a.	Compression tester

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Graphic

Compression check for fault-tracing



Part	Function
1	Compression tester

Fig. 3

5) Engine management ECU

Safety notice See Fig. 4.



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

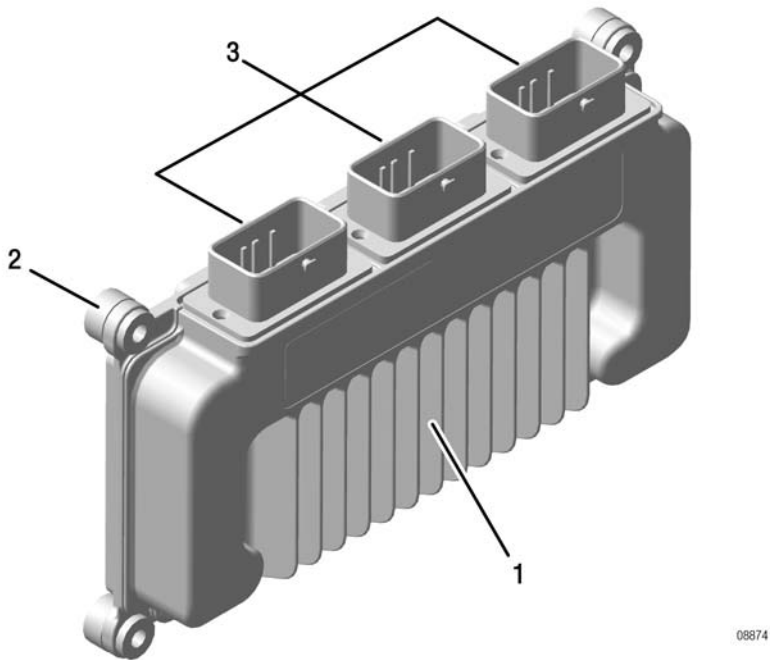
Instruction For read out the ECU data memory proceed as follows:

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.

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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.

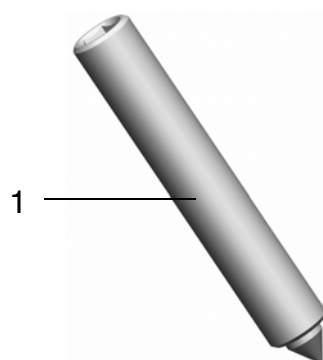
Special tools

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

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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. 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).

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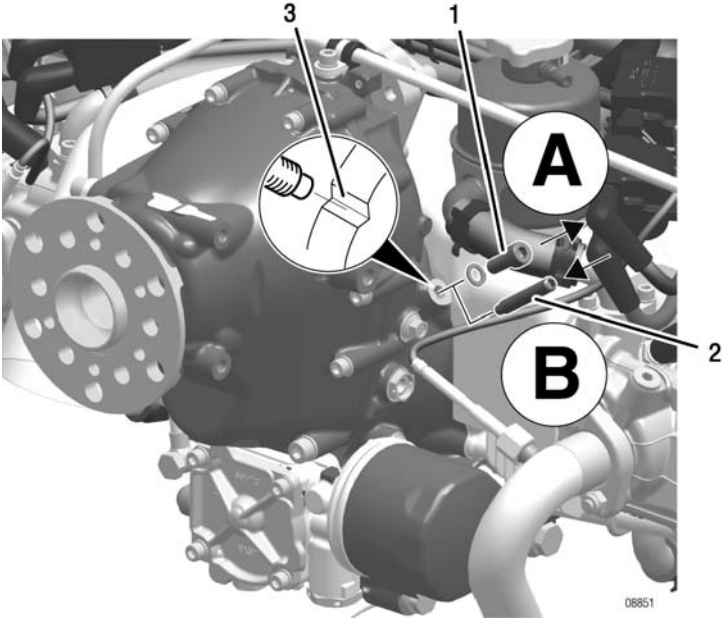
**Loosen the
crankshaft**

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

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7) Test run of engine

General note



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.

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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. NOTE: On switching off the engine switch off ignition and withdraw the ignition key.

Engine oil and coolant



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.

