

MAINTENANCE MANUAL (LINE MAINTENANCE) FOR ROTAX® ENGINE TYPE 915 I A SERIES

ref. no.: MML-915 i A | part no.: 898863

picture: ROTAX[®] 915 i A with options

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

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In any case the original text in English language and the metric units are authoritative.

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Chapter: INTRO GENERAL NOTE

Foreword Before carrying out maintenance work on the engine, read this Maintenance Manual carefully.

If any passages of the Manual are not clearly understood or in case of any questions, please contact your nearest ROTAX® Authorized Aircraft Engines Distributors or their independent Service Centers.

BRP-Rotax wishes you much pleasure and satisfaction flying your aircraft powered by this ROTAX®-aircraft engine.

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.

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Chapter: LEP LIST OF EFFECTIVE PAGES

Each new revision to the Maintenance Manual Line will have a new List of Effective Pages.

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	page		05-00-00	1	June 01 2019
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Chapter: TOA TABLE OF AMENDMENTS

Approval*

The technical content of this document is approved under the authority of DOA ref. EASA.21J.048. This document is part of the ICA for product [2019].

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.

Edition 0/Rev. 0 December 01 2017

Obsolete with Revision 1, which is a complete re-revision

Rev. 1 June 01 2019

Rev. no.	chapter	page	date of change	remark for approval	date of approval	date of inclusion	signature
					authori- ties		
0	INTRO	all	Dec. 01 2017	DOA*			
0	LEP	all	Dec. 01 2017	DOA*			
0	ΤΟΑ	all	Dec. 01 2017	DOA*			
0	00-00-00	all	Dec. 01 2017	DOA*			
0	04-00-00	all	Dec. 01 2017		EASA a	pproved	
0	05-00-00	all	Dec. 01 2017	DOA*			
0	05-10-00	all	Dec. 01 2017	DOA*			
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0	12-10-00	all	Dec. 01 2017	DOA*			
0	12-20-00	all	Dec. 01 2017	DOA*			
Rev. no.	chapter	page	date of change	remark for approval	date of approval	date of inclusion	signature
					from authori- ties		
1	LEP	all	June 01 2019	DOA*			
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1	00-00-00	7, 12, 14	June 01 2019	DOA*			

Rev. no.	chapter	page	date of change	remark for approval	date of approval from authori- ties	date of inclusion	signature
1	05-00-00	4,6 - 10	June 01 2019	DOA*			
1	05-10-00	3	June 01 2019	DOA*			
1	05-20-00	2, 6, 8–13	June 01 2019 June 01 2019	DOA* DOA*			
1	05-50-00	2,4,6,10, 13, 26,27,33	June 01 2019 June 01 2019 June 01 2019	DOA* DOA* DOA*			
1	12-10-00	3	June 01 2019	DOA*			
1	12-20-00	9,14,15,- 25,30, 31,35,41, 44–46	June 01 2019 June 01 2019 June 01 2019 June 01 2019	DOA* DOA* DOA* DOA*			

Summary of amendments

Rev. no.	chapter	page	date of change	comment
1 1 1 1 1 1 1	00-00-00 00-00-00 05-20-00 05-20-00 05-50-00 12-20-00 12-20-00	7 14 2, 6 8–13 6 33 30, 31 44, 45	June 01 2019 June 01 2019	New: Wiring color code change of text change of table change of table Warning: change of text change of text change of text, new figure New: Checking and cleaning plug screw (turbo oil sump assy.)

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

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Chapter: 00–00–00 GENERAL NOTE

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GENERAL

Purpose	The purpose of this Manual is to provide aircraft manufacturers with technical require- ments (e.g. interface descriptions and limitations) that must be adhered to when installing this type of engine into an aircraft or certifying aircraft powered by this engine type. Fur- thermore it should allow independent ROTAX® Maintenance Technicians (iRMT) to install this engine into an airframe in compliance with the relevant installation and safety instruc- tions provided by the engine manufacturer.
	For detailed information related to aircraft and aircraft/engine installation, maintenance, safety or flight operation, consult the documentation provided by the aircraft manufacturer and/or its dealer.
	For additional information on engines, its maintenance or parts, you can also contact your nearest ROTAX® authorized Aircraft Engine Distributor or their independent Service Center.
ROTAX Distributors	For ROTAX® Authorized Distributors for aircraft engines see latest Operators Manual or the official website www.FLYROTAX.com.
Engine serial number	When making inquiries or ordering parts, always indicate the engine serial number. Due to continuous product improvement, engines of the same engine type might require different support and spare parts. The engine serial number is on top of the crankcase, behind the propeller gearbox.
	Cyl. 1 Cyl. 3



Figure 1.1: Engine serial number

1 Engine serial number

ABBREVIATIONS AND TERMS

Abbreviations	Description
*	Reference to another section
•	center of gravity
۵	The drop symbol indicates use of sealing agents, adhesives or lubri- cants (only in the Illustrated Parts Catalog).
°C	Degrees Celsius (Centigrade)
°F	Degrees Fahrenheit
rpm	Revolutions per minute
A	Ampere
AAPTS	Ambient Air Pressure Temperature Sensor
AC	alternating current
AD	Airworthiness Directives
Ah	Ampere hour
A/C	Aircraft
AR	as required
assy.	assembly
ASB	Alert Service Bulletin
ACG	Austro Control GmbH
ACL	Anti Collision Light
API	American Petrol Institute
ASTM	American Society for Testing and Materials
ATA	Air Transport Association
AWG	American Wire Gauge
CAN	Controller Area Network
Coil 1–4	Ignition coils 1–4
CPS 1+2	Crankshaft Position Sensor 1+2
CSA	Constant Speed Actuator
CTS	Cooling Temperature Sensor
CW	clockwise
CCW	counter-clockwise
CGSB	Canadian General Standards Board



