

BRP-Powertrain
MAINTENANCE MANUAL

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Chapter: TOA
TABLE OF AMENDMENTS

***Approval**

The technical content of this document is approved under the authority of DOA No. EASA.21J.048.

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

no.	chapter	page	date of change	remark for approval	date of approval from authorities	date of issue	signature
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1) General note

Purpose The purpose of this Maintenance Manual is to acquaint maintenance service staff 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**

ROTAX Authorized Distributors for Aircraft Engines.

See latest Operators Manual or on the Internet at the official Homepage 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 number (1) is on the ignition cover, on the left, opposite the electric starter. See Fig. 1.

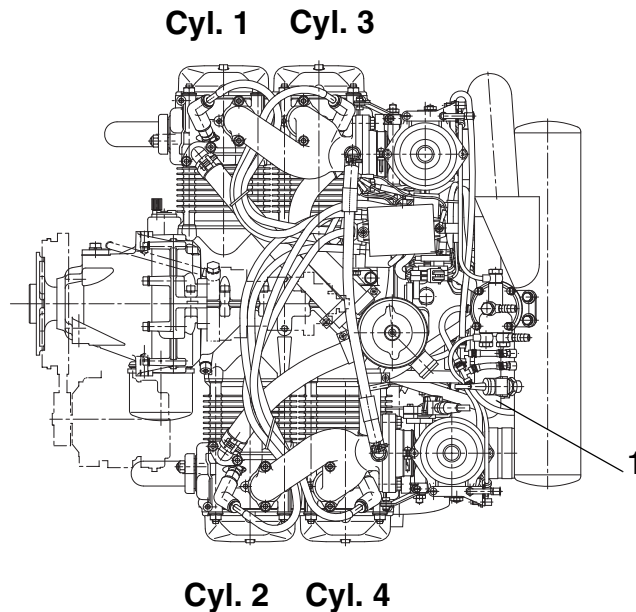


Fig. 1

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3) Safety

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.

NOTES:

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

ENVIRONMENT NOTE

Environment note gives you tips on 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 strongly recommend that any service be carried out and/or verified by a highly skilled professional mechanic
See chap. 05-00-00 section 1.2)

Manual This Manual has been prepared as a guide to correctly service and maintain all ROTAX 914 aircraft 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 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 modifications, whether authorized or not by BRP-Powertrain, after manufacturing the product.

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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.

NOTES: 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".

NOTES: 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-WebSite: www.FLYROTAX.com. Amendments and current versions can be downloaded free of charge.

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

Reference

NOTICE This Manual for maintenance is only part of the Technical Documentation and will be supplemented by the respective Operators Manual, Installation Manual, Overhaul Manual and Illustrated Parts Catalog.

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

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**Authorized ex-
ceeding**

Extension or exceeding of the TBO by 5 % or 6 months is allowed which-
ever 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 carburetors, filters, 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	Data about the type of aircraft used.
6	Useful remarks and observations concerning the engine.

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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 chap. 05-20-00 section: 5.1)) of the respective components.

Time limit

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

- venting hose of the carburetors
 - all rubber hoses of the cooling system
 - all rubber hoses of the fuel system
 - 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
 - carburetor rubber flange assy.
 - Air intake hose (connection between turbocharger and airbox)
 - diaphragm on both carburetors
 - rubber hoses on compensating tube
 - 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 chap. 05-10-00 section: 2).

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Points of Inspection	Interval Operating hours		Chapter Reference	Signature
	as indicated	100 hr.		
8.) Checking the carburetor				
Checking the idle speed.		X	12-20-00 sec. 12.3.1)	
Checking the ventilation of the float chambers. Any trouble with the float chamber ventilation impairs engine and carburetor function and must therefore be avoided. Check that the passage of the ventilation lines is free and that no kinks can arise.	every 200 hr.			
Check for free movement of the carburetor actuation (throttle lever and starting carburetor). Check that the bowden cable allows the full travel of the throttle lever from stop to stop.		X	12-20-00 sec. 12.6)	
Removal/assembly of the two carburetors and carburetor inspection.	every 200 hr.		Heavy MM 73-00-00 sec. 3)	
Check carburetor synchronization. Mechanical or pneumatic synchronization.		X	12-20-00 sec. 12.1)	
Inspect the float weight	every 200 h (and/or annual inspection)		12-20-00 sec. 12.4.1)	
9.) Inspecting carburetor sockets and drip tray				
Inspect the carburetor sockets for damage and abnormalities, checking for cracks, wear and good condition. Take note of changes caused by temperature influence. (¹ See SB-914-019 - latest edition.	every 200 hr. (¹)		Heavy MM 73-00-00 sec. 3.4.3)	
10.) 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.			
11.) Spark plugs				
Remove all spark plugs, check the heat range designation, clean, check electrode gap and adjust if necessary. Check electrode gap and adjust as necessary. Replace as required.		X	12-20-00 sec. 16.2)	
Replace spark plugs.	every 200 h	X ⁽¹⁾	12-20-00 sec. 16.2)	
(¹ use of leaded fuel more than 30% of operation.				