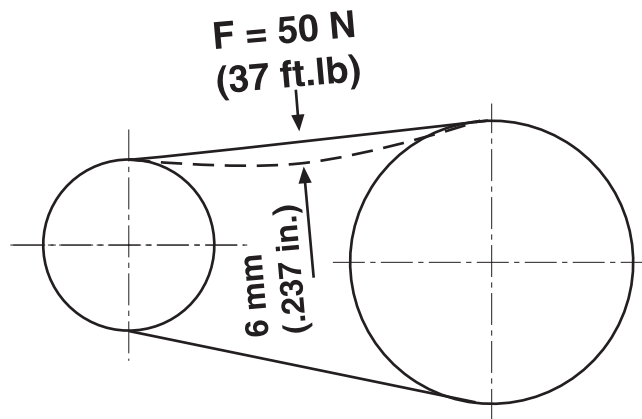


Fig. 7

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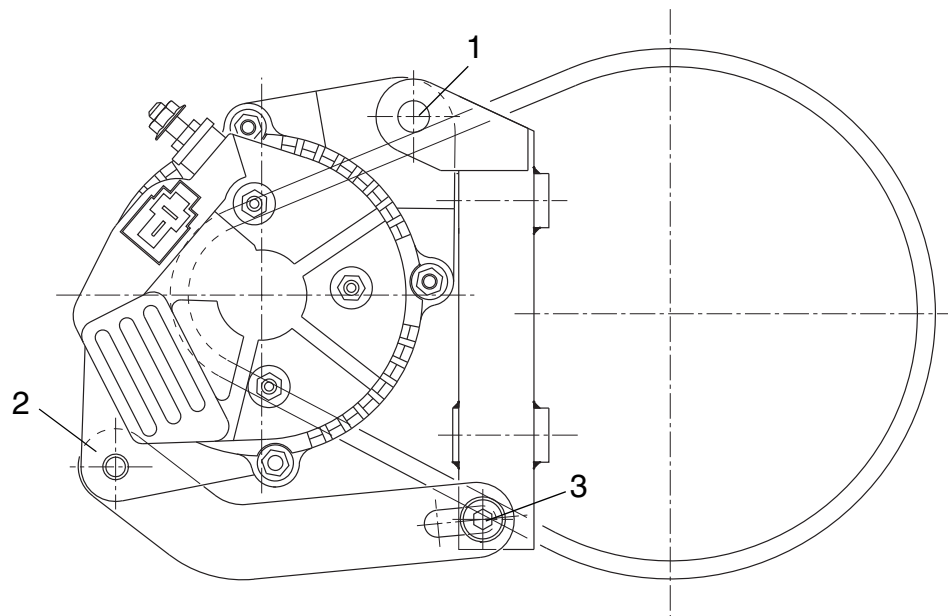
8.1) Belt tension adjustment

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

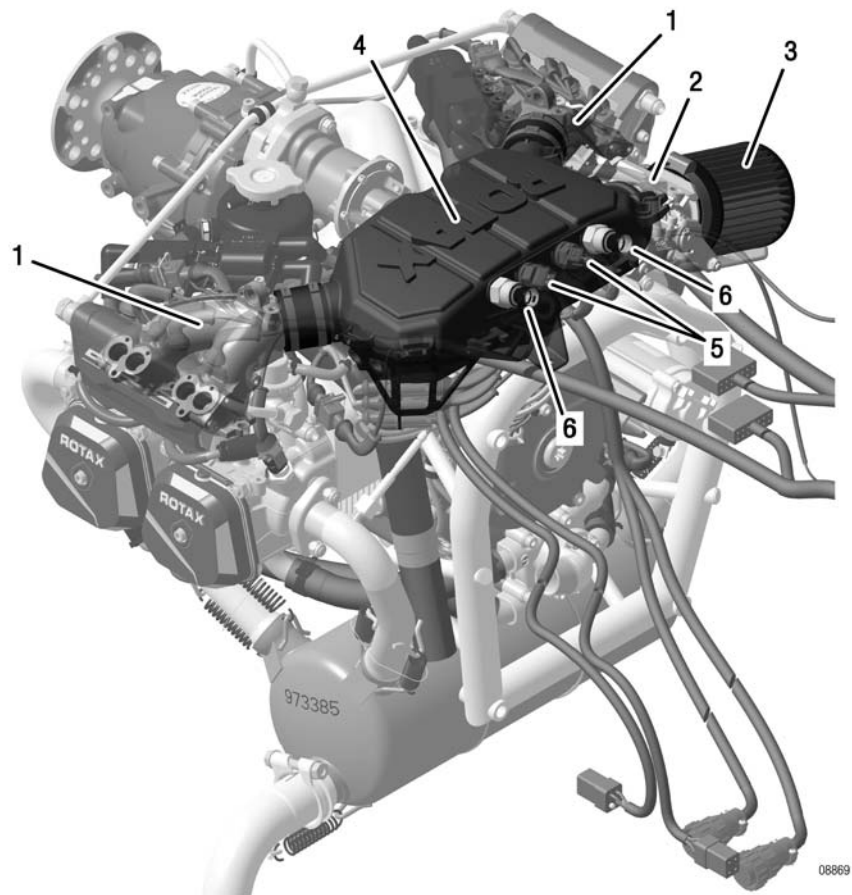
Fig. 8

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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