DCDI	Dual Capacitor Discharge Ignition
DC	direct current
DOA	Design Organisation Approval
DOT	Department of Transport
EASA	European Aviation Safety Agency
IM	Installation Manual
ECU	Engine Control Unit
EGT	Exhaust Gas Temperature
INTRO	Introduction
EMS	Engine Management System
EMS GND	Engine system internal ground reference which is intended to be dis- connected from aircraft common ground during flight
EMC	Electromagnetic compatibility
EN	European Standard
ETFE	Ethylene Tetrafluoroethylene
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FOD	Foreign object damage
Fuse box	Power conditioning and distribution for the Engine Management System
hr.	hours
HIC A	Harness Interface Connector A
HIC B	Harness Interface Connector B
IAT	Indicated Air Temperature
ICA	Instructions for Continued Airworthiness
IFR	Instrument Flight Rules
IFSD	In-flight-shutdown
INJ 1–8	Injector 1–8
IPC	Illustrated Parts Catalog
ips	inch per second
iRMT	independent ROTAX Maintenance Training
ISA	International Standard Atmosphere

kg	Kilograms
KNOCK	Knock sensor
Lane A	System A of Engine Management System
Lane B	System B of Engine Management System
LOPC	Loss of power control
MAPS 1 & 2	Manifold Air Pressure Sensor 1 & 2
MATS 1 & 2	Manifold Air Temperature Sensor 1 & 2
MON	Motor Octane Number
MAG	Magneto Side
N	Newton
n.a.	not available
NDT	Non Destructive Testing
Nm	Newtonmeter
NVFR	Night Visual Flight Rules
OAT	Organic Acid (Additive) Technology
ОНМ	Overhaul Manual
OHV	Over Head Valve
ОМ	Operators Manual
OPS	Oil Pressure Sensor
OTS	Oil Temperature Sensor
PCD	Pitch Circle Diameters
PCV	Pressure Control Valve
PMA	Permanent magnet alternator
POA	Production Organisation Approval
PS	Power supply
PTFE	Polytetrafluoroethylene (Teflon)
PTO	Power Take Off
Rev.	Revision
ROTAX®	is a trademark of BRP-Rotax GmbH & Co KG
RON	Research Octane Number
RON 424	ROTAX® Standard 424
S.V.	still valid (only Illustrated Parts Catalog)



S/N	Serial Number
SAE	Society of Automotive Engineers
SEP	Single Engine Piston
SB	Service Bulletin
SI	Service Instruction
SI-PAC	Service Instruction Parts and Accessories
SPST	Single pole single throw
STP	Shield twisted pair
SL	Service Letter
SMD	Surface Mounted Devices
ТВО	Time Between Overhaul
тс	Type certificate
part no.	part number
ΤΟΑ	Table Of Amendments
TOC	Table of content
TPS	Throttle Position Sensor
TSN	Time Since New
TSNP	Time Since New Part
TSO	Time Since Overhaul
V	Volt
VFR	Visual Flight Rules
LEP	List of Effective Pages
MM	Maintenance Manual
MEP	Multi Engine Piston
Х3	Connector on Engine Management System wiring harness which serves as an interface for power supply
XXXX	shows the serial component number

WIRING COLOR CODES

IEC 60757

Color codes (wiring)

black brown red orange	BK BN RD OG
yellow green blue	 YE GN BU
violet gray white	 VT GY WH
pink turquois	 PK TQ
Light blue Dark blue	 LBU DBU
gold silver	 GD SR
green-yellow	 GNYE 10336

Figure 1.2



CONVERSION TABLE

Units of length:	Units of power:
1 mm = 0.03937 in 1 in = 25.4 mm 1 ft = 12 in = 0.3048 m	1 kW = 1.341 hp 1 hp = 0.7457 kW 1 kW = 1.3596 PS 1 PS = 0.7355 kW
Units of area:	Units of temperature:
1 cm² = 0.155 sq. in (in²) 1 sq. in (in²) = 6.4516 cm²	K = °C – 273,15 °C = (°F – 32) / 1,8 °F = (°C x 1.8) +32
Units of volume:	Units of velocity:
1 cm ³ = 0.06102 cu in (in ³) 1 cu in (in ³) = 16.3871 cm 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	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:	spec. fuel consumption:
1 kg = 2.2046 lbs. 1 lb. = 0.45359 kg	1 g/kWh = 0.001644 lb/hph 1 lb/hph = 608.277 g/kWh
Density:	Units of torque:
1 g/cm ³ = 0.016018 lb/ft ³ 1 lb/ft ³ = 62.43 g/cm ³	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:	Cable cross-section: Conversion table- Wire Gauge: AWG-mm ²
1 N = 0.224809 lbf 1 lbf = 4.4482 N	AWG> mm ² 4> 21
Units of pressure:	6> 13 8> 8.4
1 Pa = 1 N/m² 1 bar = 100 000 Pa / 1000 hPa / 100 kPa 1 bar = 14.503 lbf/in² (psi) 1 in Hg = 33.8638 hPa	$10 \longrightarrow 5.3$ $12 \longrightarrow 3.3$ $14 \longrightarrow 2.1$ $16 \longrightarrow 1.3$ $18 \longrightarrow 0.8$ $20 \longrightarrow 0.52$

SAFETY NOTICE

Although reading such information does not eliminate any hazards, it promotes understanding, and applying of the information will promote correct use of the engine. Always apply common workshop safety rules.

The information and descriptions of components and systems contained in this Manual are correct at the time of publication. BRP-Rotax maintains a policy of continuous improvement of its products without imposing upon itself any obligation to retrofit products previously manufactured.

- **Revisions** BRP-Rotax reserves the right to remove, replace or discontinue any design, specification, feature or other at any time, and without incurring obligation.
- **Measurement** Specifications are given in the SI metric system with the imperial- and US customary measurement system equivalents in parenthesis.
- **Symbols used** This Manual uses the following symbols to emphasize particular information. This information is important and must be observed.

Identifies an instruction which, if not followed, may cause serious injury or even fatal injury.

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

ATTENTION

Identifies an instruction which, if not followed, may severely damage the engine or could void any warranty.

NOTE

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

ENVIRONMENTAL NOTE

Environmental notes give you tips on environmental protection.

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



SAFETY INFORMATION

Use for intended purpose

A WARNING

Non-compliance can result in serious injuries or death!

The user has to assume all risks possibly arising from utilizing auxiliary equipment.

▲ WARNING

Non-compliance can result in serious injuries or death!

Never fly the aircraft equipped with this engine at locations, air speeds, altitudes or in other situations which do not allow a successful no-power landing after sudden engine stoppage.

- This engine is not suitable for aerobatics (inverted flight, etc.). Flight attitudes outside the permissible limits are not allowed
- This engine has exclusively been developed and tested for fixed wing, gyrocopter, pusher and tractor applications. In case of any other usage, the OEM is responsible for testing and the correct function of the engine
- It should be clearly understood that the choice, selection and use of this particular engine on any aircraft is at the sole discretion and responsibility of the aircraft manufacturer, assembler or owner/user
- Due to the varying designs, equipment and types of aircraft, BRP-Rotax grants no warranty on the suitability of its engines use on any particular aircraft. Further, BRP-Rotax grants no warranty on this engines suitability with any other part, component or system which may be selected by the aircraft manufacturer, assembler or user for aircraft application

A WARNING

Non-compliance can result in serious injuries or death!