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Points of Inspection	Interval Operating hours		Chapter Reference	Signature
	as indicated	100 hr.		
12.) Flushing the cooling system				
Flushing the cooling system where conventional coolants are used.	when replacing the coolant		12-20-00 sec. 11.3)	
13.) Checking the wastegate flap				
Check the wastegate flap for free running and correct position.		X	12-20-00 sec. 8)	
Check the wastegate bowden cable for free movement and damage.		X	12-20-00 sec. 8)	
Lubricate the axle (wastegate flap).		X	12-20-00 sec. 8)	
14.) Fuel filter (on airframe side)				
Check the fuel filter.		X	12-20-00 sec. 9)	
15.) Checking the propeller gear box				
Check the friction torque in free rotation on gearboxes with overload clutch. Actual friction torque _____ Nm (in.lbs)		X	12-20-00 sec. 17.1)	
Gearboxes (with overload clutch). Inspect overload clutch.	every 600 hr. ⁽¹⁾		05-50-00 sec. 2) SB-914-020	
Check the propeller gearbox (with overload clutch).	every 1000 hr.		12-20-00 sec. 17.2)	
Check the propeller gearbox (without overload clutch).	every 600 hr.		12-20-00 sec. 17.2)	
16.) Oil change				
Remove old oil filter from engine and install new oil filter.	50 hr. ⁽¹⁾	X	12-20-00 sec. 13.3), 13.4))	
Cut old oil filter without producing any metal chips and inspect following components for wear and/or missing material Filter mat Findings: _____ _____ Filter cover Findings: _____ _____ Sealing lip (wear, cracks, missing material) Findings: _____ _____	50 hr. ⁽¹⁾	X	12-20-00 sec. 13.5)	

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Points of Inspection	Interval Operating hours		Chapter Reference	Signature
	as indicated	100 hr.		
Spring of bypass valve (small) Findings: _____ _____				
Positioning spring (large) Findings: _____ _____				
Check oil tank. Refill oil tank with approx. 3 litres of oil. For oil quality, see Operators Manual and SI-914-019, latest edition.	50 hr. ⁽¹⁾	X	12-20-00 sec. 13.2), 13.6)	
⁽¹⁾ In the case more than 30% of operation with leaded fuel e.g.: AVGAS 100 LL			12-20-00 sec. 13.2) SI-914-019	
17.) Checking the V-belt tension				
On configurations with auxiliary generator, check the attachment and the V-belt tension.		X	12-20-00 sec. 6)	
18.) Electric fuel pumps				
Check the electric fuel pumps.	every 1000 hr.		MM II (Heavy) 73-00-00 sec. 3.4.6)	
Replace the main fuel pump.	every 1000 hr.		IM sec. 14.4)	
19.) Engine test run				
Observe the safety instructions!				
Start the engine and run to operating temperature. Limits see Operators Manual 914 series. Ignition check at _____ rpm engine speed. Speed drop without ignition circuit: 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. 8)	
General note				
All Service Bulletins are complied with.		X		

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Points of Inspection	Interval Operating hours		Chapter Reference	Signature
	as indicated	100 hr.		
<p>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.</p> <p>Location, Date _____</p> <p>Inspector _____</p> <p>Aircraft mechanic _____</p> <p>Certificate No. _____</p>				

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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.

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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 float chamber venting false air intake due to defective carburetor flange carburetor icing
Ignition system (shorting cable, electronic module, charging coil) Spark plug	malfunction grounding defect wrong spark plug connection

Rough running

Rough running engine	
part	possible cause
Ignition	wiring (assignment fault)
Carburetor	fuel supply contamination in float chamber or float needle valve float chamber venting false air intake due to defective carburetor flange incorrect synchronization of the carburetor
Engine	engine temperature too low too lean carburetor jetting due to conditions prevailing in intake silencer

Engine stoppage

NOTICE

Should one of the above mentioned points 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

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Unintended engine stoppage by seizing	
part	possible cause
Camshaft bearings/Conrod bearings	rather consequential damage wear (low oil pressure)
NOTICE	The entire assembly must be dismantled, inspected and repaired.

- 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 or coolant temperature above normal operating limits (see Operators Manual) is a clear signal for a failure in the cooling system.

Cylinder head temperature or coolant temperature too high	
part	possible cause
Cooling system	not enough coolant bad venting
Return valve is not working	malfunction
Radiator	contaminated
Radiator cap	leaking
Pressure relief valve	malfunction
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. See latest Maintenance Manual of the relevant engine type.

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.

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Complete inspection of these components:	
generator	cooling system
gearbox	valve train system
engine suspension frame	exhaust system
fuel system	lubrication system
ignition system	electric starter
cylinder unit	

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

If an engine was submerged into water, all electrical components (e. g.: ignition coils, stators, spark plugs, spark plug connectors, turbocharger control unit, sensors, wiring harness) must be replaced.

NOTE: Discoloration or corrosion are signs of submerging in water.

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 carburetor jetting and of the cooling system. To do this, it is necessary to contact the aircraft manufacturer and an authorized ROTAX distributor.

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3.3) Exceeding of max. admissible engine RPM

General note **NOTES:** 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.

5800 rpm up to max. 6200 rpm

If the limit was exceeded for max. 1 minute up to 6200 rpm

Step	Procedure
1	No action is required.