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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

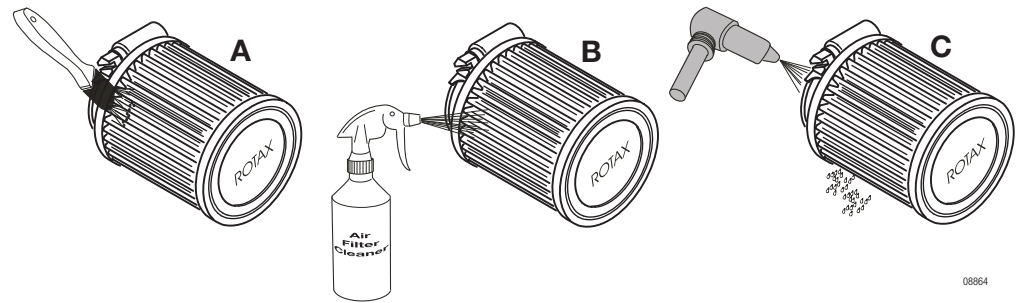


Fig. 10

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.

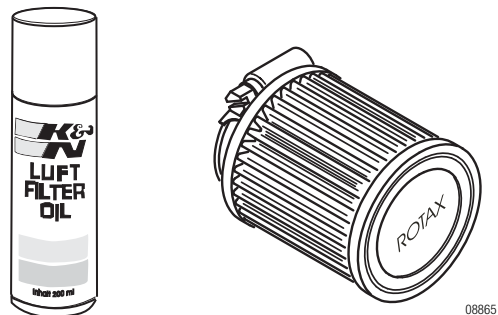


Fig. 11

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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.



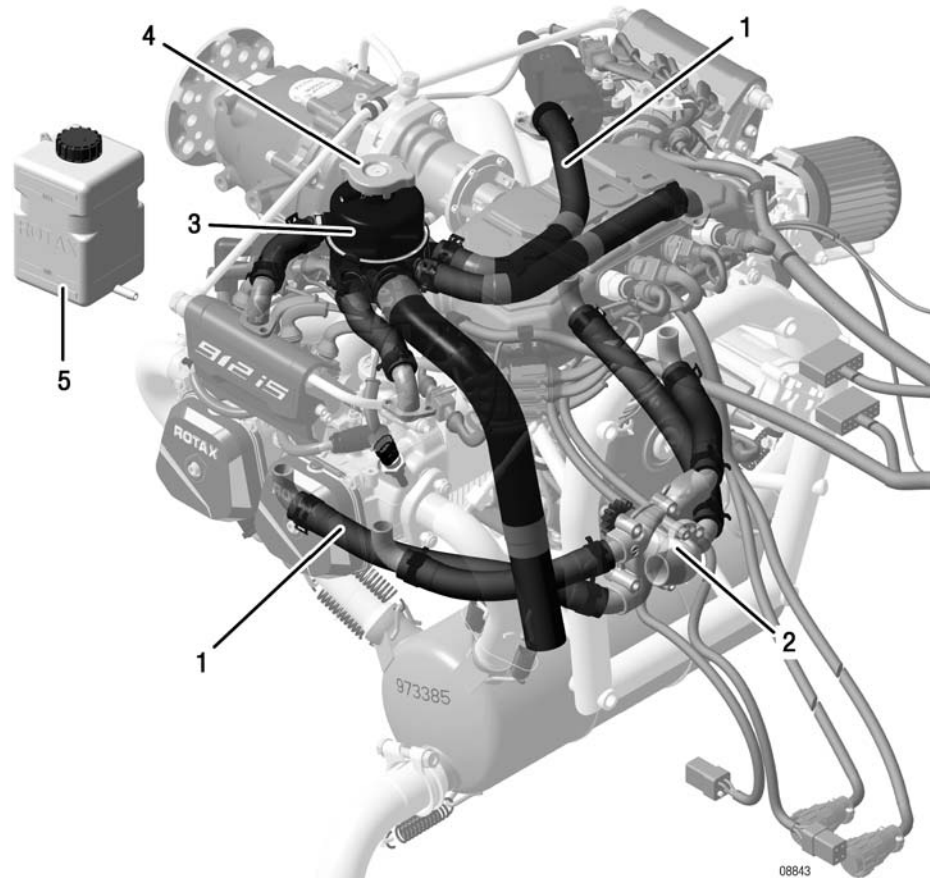
Part	Function
1	Air filter

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

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General note



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



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).