For each use of DAY VFR, NIGHT VFR or IFR in an aircraft the applicable legal requirements and other existing regulations must be adhered to.

- In addition to observing the instructions in our Manual, general safety and accident precautions, 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 shall be applied
- For continued airworthiness see Maintenance Manual Line
- Unauthorized modifications of engine or aircraft will automatically exclude any liability of the engine manufacturer for consequential damage



- **Engine operation** The engine must always be operated according to the content of the latest Operators Manual
 - To eliminate the risk of injury or damage, ensure any loose equipment or tools are properly secured before starting the engine
 - The use of propellers and their fastenings which exceed the specified values of moment of inertia and imbalance is not allowed and releases the engine manufacturer from any liability
 - Improper engine installation, use of unsuitable piping for fuel, cooling and lubrication system and use of unsuitable wiring for electric and engine management system releases the engine manufacturer from any liability



INSTRUCTION

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

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

These instructions should cover explanation of the technical context, advice for operation, maintenance, installation, 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-Rotax. Modifications are only allowed after consent of the engine manufacturer.

Spare parts



See Illustrated Parts Catalog, latest issue for the respective engine type.

ATTENTION

Only use GENUINE ROTAX® spare parts. Spare parts must meet the requirements defined by the engine manufacturer. This can only be guaranteed when using GENUINE-ROTAX®-spare parts and/or accessories. Spare parts are available at ROTAX® Authorized Distributors and their independent Service Centers. Any warranty by BRP-Rotax will become void if spare parts and/ or accessories other than GENUINE-ROTAX®-spare parts and/or accessories are used (see latest Warranty Conditions).

See relevant Service Letter on www.FLYROTAX.com

Standard tools / Special tools

ATTENTION

Only use tools and appliances which are suitable for the relevant task according to the latest Manuals.

State of delivery

A WARNING

Engine and gearbox are delivered in "dry" conditions (without fuel, oil and coolant). Before putting the engine into operation it must be filled with oil and cooling liquid. Use

only oil and coolant as specified.





See latest Operators Manual and Service Instruction SI-915 i-001 "Selection of suitable operating fluids", current issue.

MAINTENANCE CONCEPT

General note	The maintenance functions detailed in this Manual are divided into two categories:
	Maintenance I (Line Maintenance)
	Maintenance II (Heavy Maintenance)
	Repairs beyond the levels detailed in Manual I and Maintenance Manual II are not recom- mended as maintenance functions and must be conducted by an authorized overhaul facility.
Maintenance I (Line Maintenance)	Chapter 00,05 and 12
,	The scope of line maintenance consists of servicing and adjustment of engine compo- nents (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 nor- mally considered beyond the scope of the "Line Maintenance".
	NOTE
	This Manual can only be used in combination with Maintenance Manual I (Line Maintenance), as it builds upon it.

TECHNICAL DOCUMENTATION

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

The information contained herein is based on data and experience that are considered applicable for authorized mechanics (iRMT, see Maintenance Manual Line) under normal conditions for engine removal and installation. Concerning design of engine installation in depth knowledge of aircraft design is required.

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

Documentation

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

Service Letter

Service Instruction / Service Instruction-Parts and Accessories



- Status The status of the Manuals can be determined by checking the table of amendments. The first column of this table indicates the revision status, which should be compared with the revision provided on the ROTAX®-Website: www.FLYROTAX.com Amendments and current versions can be downloaded free of charge.
- Replacement
pagesFurthermore the Manual is constructed in such a way that single pages can be replaced
instead of the complete document. The list of affected pages is given in the chapter LEP.
The particular edition and revision number is given on the footer of each page.

Reference This Manual is only part of the technical documentation and will be supplemented by the respective Operators Manual, Maintenance Manuals and Illustrated Parts Catalog.

ATTENTION

Pay attention to references to other documentation, found in various parts of this Manual.

If not stated otherwise, any reference to a document refers to the latest edition issued by BRP-Rotax.



This symbol informs you of additional references (data sheets, Manuals, etc.) associated with the given subject.



Illustrations The illustrations in this Manual are merely sketches and show typical arrangements. They may not represent full detail or the exact shape of the parts but should outline the same or similar function. Therefore deriving dimensions or other details from illustrations is not permitted. TYPICAL indicates a general view which may not represent exact details. NOTE The Illustrations in this Manual are stored in a graphic database system and are provided with a consecutive, irrelevant, number. This number (e.g. AE 5iS001) is of no significance for the content. Some measurements are given in the drawings, these are manufacturing dimensions and are subject to corresponding tolerances. Installation Installation drawings and a DMU-model for (virtual) installation analysis are available from the ROTAX® Authorized Distributors or their independent Service Centers on special redrawings quest and relevant non disclosure and copyright regulations. The illustrations in this Manual show a possible installation variant including non certified parts.

USE FOR INTENDED PURPOSE

	Explosion hazard. Flying components can cause serious injuries. Never run an engine without propeller.			
Use	The engine ROTAX® 915 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® 915 iSc A has been tested as per aeronautical standards for safety and time between overhaul. It was developed to conform to the latest technological standards and has been rigorously tested.			
Non certified engines	The ROTAX® 915 iS A is not certified. These engines have not received any aeronautica standards or regulatory safety or durability testing, and do not conform to any aircraft standards. These engines are meant for use in experimental, uncertificated aircraft and vehicles only in which an engine failure will not compromise safety.			
	NOTE			
	These engines are technically equivalent to certified engines and have been man- ufactured by BRP-Rotax using the same quality assurance system.			
Engine stoppage	In using the engine the operator assumes all risk of use and acknowledges 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 re- liability of the engine and can increase the durability of the engine.			



Chapter: 04–00–00 AIRWORTHINESS LIMITATIONS

TOPICS IN THIS CHAPTER

	Approval						
THE AIRWORTHINESS LIMITATIONS SECTION IS APPROVED BY THE EUROPEAN AVIATION SAFETY AGENCY (EASA) IN ACCORDANCE WITH PART 21A.31(a)(3) AND FAR 33.4. ANY CHANGE TO MANDATORY REPLACEMENT TIME, INSPECTION INTERVAL, AND RELATED PROCEDURES CONTAINED IN THIS AIRWORTHINESS LIMITATIONS SECTION MUST ALSO BE APPROVED.							
rev. no.	chapter	page	date of change	remark for approval	date of approval from authori- ties	date of issue	signature
0	04–00–00	all	Dec. 01 2017		EASA a	pproved	

Introduction This chapter 04-00-00 provides information about "Airworthiness Limitations".