5800 rpm up to max. 6200 rpm

If the limit was exceeded for more than 1 minute up to 6200 rpm

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

6200 rpm up to max. 6500 rpm

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

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

6200 rpm up to max. 6500 rpm

If the limit was exceeded for more than 1 minute up to 6500 rpm

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 and torsion. 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 for out-of-roundness and torsion. See chapter 72-00-00 of the Heavy Maintenance Manual.
5	Check if piston had contact with valve.

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Step	Procedure
6	Check roundness of valves.
7	Inspect all systems for correct functioning.
8	Detailed inspection of affected engine components.

3.4) Cooling system temperature exceeded

General note

NOTICE

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

NOTES:

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

3.4.1) Exceeding of max. cylinder head temperature (relevant for engine S/N without Suffix -01)

See latest SB-912-068.

Graphic

Overview and proceed:

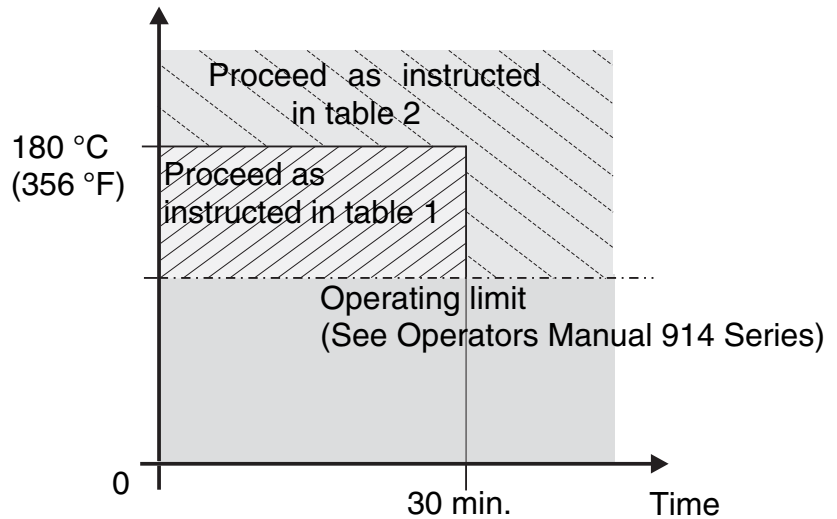


Fig. 2

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Exceeding up to
180 °C (356 °F)

Table 1.

Max. temperature exceeded up to 180 °C (356 °F) - 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. <ul style="list-style-type: none"> - Leakage check on the cooling system. - Check that the cylinder head attachment is fitted securely. If the cylinder head nut is 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.

Exceeding of
over 180 °C
(356 °F)

Table 2.

Excess temperature of over 180 °C (356 °F) and/or 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 chap. 72-00-00 in the Heavy Maintenance Manual.

3.4.2) Exceeding of max. coolant temperature (relevant for engine S/N with Suffix -01)

See latest SB-912-068.

General note

NOTICE

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

NOTES: 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.

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Grafik

Overview and proceed;:

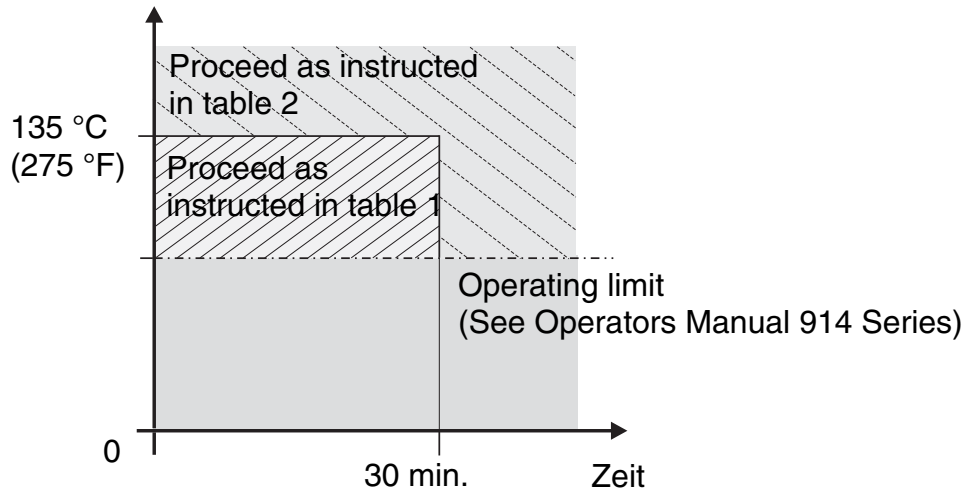


Fig. 3

07140

3.5) 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 cooling system temperature. Please observe the relevant instructions.

NOTES:

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.