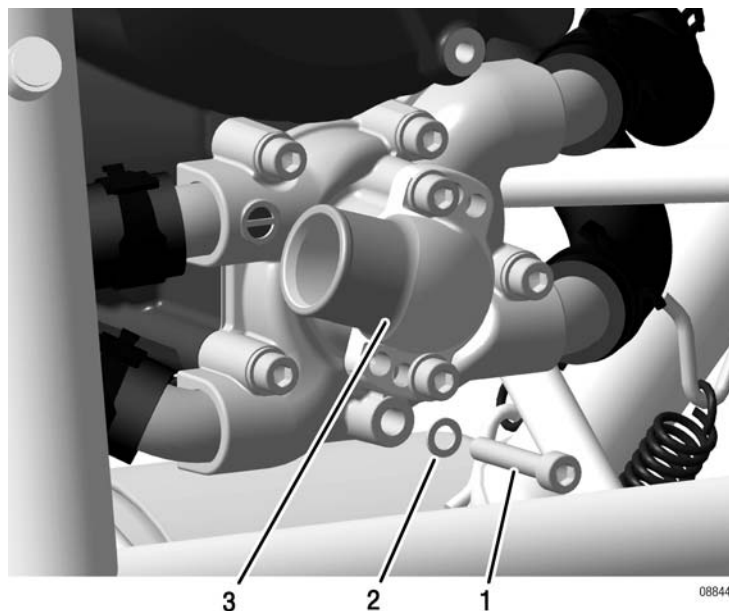
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Step	Procedure
3	Drain the engine coolant. NOTE: If the radiator is located below the engine, also detach the lowest positioned coolant hose.
4	Fit attachment screw (stainless steel) along with a new sealing ring. Tighten to 10 Nm (90 in.lb).
5	If 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.

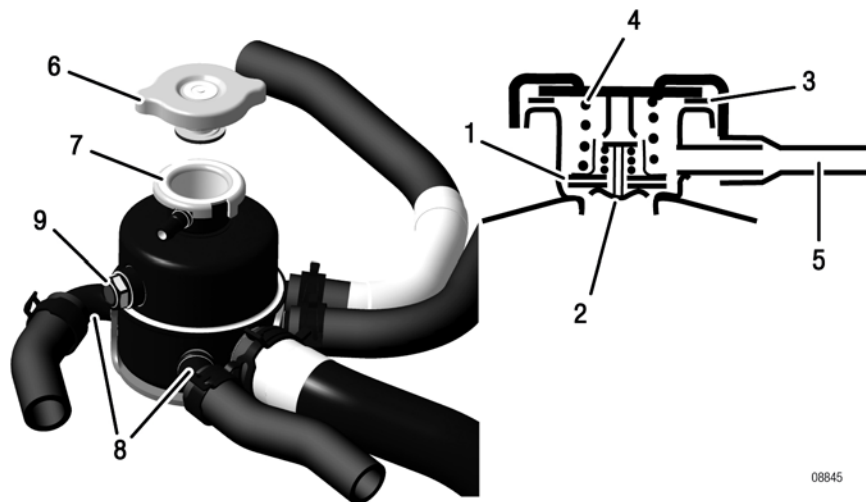
Procedure

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). 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. 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.

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.



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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

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Part	Function
7	Sealing surface
8	Tube connections
9	Sight glass