Airworthiness Limitations

For the ROTAX® engine type 915 i A Series the airworthiness limitations are not applicable.

NOTE

- NONE

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 required by the authorities in order to ensure Continued Airworthiness! See Chapter 05-00-00 Maintenance.

ContinuedScheduled inspections of the engine including replacement and overhaul of definedAirworthinesscomponents are required in order to ensure Continued Airworthiness of ROTAX® aircraft
engines.



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Chapter: 05–00–00 MAINTENANCE

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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.

GENERAL NOTE

	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 recommen- dation 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-Rotax parts are not verified for suitability by BRP-Rotax and thus are not authorized for use. In- stallation 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-Rotax when disassembling and assembling the engine.			

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AUTHORIZED PERSONNEL

General note	It is a requirement that all organizations or individuals possess the required special tool- ing. 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-Rotax requirements.
Requisite knowledge	Any task outlined herein may be performed if the organization or individual has met the fol- lowing 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 authorities and/or BRP-Rotax.
	or
	Experience in performing the task or
	Formal instruction from a BRP-Rotax authorized training facility or
	Instruction by an authorized BRP-Rotax 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-Rotax through its worldwide distribution network for information and guidance on any of the tasks outlined herein. See Chapter 00-00-00 section Technical Documentation.
Type-specific training	Type-specific training:
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.



PROCEDURE NOTES

General note

▲ WARNING

Non-compliance can result in serious injuries or death!

When carrying out maintenance and service work, respect without fail all safety regulations.

Ignition "OFF"

WARNING Non-compliance can result in serious injuries or death! This precautionary measure serves to avoid any injuries in case of an unintentional start of the engine. Principally ensure the following at each maintenance event Lane Select Switch Lane A "OFF" Lane Select Switch Lane B "OFF" Master Switch "OFF" Battery Backup Switch "OFF" · Disconnect battery and secure engine against unintentional operation Ignition "ON" 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 oper-

ating fluids

▲ WARNING

Risk of burns and scalds. Hot engine parts. Always allow 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.				
ΤοοΙ					
	ATTENTION				
	In order to avoid mechanical damage, always loosen or tighten screws and nuts with specified tools.				
Safety wiring					
	ATTENTION				
	If during disassembling/reassembling the removal of a safety item (e.g. safety wiring, self-locking fastener, etc.) should be necessary, it must always be replaced by a new one.				
Cleaning of parts					
	ATTENTION				
	All metal and synthetic parts should be cleaned 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 un- sure, use new parts.				
Self-securing nuts	Once loosened, always replace self-securing nuts.				
	Non-compliance can result in serious injuries or death! Exactly observe the tightening torques for screws and nuts. Overtightening or a connec- tion which is too loose 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				



TROUBLESHOOTING

General notes

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



See Chapter 4 in the Operators Manual for engine type 915 i A Series.



CONSUMABLE MATERIALS

General note

ATTENTION

Use only the specified or technically equivalent materials from BRP-Rotax 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 243 and LOCTITE 648. 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.



Consider the curing time of the sealing surface compound as stated by the manufacturers instruction.

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.	
В	897651	LOCTITE 243,blue Blue medium duty screw locking agent, oil tolerant	10 ml (0.003 gal (US))	
С	899788	LOCTITE 648 green, Green high temperature screw locking agent + retaining compound	5 ml (0.001 gal (US))	
E	297434	LOCTITE ANTI SEIZE 8151 Long-therm lubricant for shaft seals	50 ml (0.013 gal (US))	
F	ХХХ	LOCTITE 7063 For degreasing and cleaning surfaces	AR	
Н	897870	K&N FILTER OIL 99–11312	14.8 ml (0.004 gal (US))	
I	897330	Lithium-base grease Electrical insolating	250 g (0.55 lb)	
0	297997	Engine oil Aeroshell Sport Plus 4	AR	
Р	899791	LOCTITE 5910 Flange sealant provides flexibility and adhesion	50 ml (0.013 gal (US))	



No.	part no.	Description, Application	Qty.
R	297711	PU-glue For vibration damping	310 ml (0.082 gal (US))
V	297386	Locking paint	
AG	897186	SILICONE HEAT CONDUCTION COMPOUND (torque seal or whiteness paint), Application of the heat conduction compound will increase heat transfer resistance. The greaselike, temperature-resistant silicon com- pound 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)
Z	899789	LOCTITE 603 Oil tolerant retainer retaining compound, heavy-duty	10 ml (0.003 gal (US))



Figure 2.1: Consumable materials



Additional materials

ATTENTION

Use only the specified or technically equivalent materials from BRP-Rotax 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.

No.	part no.	Description, Application	Qty.		
1	n.a	1.a Cleaning agents Soak combustion chamber, piston and cylinder head with cleaning agent and remove combustion residues with a bronze brush. CASTROL "Clenvex 2000" has proved very effective. It is a solvent - cold cleaner, free of halogen, on the basis of selected fuel fractions and is biodegradable. Never use caustic or corrosive cleaning agents.			
2	n.a	Preservation oil This special oil has excellent penetrating capabil- ities and reaches even tiny gaps, its highly effective additives protect against corrosion of metal surfaces.	AR		
3	n.a	Abrasive pad for surface finishing 3M Scotch- Brite Multi Flex - very fine or ultra fine Is sold by the meter and used for manual removal of smaller rust spots or oxidation, especially for opti- mum ground connections. It is particularly suitable for removing LOCTITE from surfaces or threads to make them metallic clean. Before re-applying LOC- TITE, clean surfaces with nitrothinner or degreasing agent (CASTROL ZA 30 or OMV - SOFT SOL). When using solvents, observe the safety regula- tions for persons and the environment.	AR		
4	n.a.	Valve lapping paste This paste, produced by various manufacturers, is a fine granulate lapping paste for manual lapping of valve seats and valves. The paste is usually avail- able in 3 different granulate sizes. Use as per man- ufacturers instructions.	AR		

No.	part no.	Description, Application	Qty.
5	n.a	Compressed air blasting using a solid blasting agent This method is suitable for local and gradual very fine treatment of steel parts with rust film (propeller shaft). The MICRONORM abrasive contains no harmful substances, is approved by the competent authorities and guarantees optimum cleaning. The granulates used are of sizes 40 to 60 μ . The achiev- able surface roughness is between 0.5 to 1 μ , which corresponds to ultrafine machining of surfaces.	AR

ATTENTION

Exhaust valves and intake valves may NOT undergo a compressed air blasting treatment with solid blasting, strong abrasive material. Due to this surface treatment one does gain a microscopic surface roughness/pitting which does allow as a consequence the adhesion of fuel residues. These deposits are then involved in a chemical reaction (especially of the sulfur and lead content of AV-GAS) with the valve material. This effect may cause hot-gas corrosion on the affected parts.