Graphic

Overview and proceed;:

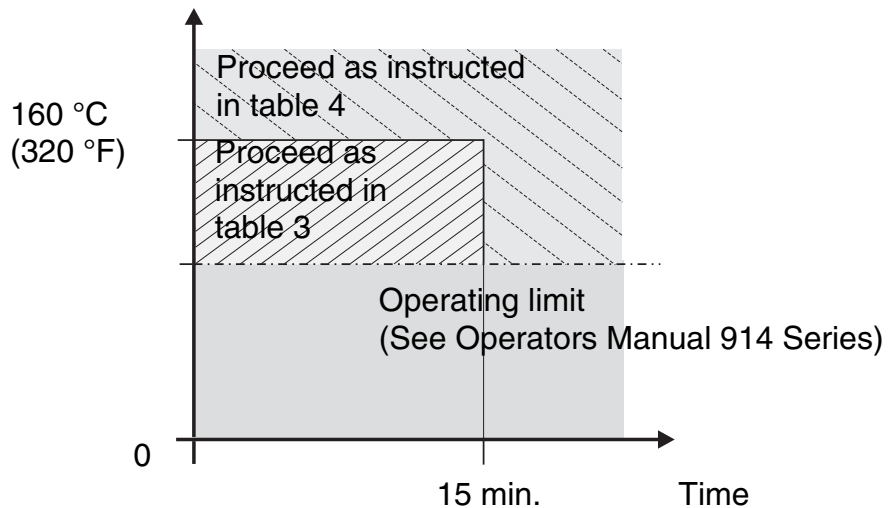


Fig. 4

07140

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

Table 3.

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

**Exceeding over
160 °C (320 °F)**

Table 4.

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

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4) 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 distributor.

NOTES: The form is also available from the official ROTAX AIR-CRAFT ENGINES Homepage in electronic version.

www.FLYROTAX.com

Register: **Document type/Diverses**

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NOTES

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3) Visual inspection

General note General visual inspection of the engine for damage or abnormalities. For definition and scope of visual inspection (See chap. 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 and turbocharger with attachment

Notes on turbocharger:

Step	Procedure
1	Only a visual inspection is necessary.
2	Check compressor impeller for mechanical damage and free movement.
3	Carry out visual inspection of compressor and turbo housing for cracks.
4	Turbocharger unit - see 76-00-00 of the Heavy Maintenance Manual.

- Engine suspension frame - see 71-00-00 of the Heavy Maintenance Manual
 - Heat protection hoses
Check the two heat protection hoses (water pump - cylinder head 1 and 2) for mechanical damage.
 - Fuel and oil lines - see 73-00-00 of the Heavy Maintenance Manual
 - Fuel pumps
 - Servo motor - see 76-00-00 of the Heavy Maintenance Manual
 - Pressure sensors
 - Heat protection plates
 - Wiring harness
 - Venting hoses (carburetor, oil tank)
 - Cooling air duct and cooling fins of the cylinder
 - Oil filter
-

Condensation trap NOTES: Only fitted on engines with airbox of older model.
There is a condensation trap between the airbox and the pressure sensor. It must be replaced when it fills with condensation.

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Pressure connecting lines

See Fig. 4. See 73-00-00 of the Heavy Maintenance Manual

WARNING

As a failure of the pressure connecting lines (1) between the airbox, float chambers, fuel regulator and pressure sensor is almost certain to cause engine stoppage, they must be checked with especial care.

- Airbox - fuel pressure regulator
- Airbox - pressure sensor
- Airbox - reversing valve
- Reversing valve - 2x Float chamber ventilation

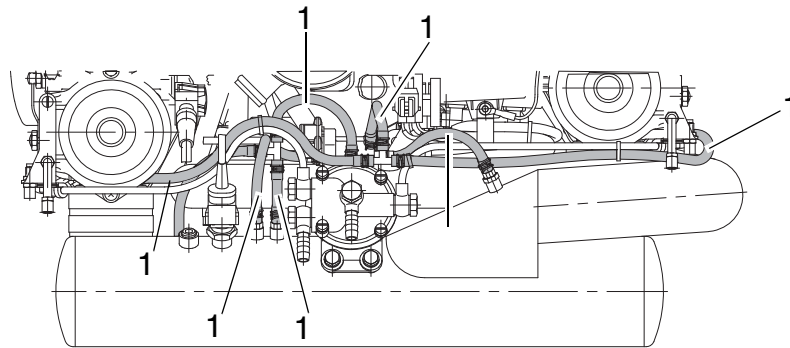


Fig. 4

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4) 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.

Leakage

NOTES: If a leak is suspected, then the following check is possible:

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.

NOTICE

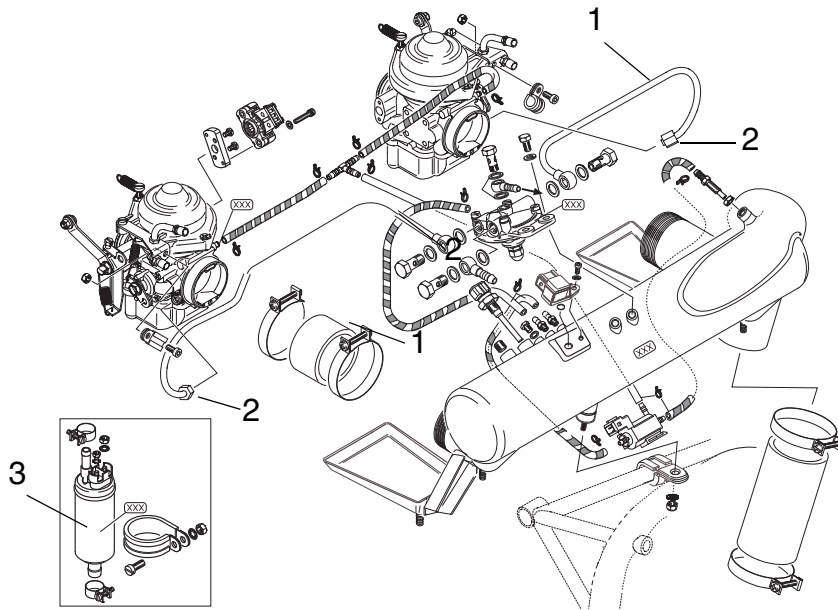
Avoid overstretching the fixing elements. Always comply with the specified torque!