Fig. 15

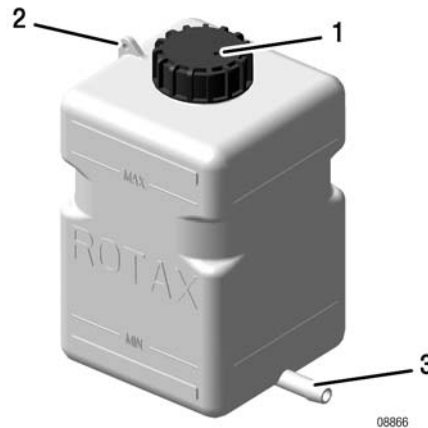
10.5) Overflow bottle

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

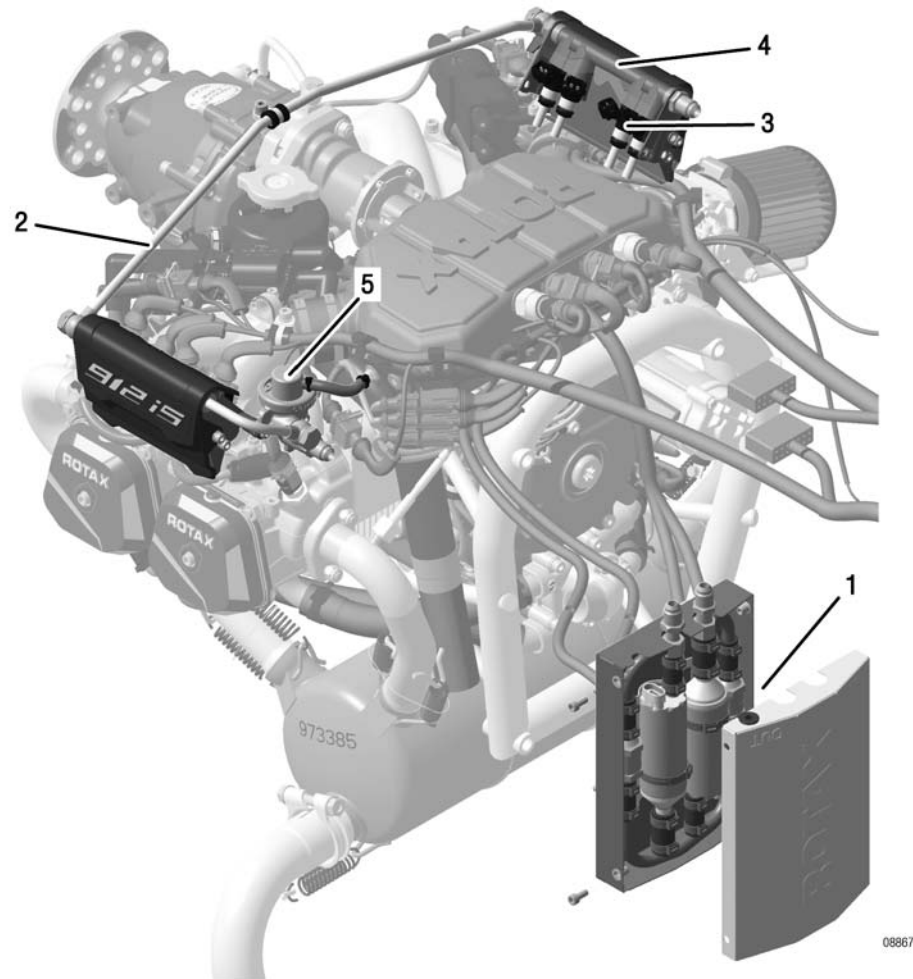
10.6) Accessories (including radiator, radiator hoses, hose clamps, cooling air ducts)

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

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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)

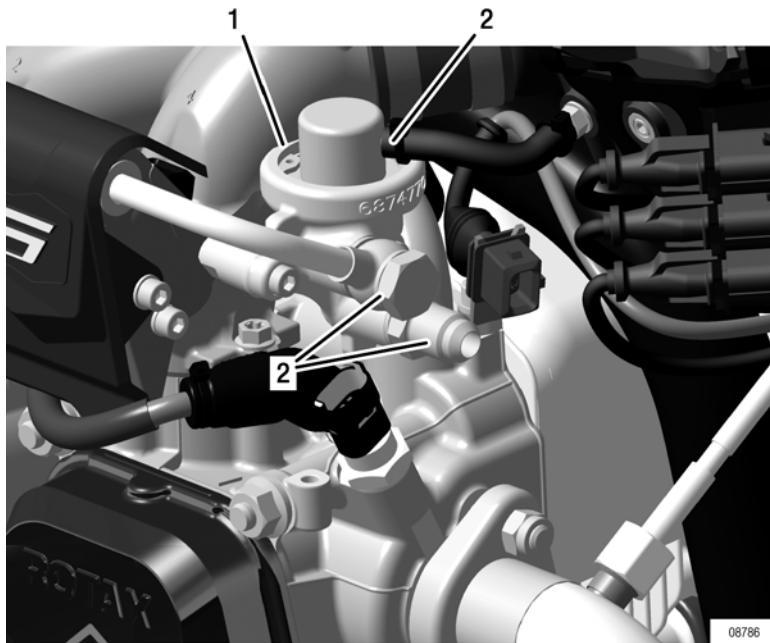
11.4) Checking the fuel line pressure

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.