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

ATTENTION

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 elements 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.



AE_912I_0125

Figure 2.2: Lock washer



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Chapter: 05–10–00 TIME LIMITS

TOPICS IN THIS CHAPTER

Definition of terms	2
Operating hours	2
Terminology	2
Time limit	3
Life cycle	
General overhaul (TBO)	
Purging the oil system.	3
Time Limit	4
Time limit for parts	5
Time limit for the coolant	6
Annual inspection	6
•	

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

DEFINITION OF TERMS

OPERATING HOURS

Definition

General Note

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.

- In aviation there are different measurement methods used as an acceptable means to record operating time elapsed.
 - BRP-Rotax does not mandate a specific method to record time elapsed as a basis for maintenance and overhaul intervals.
 - BRP-Rotax therefore relies on common practice and defers to the aircraft original equipment manufacturer and/or local regulations.

In order to prevent misunderstandings and to ensure safety, BRP-Rotax accepts any of the following methods to record operating hours:

- · mechanical hour meters such as an oil pressure switch, etc.
- electronic hour meters such as BRP-Rotax ECU, TCU, FlyDat, etc.
- "flight Hours" entered in the aircraft's Journey Log or Technical Log.
- operating hours determined by "Hobbs" or "Tach" time (if the aircraft does not have Journey or Technical Log)

NOTE

Maintenance and overhaul intervals are always dictated by the relevant method used.

NOTE

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.

TERMINOLOGY

The following terminology is used throughout this Manual, and the meanings are defined as follows:

- Inspection An inspection must be done only by certified mechanics who are approved on this engine, using permitted procedures to make an analysis of the physical condition and find defects. An inspection for condition and possible damage must be done in accordance with the accepted procedures for maintenance (refer to FAA "Advisory Circular" AC 43.13).
- **Check** A check can be done by pilots and/or mechanics who are approved on this engine and has examinations that compare condition with written standards to make sure of condition, precision and tolerances.
- TestA test is the operation of engine components, appliances or systems to make an analysis
of performance.



Effectivity: 915 i A Series Rev. 1

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.

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 if the specified time span or number of flight hours is reached (whichever comes first).

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 can 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.

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 Installation Manual for the engine type 915 i A Series Chapter 79-00-00 section Purging the lubrication system.



TIME LIMIT

General

ATTENTION

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

ATTENTION 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 Observe the storage and preservation directives! **the engine**

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 a ROTAX® authorized overhaul facility for inspection.

Engine Type description	Engine affected engine S/N	TBO Time Between Overhaul	
915 iSc	from start of production (EASA certified)	1200 h or 15 years, whichever comes first	
915 iS	from start of production (ASTM compliant)	1200 h or 15 years, whichever comes first	

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

Authorized exceeding

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 analysis).

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

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, en- gine operating hours since a previous overhaul (TSO). NOTE: This informa- tion 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.

TIME LIMIT FOR PARTS

General note

Time limit

ATTENTION This time limit must be followed independently and in addition to the visual inspections (see Chapter 05-20-00 section: Visual Inspection) of the respective components.

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

- · All rubber hoses of the cooling system (except GENUINE ROTAX® silicon hoses), which need to be checked by "on-condition" maintenance according to the instructions of continued airworthiness.
- All rubber hoses of the lubrication system which are part of the engine supply volume and if they are not in the maintenance schedule of aircraft manufacturer
- · Connecting hose of the air intake system
- V-belt
- Fuel pressure regulator assy. (only pressure regulator, not pressure regulator housing)
- Air intake hose (connection between turbocharger and airbox)



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.

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 Chapter 05-20-00 section Scheduled maintenance checks.



Chapter: 05–20–00 SCHEDULED MAINTENANCE CHECKS

TOPICS IN THIS CHAPTER

Scheduled maintenance checks 2 Unscheduled maintenance checks 3 Visual inspection 4 Maintenance schedule procedures (maintenance check list) 5 Check List/Maintenance Schedule 6 Maintenance Schedule 6 Maintenance Schedule 6 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	2	
Scheduled maintenance checks Unscheduled maintenance checks Visual inspection Maintenance schedule procedures (maintenance check list) Check List/Maintenance Schedule Maintenance Schedule Maintenance Schedule 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 partified circreft mechanic. As the party	3	
Visual inspection	n	4
Maintenance sc	hedule procedures (maintenance check list)	5
Check List/Mair	Itenance Schedule	6
Maintenance Sc	hedule	8
Introduction	The owner and/or user is primarily responsible for the maintenance and airworthiness the engine. This includes compliance with all applicable airworthiness directives.	of
	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 of the engine of the maintenance and airworthiness of the engine.	or

user should only have the maintenance work carried out by qualified engineers (corresponding to the iRMT levels).
 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.

SCHEDULED MAINTENANCE CHECKS

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

Intervals Periodic inspections are those which must be performed at 25, 100, 200, 600 hr. intervals in accordance with Chapter 05-20-00 section Maintenance Schedule. This means for example that. every 100 hr of operation a 100 hr. check must be carried out. Every 200 hr. of operation a 100 hr. and the additional checks for 200 hr. must be carried out.

	Intervals –hours						
	25 hr 100 hr 200 hr 300 hr 400 hr 600 hr 700 hr						700 hr
100 hr	Х	Х	Х	Х	Х	Х	Х
200 hr			Х		Х	Х	
600 hr						Х	



100 hr. check or annual check

• In order to demonstrate continued airworthiness, an engine must be inspected after every 100 hours of operation or 12 months.

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

Special hr. check NOTE

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

25-hr. check

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



UNSCHEDULED MAINTENANCE CHECKS

Operating limits 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.

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
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 nec- essary, replaced application of LOCTITE Anti-Seize) 	Risk of fracture, wear. Smooth engine running.



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 and Hoses	Cracks, dents, kinks, required flexibility, collapsed lines/hoses, abrasion, cleanliness, se- cure seating and other visually evident damage.
Wiring	General cleanliness; loose, corroded or broken terminals; chafed, broken or worn insula- tion; 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 and Screens	Filters and screens must be inspected for contamination and potential blockages, cleaned and replaced as required.