On steel fuel lines in the area at connections (fittings) (2) a detailed visual inspection is necessary. See [Fig. 5](#).

BRP-Powertrain
MAINTENANCE MANUAL

Graphic

Connections and fuel lines



Part	Functions
1	Fuel lines (Steel)
2	Connections (Fittings)
3	Fuel filter

Fig. 5

07069

Fuel pump

Inspect the 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 and the suction oil line from the turbocharger to the oil pump (especially in the area of the fixation screw).

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.

12.4) Checking of the float chamber

General note See [Fig. 24](#).



WARNING

Risk of Burns!

Hot engine parts!

Always allow engine to cool down to ambient temperature before start of any work.

Instruction

To check of the float chamber the following steps are necessary:

Step	Procedure
1	Remove drip tray (1).
2	Open attachment screw (2).
3	Remove float chamber (3) with gasket (4) and both floats.
4	Remove both floats (5) from the float chamber.
5	Inspect the float chamber for contamination and corrosion.

NOTICE

If any contamination on float chamber the find out what the cause is and take corresponding action to rectify the problem. Inspect and clean the complete fuel system including carburetor.

Step	Procedure
6	Assembly of the float chamber should be carried out analogously the disassembly.
7	Adjust with the idle speed adjustment. See chap. 12-20-00 section: 12.5 .

12.4.1) Wiegekontrolle der Schwimmer

Mittels Wiegekontrolle kann festgestellt werden, ob die betroffenen Schwimmer Kraftstoff aufgenommen haben. Dies ist natürlich nur aussagekräftig, sofern die Schwimmer bereits mit Kraftstoff in Kontakt waren.

HINWEIS: Bei neuen, noch nicht mit Kraftstoff in Verbindung gebrachten Ersatzteilen, muss diese Prüfung nicht durchgeführt werden.

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Schritt	Vorgehen
1	Schwimmer 1-2 Minuten an der Luft trocknen. Nur im trockenen Zustand wiegen.
2	Bei sämtlichen betroffenen Schwimmer mittels kalibrierter Waage das Summengewicht beider Schwimmer ermitteln. Messgenauigkeit der Waage 0,1 g oder besser.
3	Die Werte der Messung sind in den Wartungsunterlagen zu vermerken. Das max. zulässige Gesamtgewicht (beider Schwimmer gemeinsam) beträgt 7 Gramm.

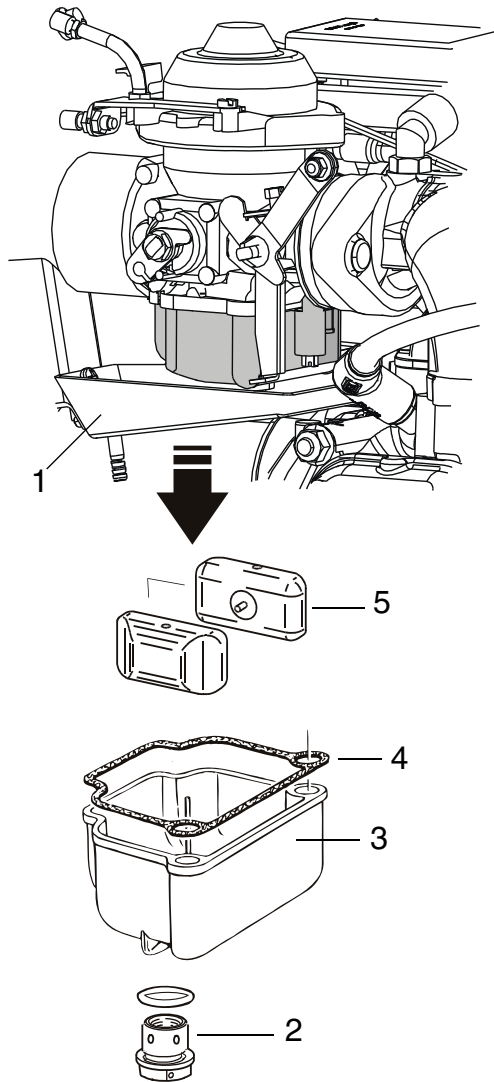
NOTICE

Sämtliche Schwimmer, die den Wert überschreiten, sind ausnahmslos zu erneuern.

BRP-Powertrain
MAINTENANCE MANUAL

Graphic

Float chamber



Part	Function
1	Drip tray
2	Attachment screw
3	Float chamber
4	Gasket
5	Float

Fig. 24

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12.5) Idle speed adjustment

General note See Fig. 23.

NOTICE

If satisfactory idle speed adjustment cannot be achieved, inspection of the idle jet or additional pneumatic synchronization will be necessary.
See chap. 12-20-00 section: 12.3).