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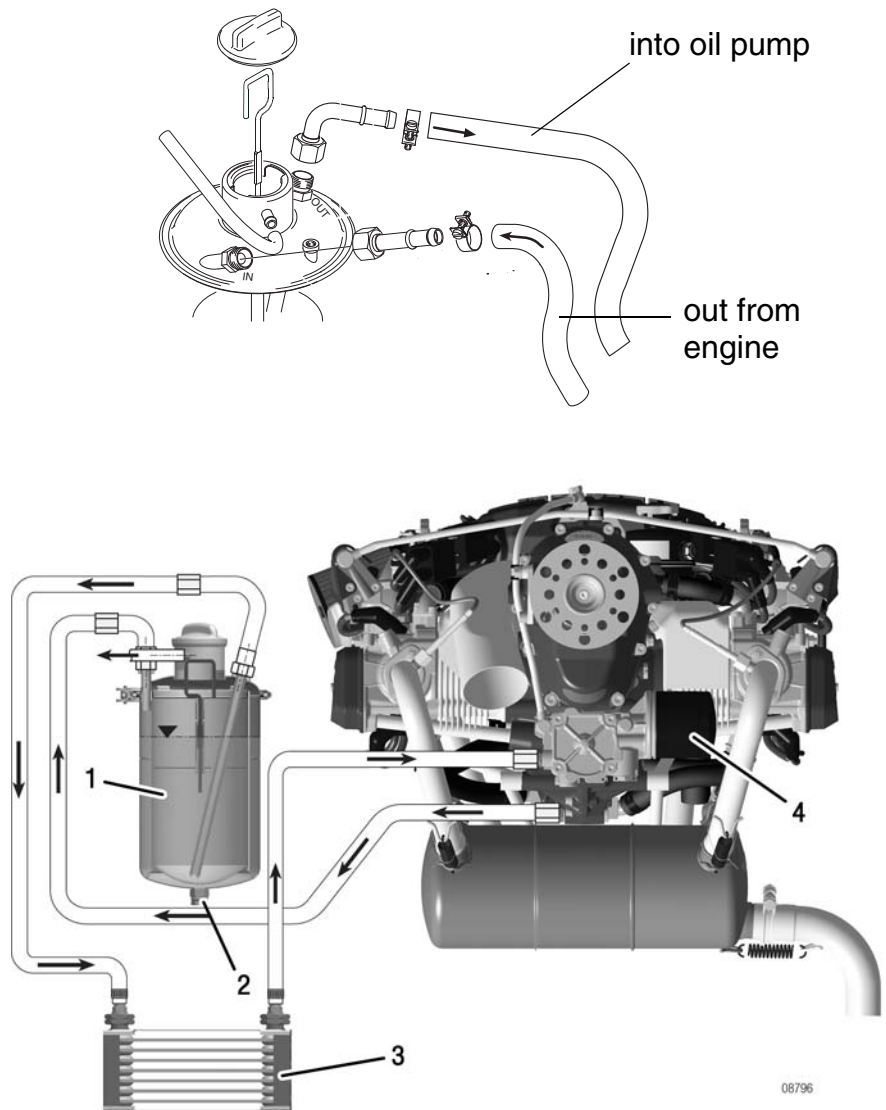
NOTES

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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.

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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. 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. 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.

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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

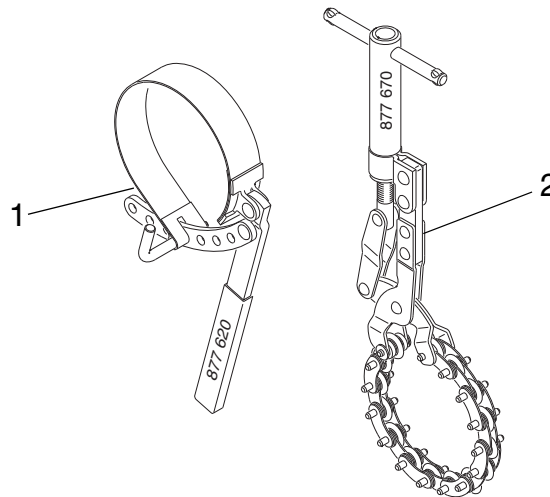


Fig. 20

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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