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.
	 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 air- craft 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/re- medial action	All discrepancies and remedial action must be recorded in a report of findings to be gener- ated 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. fuel pump, governor) and execution of SB (AD) must be entered in the engine log book, stating S/N, TSN and date.

CHECK LIST/MAINTENANCE SCHEDULE

	Identification							
AIRCRAFT								
Registration number								
Aircraft make								
Aircraft model and S/N								
Time since new								
ENGINE								
Engine type								
Engine S/N								
TSN (time since new)								
TSO (time since overhaul)								
ECU S/N								
FUSE BOX								
Used operating fluids:								
Coolant								
mixture ratio								
Fuel								
Oil								
• type								
viscosity								



Identification						
AIRCRAFT OPERATOR						
Name						
Contact						
Address						
Telephone/Fax						
E-mail						
MAINTENANCE FACILIT	Y					
Maintenance workshop						
Address						
Telephone/Fax						
E-mail						
Certificate						
This check is applicable (circle on)	25 hr.	50 hr.)1	100 hr.	200 hr.	600 hr.	1000 hr.
)1leaded fuel more than 30	% of opera	ition				
Next check due at:						hr.
				(TSN) (e	ngine hr.)



MAINTENANCE SCHEDULE

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

=

Legend:

do the task = no task required

NOTE

Х

blank

If the first 3 checks (General, Differential pressure check and Spark plug) are acceptable then continue with the maintenance schedule. If one of the first 3 checks are not acceptable, the engine must be checked and repaired in accordance with the BRP-Rotax instructions for continued

airworthiness.

	Points	of Insp	pection			Inter	val Op	erating	g hours	S	Chapter Reference	Signa- ture
* no peri ment aft operatio	* no periodic maintenance (require- ment after the first 25 hours of operation)				25*	50	100	200	600	1000		
						1) Ger	neral no	ote				
All applic are comp	able (A	Alert) Se ith and c	ervice Bu docume	ulletins nted.	Х		х					
All applicable SI-PAC (Service Instruc- tion Part and Accessories) for addition- al GENUINE-ROTAX®-parts and accessories used on the relevant air- craft are complied with and documented.			Х		Х							
				2)	Diffe	rentia	l press	ure ch	eck			
Check th tial press Test pres	e comp sure me ssure	oressior ethod.	h by the _hPa (pe	differen- si) on)			X (1	Х			12–20–00 Checking the compression	
Cvl. #	1	2	3	4								
bar/ psi	-											
⁽¹ use of operation	leaded า	fuel mo	ore than	30% of								

Points of Inspection		Inter	val Op	erating	g hour	S	Chapter Reference	Signa- ture
* no periodic maintenance (require- ment after the first 25 hours of operation)	25*	50	100	200	600	1000		
		3) Sp	ark plu	g				
Check that spark plug connectors fit tightly on the spark plugs. Minimum pull-off force is 30 N (7 lb).				Х			12–20–00 Inspection of spark plugs	
Remove all spark plugs and check for spark plug defects (deposits, melt- ing,). Check if GENUINE-ROTAX®- spark plugs are used.	X		Х				12–20–00 Remove the spark plugs	
Replacing spark plugs. ⁽² use of leaded fuel more than 30% of operation			X(2	Х			12–20–00 Installation of spark plug	
4) Inspecting the magnetic plug								
Check the magnetic plug.	X		X				12–20–00 Inspecting the magnetic plug	
	5) Ins	pecti	ng the	oil filte	r			
Remove oil filter from engine. Cut old filter without producing any metal chips and inspect following components for wear and/or missing material Filter mat: Findings:		Χ(3	x				12–20–00 Inspection of the oil filter components	
⁽³ use of leaded fuel more than 30% of operation.								
6) V	isual i	nspe	ction o	f the e	ngine			
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.	x		x				12–20–00 Visual inspection	



Points of Inspection		Inter	rval Op	erating	g hour	S	Chapter Reference	Signa- ture
* no periodic maintenance (require- ment after the first 25 hours of operation)	25*	50	100	200	600	1000		
Inspect temperature sensors and oil pressure sensor for secure fit and signs of wear.			X					
Inspect all coolant hoses of the engine for damage, including leakage, harden- ing from heat, porosity, loose connec- tions and secure attachment. Verify routing is free of kinks and restrictions.	Х		X				12–20–00 Leakage check	
Carry out visual inspection of leakage bore at the base of the water pump for signs of leakage.	Х		X				12–20–00 Leakage check	
Inspect the expansion tank for damage and abnormalities. Check coolant lev- el, replenish as necessary. Inspect ra- diator cap. Inspect protection rubber on expansion tank base for correct fit.	Х		X				12–20–00 Expansion tank, radiator cap	
Check steel fuel rails for any cracks and/or scuffing marks.	Х		х				12–20–00 Checking the fuel lines	
Inspect the wiring (wiring harness) and its connections for secure fit, damage and signs of wear.	Х			Х			12–20–00 Check of wiring	
Check the airbox (GENUINE ROTAX® part) incl. throttle body actuation. In- spect sensors for tight fit, damage from heat, damage and signs of wear.	X		X					
Inspection of the GENUINE ROTAX® exhaust system included in the standard delivery.			Х					
NOTE								
If there is no standard/genuine ex- haust system in use, the specifica- tions of the manufacturer must be observed.								

Points of Inspection		Inter	val Op	erating	g hour	S	Chapter Reference	Signa- ture
* no periodic maintenance (require- ment after the first 25 hours of operation)	25*	50	100	200	600	1000		
		7) Oi	l chang	je				
Drain oil from oil tank.	X	X(4	Х				12–20–00 Oil change, Flushing the oil circuit	
Check the oil tank and clean the oil tank if contaminated.			X ⁽⁴	Х			12–20–00 Oil change, Cleaning the oil tank	
Refill oil tank with approx. 3 litres of oil. For oil quality, see Operators Manual latest edition.	Х	X(4	X				12–20–00 Flushing the oil circuit, Purging the oil system	
Inspect and clean screen in turbo oil sump.		X(4	Х				12–20–00 Turbo sump screen	
Install new oil filter	Х	X(4	Х				12–20–00 Oil filter change	
⁽⁴ In the case more than 30% of operatio	n with	leade	d fuel e	.g.: AV	GAS 1	00 LL		
		8) Fue	el syste	em				
Inspect the fuel system on the engine side for leaks.			Х				12–20–00 Fuel system	
Inspect the fuel system for damages.			Х					
	9) Er	ngine	manag	ement	:			
Check the ECU and its mountings.					Х		12–20–00 Checking ECU	
Read out the ECU fault memory (fault and data logs).	X		Х				12–20–00 Read out the ECU data memory	
		10) Fl	JSE BC	X				
Check the FUSE BOX and its mounting.					Х			