Idle adjustment Always carry out idle speed adjustment when the engine is warm.

- Basic adjustment of the idle speed is first effected using the idle speed adjustment screw (2) of the throttle valve.
See chap. 12-20-00 section: 12.2).

Optimizing engine running Necessary only if not taken care of at synchronization.

Step	Procedure
1	Close idle mixture screw (4) by turning clockwise to screw in fully and then opening again by 1.5 turns counter clockwise.
2	Starting from this basic adjustment, the idle mixture screw (4) is turned until the highest idle speed is reached.
3	The optimum setting is the middle between the two positions at which an rpm. drop is noticed.
4	Then readjustment of the idle speed is carried out using the idle speed adjustment screw (2) and if necessary, by slightly turning the idle mixture screw again. NOTES: Turning the idle mixture control screw in clockwise direction results in a leaner mixture and turning counter clockwise in a richer mixture.

12.6) Checking the carburetor actuation

General note

See [Fig. 25](#).

Route bowden cables in such a way that carburetor actuation will not be influenced by any movement of engine or airframe, thus possibly falsifying idle speed setting and synchronization.

NOTES: Each carburetor is actuated by two bowden cables. At position (1) connection for throttle valve, and at position (2) connection for choke actuation.

 **WARNING**

Risk of life threatening injuries caused by propeller!
Adjust bowden cables so that the throttle valve and the choke actuation of the starting carburetor can be fully opened and closed. Bowden cables and lever must not jam!

 **WARNING**

Risk of life threatening injuries caused by propeller!
With carburetor actuation not connected, the throttle valve is fully open. The initial position of the CD carburetor is **full throttle!** So never start the engine with the actuation disconnected.

Procedure

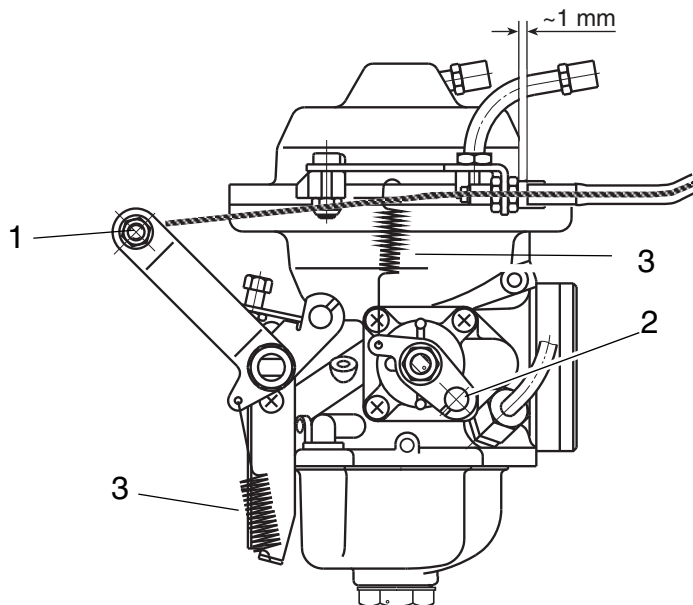
To test the carburetor actuation the following steps are necessary:

Step	Procedure
1	Inspect bowden cables and levers for free movement.
2	Bowden cable must allow full travel of lever from stop to stop.
3	Adjust throttle cables to a clearance of 1mm (0.04 in).
4	Inspect and lubricate linkage on carburetor and carburetor joints with engine oil.
5	Inspect return springs (3) and inspect engagement holes for wear.

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 MAINTENANCE MANUAL

Graphic

Checking the carburetor actuation



Part	Function
1	Connection for throttle valve
2	Connection for choke actuation
3	Return springs

Fig. 25

02480

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13.2) Oil change

Procedure

NOTES: 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 chap. 12-10-00 section: 4.1).
2	Remove safety wire and oil drain screw from the oil tank, drain the used oil and dispose of as per environmental regulations.
3	Replace oil filter at each oil change and inspect the filter components. See chap. 12-20-00 section: 13.5).
4	After inspection dispose the oil filter components according to environmental regulations.
5	Fit drain screw (M12x12) with a new sealing ring and safety wire. Tightening torque 25 Nm (18.5 ft.lb). NOTES: When installing the oil drain screw one has to lock the nut which is on the floor of the oil tank. This will prevent damage of the oil tank floor.

NOTICE

Only use brand name oil in accordance with the latest Operators Manual and SI-914-019, "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).

Step	Procedure
6	Pour in approx. 3l (0.8 gal (US)) of fresh oil.
7	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.
8	Compressed air must not be used to blow through the oil system (or oil lines, oil pump housing, oil bores in the housing).

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13.3) 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

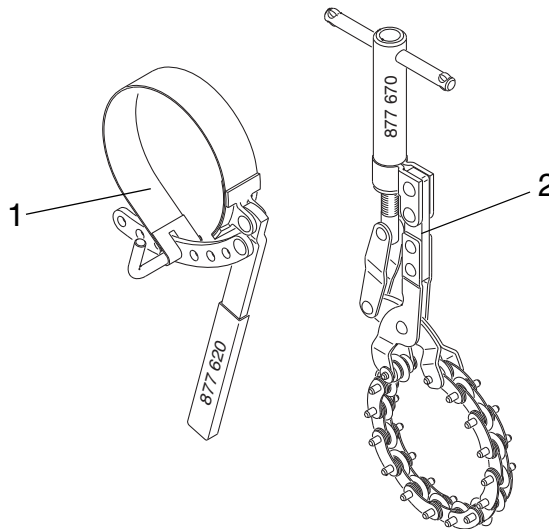


Fig. 27

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Procedure

Unscrew the oil filter.