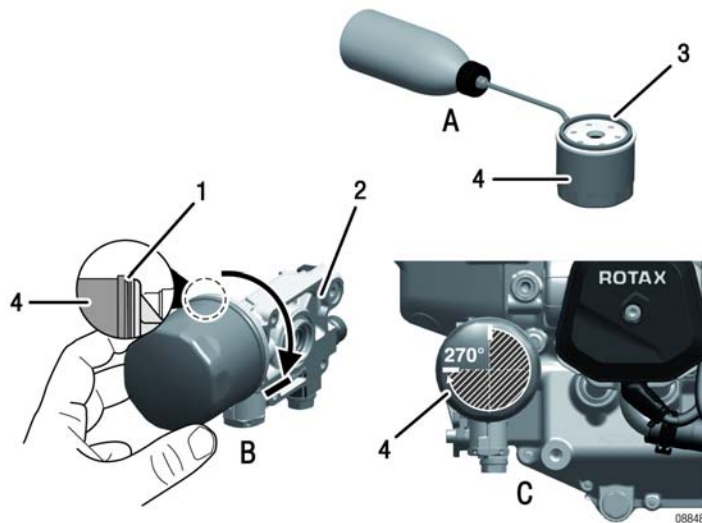
To mount the oil filter the following steps are necessary:

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. 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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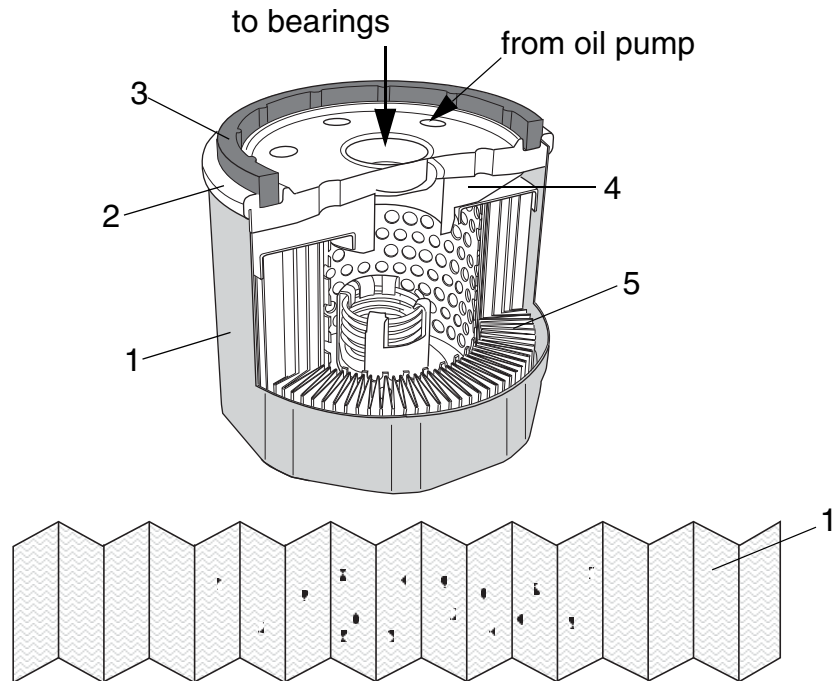
Contaminated

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

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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.

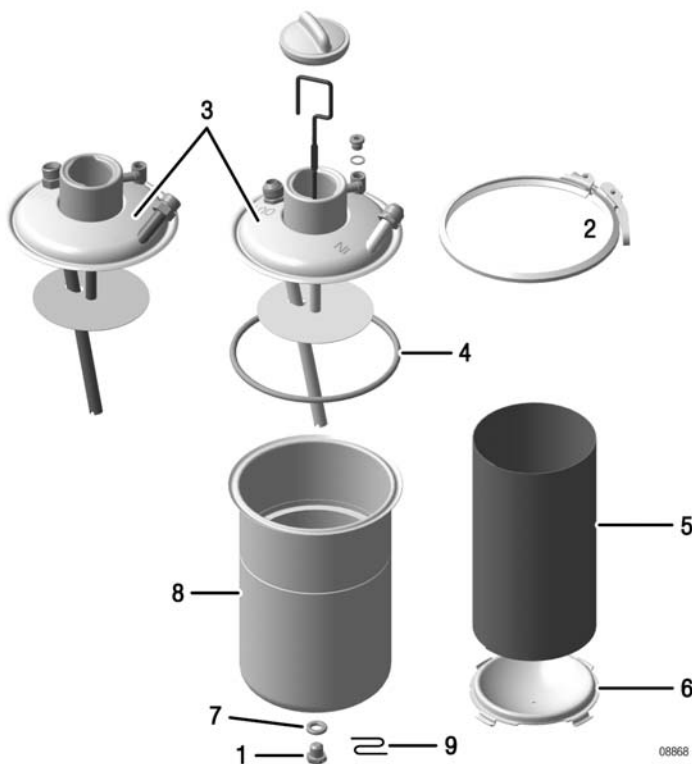
NOTICE

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.