Points of Inspection		Inter	val Op	eratinç	g hour	S	Chapter Reference	Signa- ture
* no periodic maintenance (require- ment after the first 25 hours of operation)	25*	50	100	200	600	1000		
Visual inspection of the fuses.	Х		Х					
11)	Check	king t	ne was	tegate	lever	-		
Check the wastegate lever for free run- ning and correct position	Х		Х				12–20–00 Turbocharger	
Lubricate the wastegate lever.	Х		Х				12–20–00 Turbocharger	
12) 0	hecki	ng th	e prope	eller ge	ar box	2		
Check gear set (pittings)					X		See Heavy Maintenance Chap. 72–10–00	
Check wear on tooth of overload clutches					X		See Heavy Maintenance Chap. 72–10–00	
Check overload clutches					X		See Heavy Maintenance Chap. 72–10–00	
Check wear on the intermediate shaft					Х		See Heavy Maintenance Chap. 72–10–00	
Change torsion shaft					Х		See Heavy Maintenance Chap. 72–10–00	
13)	Flush	ning ti	ne cool	ing sy	stem		•	
Flushing the cooling system if massive deposits on the expansion tank or radiator cap and/or if the coolant manufacturer required an change interval.	wher	n repla	icing the	e coola	nt		12–20–00 Flushing the cooling system	

Points of Inspection		Inter	val Op	erating	g hour	S	Chapter Reference	Signa- ture
* no periodic maintenance (require- ment after the first 25 hours of operation)	25*	50	100	200	600	1000		
	14)) Engi	ne clea	ning				
Engine cleaning.	Х		Х				12–20–20 Engine cleaning	
	15)	Liqui	d level	check				
Verify liquid level, replenish as necessary.	Х		Х				12–10–00 Fluid capacities	
16) Cheo	cking	the po	p-off v	alve			
Check the pop-off valve for 700 mbar / 10.15 PSI low-pressure and its full opening.			X				See Heavy Maintenance Chap. 73–10–00	
	17) Eng	ine tes	t run	-			
Observe the safety instructions!								
Start the engine and run to operating temperature. Limits see Operators Manual 915 i A Series LANE check at rpm engine speed. Speed drop without LANE: A (Off) rpm B (Off) rpm A/B (difference) rpm	X		X				12–20–00 Test run of engine	
Returning engine to service On the engine identified as per point 5, c Check athr. (TSN, TSO) facturer and was recorded in the Engine Location, Date Inspector Aircraft mechanic Certificate No	on the _ was ca Log bo	nrried (ook.	out acco	ording 1	to reco	tommenda	hehr. ations of the eng	ine manu-



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Chapter: 05–50–00 UNSCHEDULED MAINTENANCE CHECKS

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Introduction

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

ATTENTION

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.

ATTENTION

Observe without fail all the specified instructions.



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.

REMOVAL OF THE PROPELLER GEARBOX

Preparation Before the propeller gearbox is removed, the work described below must be carried out to identify any further malfunctions in the propeller gearbox and rectify them as part of repair work.

ATTENTION

If these checks are omitted, it may be necessary to dismantle the propeller gearbox again to rectify any faults after it has been repaired.

- General visual inspection. See Chapter 12–20–00.
- Engine cleaning. See Chapter 12-20-00.
- · Carry out an engine test run. See Chapter 12-20-00.
- Remove surrounding assemblies.
- Remove external Alternator if installed.

NOTE

The assemblies and lines are only to be removed if necessary and only as far as is necessary!

CONFIGURATION 3



Detach governor pressure oil line assy.. See Maintenance Manual Heavy Chapter 61-20-00.

CONFIGURATION 2



Detach gearbox oil line assy.. See Maintenance Manual Heavy Chapter 72-10-00.



Step	Procedure
1	Loosen M12x20 hex. screw with sealing ring.
	NOTE
	Do not remove the hex. screw completely.



Figure 5.1: TYPICAL

1 M12 Hex. screw

Step	Procedure
2	Lock the crankshaft into place. See relevant Maintenance Manual Line for the respective engine type.
3	Loosen two Hex/Torx-flange screw M8x45 and ten Sk/Torx-flange screws M6x40 from the gear cover diagonally from each other. The gear cover is held in place with two dowel pins.



ATTENTION

When removing the propeller gearbox, take care not to damage the bearing point and the oil seal running surface (on the roller bearing side) of the propeller shaft.



Figure 5.2: TYPICAL

- 1 Hex./Torx-flange screw M8x45
- 2 Sk/Torx-flange screw M6x40

Step	Procedure
4	Install puller part no. 877660 onto the two threaded bolts M8 of the gear cover.
5	The entire propeller gearbox can now be pulled off by moving the handle of the special tool part no. 877660 without damaging the ball bearing or propeller shaft.

Non-compliance can result in serious injuries or death! Overload clutch, torsion shaft and propeller shaft are installed in splines only, they can

and will separate from removed gearbox.





2 Handle

Figure 5.3: TYPICAL

- 1 Puller part no. 877660
- 3 Gear cover



REMOVAL OF THE DRIVE GEAR

ATTENTION

The large and small gears are considered the same part with the same part number and same serial number. They must not be mixed up with other gear sets.

Step	Procedure
1	Heat the hex. nut M30x1.5 with the hot air gun (100–120 $^\circ\text{C}$ (212–248 $^\circ$ F)).
2	Turn clockwise to loosen hex. nut M30x1.5 with socket wrench SW 41 part no. 877445.



Figure 5.4

1 Socket wrench SW 41 part no. 877445 2 Hex. nut M30x1.5

NOTE

The hex. nut has a left handed thread!

Step	Procedure
3	Remove the drive gear and the friction washer from the crankshaft.

NOTE

If necessary, carefully lever off the drive gear with 2 screwdrivers.





Figure 5.5

- 1 Crankshaft
- 3 Friction washer

- 2 Drive gear
- 4 Hex. nut M30x1.5



INSTALLATION OF PROPELLER GEARBOX

Preparation

ATTENTION

No hammering or pressing!

The drive gear must only be pushed on manually.

ATTENTION

Ensure that the friction washer is in the correct installation position.