Step	Procedure
1	Unscrew the oil filter with the oil filter wrench.

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13.4) Install oil filter

General note See Fig. 28.

NOTICE

After test run inspect tight fit of oil filter.

Procedure

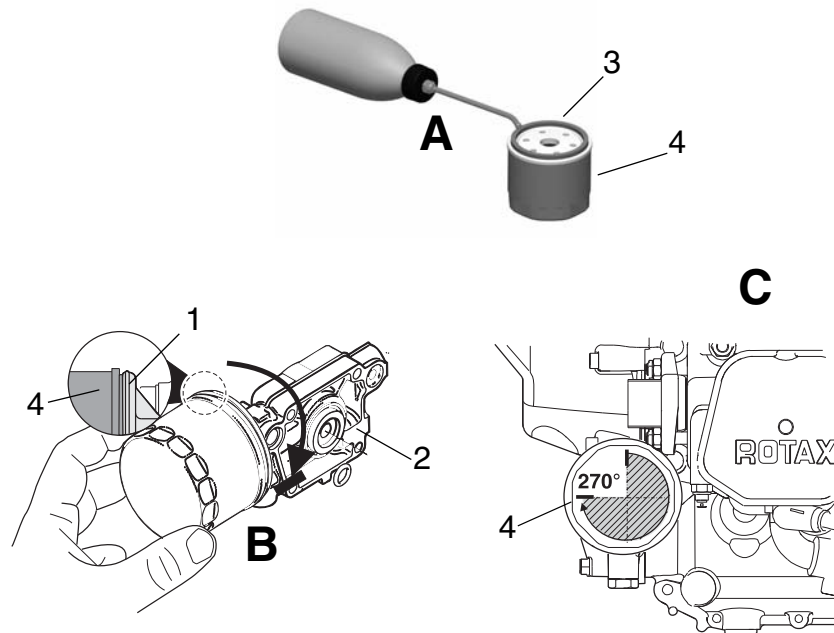
To mount the oil filter the following steps are necessary:

Step	Procedure
1	Clean the contact surface (1) of the oil pump housing (2) with a clean cloth.
2	Apply thin film engine oil on the gasket (3) of the oil filter (4).
3	Install the oil filter on the engine.
4	Screw on oil filter until oil filter gasket is seated solidly.
5	Tighten oil filter with a 3/4 turn (270°).

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. 28

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13.5) Inspection of the filter components

General note

NOTICE

The filter components must be inspected carefully.

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	Cut oil filter open using special tool taking care not to produce chips.
2	Remove anti-drain membrane.
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 matt with a clean magnet and inspect for metal.
7	Inspect filter housing at the contact surfaces for increased wear.
8	Check both springs of oil filter for increased wear.
9	Check anti-drain membrane for damage in the area of filter contact.

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 chap. 12-20-00 section: 10).
4	Inspect the oil filter once more.

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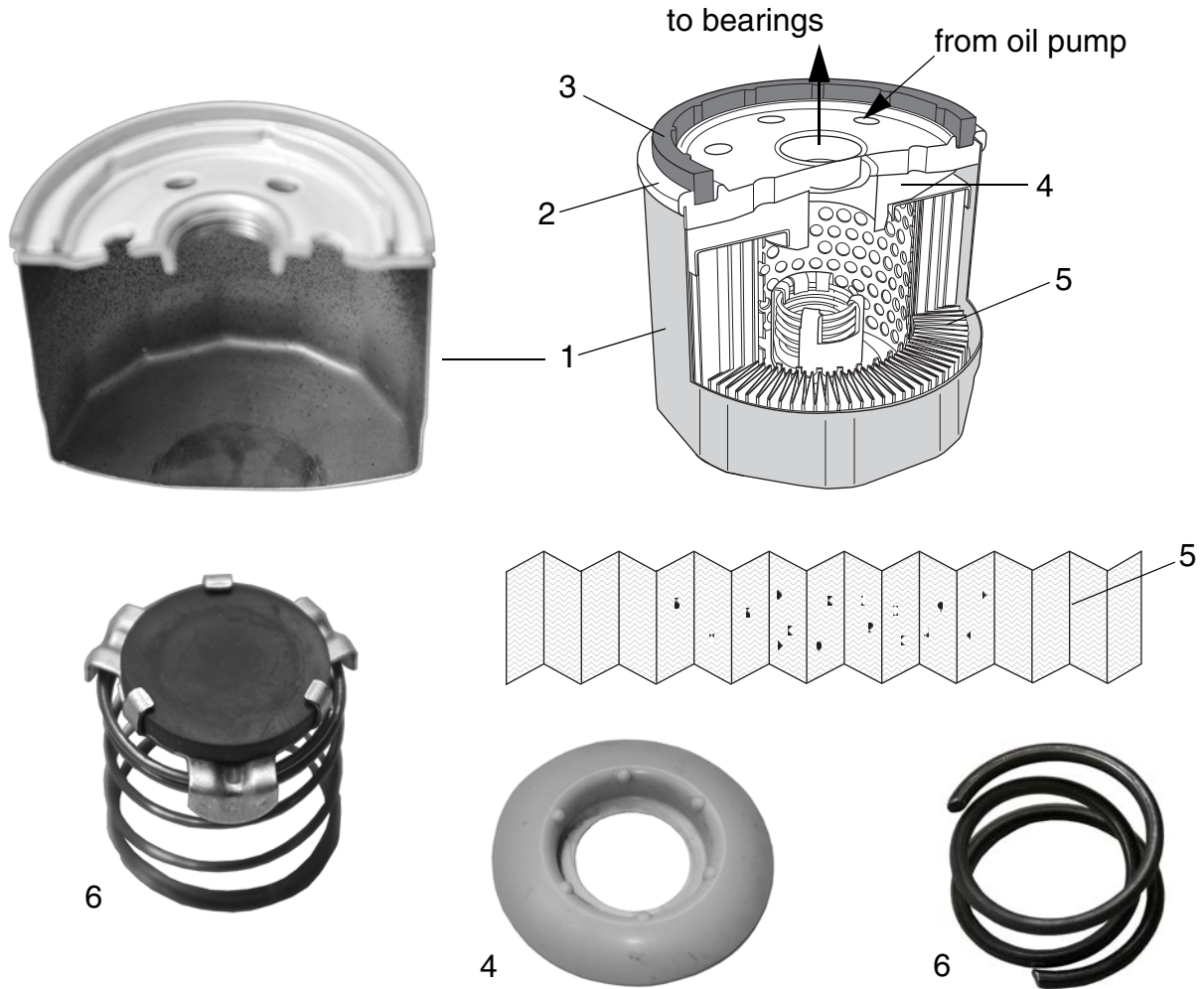
Contaminated