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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 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-Pow-ertrain instructions for continued airworthiness.										
Unclear findings	In the case of unclear findings: <table><tr><th>Step</th><th>Procedure</th></tr><tr><td>1</td><td>Flush the oil circuit.</td></tr><tr><td>2</td><td>Fit a new oil filter.</td></tr><tr><td>3</td><td>Engine test run. See chapt. 12-20-00 section: 7).</td></tr><tr><td>4</td><td>Inspect the oil filter once more.</td></tr></table>	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.
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.										

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Graphic

Inspecting the magnetic plug.

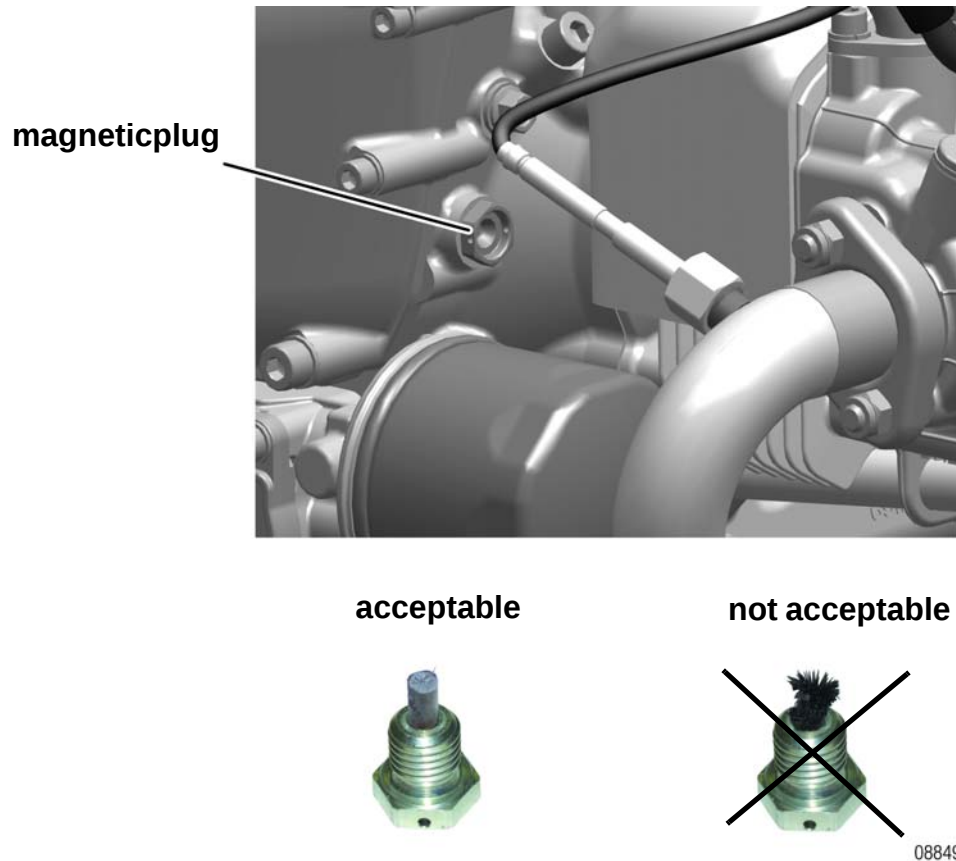


Fig. 24

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.

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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

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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 be 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: - mixture too rich - insufficient air intake (clogged air filter) - engine operating temperature too low
oily, glossy coating	Possibly indicates one or more of the following: - damaged valve stem seal - misfiring - too much oil in combustion chamber - worn cylinder and piston rings
white with formation of melt beads	Possibly indicates one or more of the following: - mixture too lean - 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.

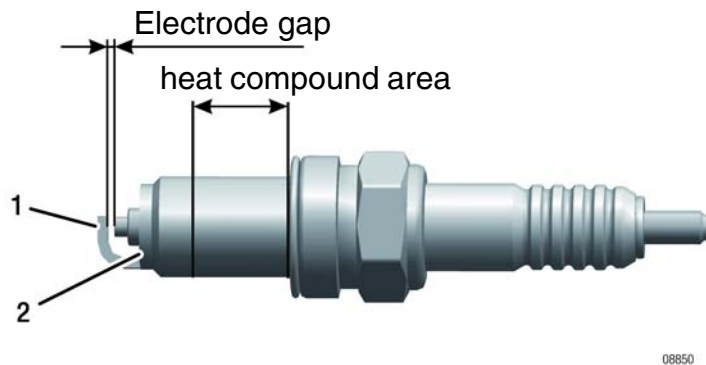
NOTICE

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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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.

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