NOTICE

If the oil circuit is contaminated, replace the oil cooler and flush the oil circuit. See chap. 12-20-00 section: 15). Proper judgement requires years of experience in repair of piston engines.

| Graphic

Oil filter



Part	Function	Part	Function
1	Filter housing	4	Anti-drain membrane
2	Filter cover	5	Filter mat
3	Gasket ring	6	Springs

Fig. 29

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13.6) Cleaning the oil tank

See Fig. 30.

General note

NOTES: This procedure is optional and requires venting of the oil system. See chap. 12-20-00 section: 13.7).
It is only necessary to clean the oil tank and the inner parts if there is heavy oil contamination.

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 can cause engine faults or engine damage.

Step	Procedure
4	Fit drain screw (1) M12x12 with a new gasket ring. Tighten to 25 Nm (18.5 ft.lb).
5	Safety wire.
6	Reassemble the oil tank by following the same steps in reverse order.

14) Inspecting the magnetic plug

General note

See [Fig. 31](#).

NOTES:

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. 31](#) can be tolerated if the accumulation is below 3 mm (0.125 in).

Steel chips in larger numbers

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

Unclear findings

In the case of unclear findings:

Step	Procedure
1	Flush the oil circuit.
2	Fit a new oil filter.
3	Install magnetic plug.
4	Engine test run. See chap. 12-20-00 section: 10).
5	Check magnetic plug once again.
6	Check oil filter once again.

Contamination

NOTICE

If the oil circuit is contaminated, replace the oil cooler and flush the oil circuit.

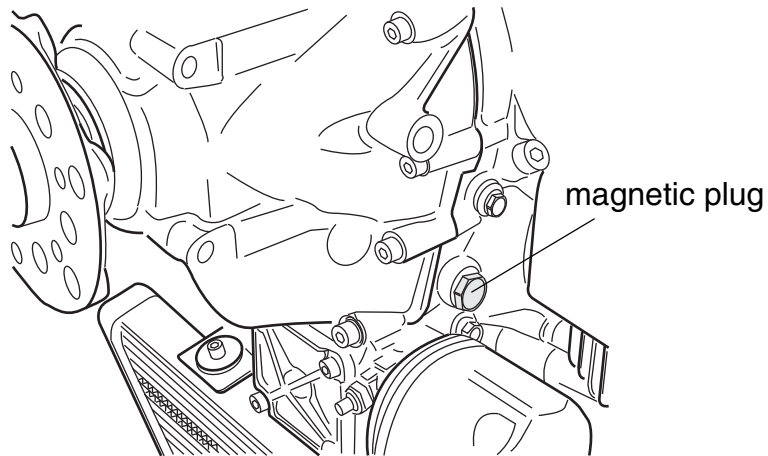
See chap. 12-20-00 section: [15](#)). Detailed inspection of affected engine components.

Trace the cause and remedy.

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Graphic

Inspecting the magnetic plug.



acceptable

not acceptable

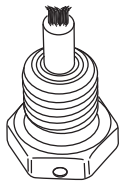


Fig. 31

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14.1) Installation of the magnetic plug

Install

The following steps are necessary:

Step	Procedure
1	Clean the magnetic plug.
2	Refit the magnetic plug. Tightening torque 25 Nm (18.5 ft.lb).
3	Safety wire the plug.

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

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