ATTENTION

The dog and drive gears are in pairs. Only use parts with the same serial number.

- Clean and degrease all parts carefully.
- Remove LOCTITE adhesive residue with LOCTITE 7063 or equivalent.
- Visual inspection of the crankshaft on the power take off side.



Figure 5.6

- 1 Crankshaft (power take off side)
- 2 Drive gear

3 Friction washer VS-30

4 Hex. nut

Step	Procedure
1	Push the drive gear onto the crankshaft.

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NOTE

Due to limited tolerances, it may be difficult to push the drive gear onto the end of the crankshaft. If necessary, turn it and push it on in another position.

Step	Procedure
2	Secure the Hex. nut M30x1,5 with LOCTITE 648 and screw it counter clockwise left hand threads onto the crankshaft along with the friction washer VS-30. Tightening torque 300 Nm (221 ft.lb.).



Figure 5.7

- 1 Crankshaft (power take off side)
- 2 Drive gear

- 3 Crankshaft
- 5 VS-30 friction washer

- 4 Hex. nut
- 6 Serial number

ATTENTION		
The sealing surface must be free from dirt and oil.		
Step Procedure		
3	Inspect the run-out. See also Chapter 72-10-00 section Wear limits. (CS24)	

NOTE

If there is slight vertical run-out, replace the nut and repeat the measurement.



Step	Procedure
4	Insert 2 6x20 dowel pins into the crankcase.
5	Apply engine oil into the needle bearing and lubricate the crankshaft with LOCTITE Anti Seize.



Figure 5.8: TYPICAL

1 Dowel pins 6x20

ATTENTION	
If excessive installation force is used, the bearing or vacuum pump gear can be damaged.	

Step	Procedure	
6	Check the overload clutch for correct installation. Observe the mark.	





Figure 5.9

1 Torision shaft

2 Overload clutch assy.

Step	Procedure	
7	Apply LOCTITE 5910 surface sealing compound to the sealing surface of the gearbox housing and place on the gear cover assy. with the pre-assembled gearbox.	

NOTE

Move the propeller shaft a little to allow the dog gear to engage.

Step	Procedure	
8	Tap gently on the gearbox housing with a soft-faced hammer to position the gearbox on the crankcase.	
9	Tighten two Hex/Torx-flange screw M8x45 and ten Sk/Torx-flange screws M6x40 diagonally from each other. Fasten the screws according to the screw diagram. Tightening torque M6: 10 Nm (89 in.lb.) Tightening torque M8: 25 Nm (18 ft.lb.)	
10	Observe (Pos 7 Screw diagram): Secure the Sk/Torx-flange screw M6x40 with LOCTITE 243 . Tightening torque 10 Nm (89 in.lb).	





- 1 Hex./Torx-flange screw M8x45
- 2 Sk/Torx-flange screw M6x40



Figure 5.11: Screw diagram

Step	Procedure
11	Inspect the run-out. See also Chapter 72-10-00 section Wear limits. (GB04)
12	Secure Hex. screw M12 x 20 with LOCTITE 243. Tightening torque 20 Nm (15 ft. lb.).



Figure 5.12: TYPICAL

1 Hex. screw M12 x 20

CONFIGURATION 3



Install governor pressure oil line assy.. See Maintenance Manual Heavy Chapter 61-20-00.

CONFIGURATION 2



Install gearbox oil line assy.. See Maintenance Manual Heavy Chapter 72-10-00.



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 (wiring connectors, charg- ing coil, ECU, FUSE BOX) Spark plug	malfunction grounding defect wrong spark plug connection loose connection	

Rough running engine

Rough running engine		
part	possible cause	
Ignition	wiring (assignment fault)	
Engine	engine temperature too low wrong intake air	

Engine stoppage

ATTENTION

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 plugged / restricted venting	
Oil pump	defect	
Camshaft bearings/Conrod bearings	other consequential damage wear (low oil pressure)	



ATTENTION

The entire assembly must be dismantled, inspected and repaired.

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

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

Coolant temperature too high		
part	possible cause	
Cooling system	not enough coolant bad venting	
Radiator	contaminated sealing of radiator to cowling poor cooling flow	
Radiator cap	leaking	
Water pump	malfunction	

RETURNING ENGINE TO SERVICE AFTER SUBMERGING IN WATER

General note



An engine which has been submerged in water must be inspected, repaired or overhauled in accordance with the BRP-Rotax instructions for continued airworthiness. See current Maintenance Manual of the respective 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.



Complete inspection of these components:

- power supply
 cooling system
 gearbox
 valve train system
- engine suspension frame
 exhaust system
- fuel system
 lubrication system
- cylinder unit
 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, FUSE BOX, sensors, ECU, wiring harness) must be replaced.

NOTE

Discoloration or corrosion are signs of submerging in water.

INSPECTION IN EXTREME CLIMATIC CONDITIONS

General note

ATTENTION

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 ROTAX® Authorized Distributor or their independent Service Center.

DIMINISHED FUNCTIONAL CAPABILITY OF EMS

General note

NOTE

The diminished functional capability of EMS must be entered by the pilot into the engine log book, stating duration extent of diminished functional capability and all pertinent details.

• Perform engine inspection.



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

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-Rotax 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 burn 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.

EXCEEDING OF MAX. ADMISSIBLE ENGINE RPM

General note

ATTENTION

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.

5800 rpm up to max. 6200 rpm

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

Procedure Step 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.
	01.0	Due e e dune

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



EXCEEDING OF MAX. COOLANT TEMPERATURE

General note

ATTENTION 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.



Figure 5.13: Overview and proceed:

Temperature exceeded briefly

Table 1: Temperature exceeded less than 30 min.	
Step	Procedure
1	The whole cooling system must be inspected, repaired or overhauled in ac- cordance with the BRP-Rotax instructions for continued airworthiness.



Table 1: Temperature exceeded less than 30 min.	
Step	Procedure
2	Inspect all further systems for correct functioning.
3	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 tem- perature of over 180 °C (356 °F) and/or for longer than 30 min.".
	Check all coolant fittings (feed/outflow) for secure fit.

Exceeded for longer than 30 min.

Table 2: Exceeded for longer than 30 min.		
Step	Procedure	
1	The whole cooling system must be inspected, repaired or overhauled in ac- cordance with the BRP-Rotax 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 compression check.	
5	All cylinder heads and cylinders must be removed and subjected to a de- tailed check including hardness testing. See chapter 72-00-00 of the Heavy Maintenance Manual.	

NON COMPLIANCE WITH THE COOLANT SPECIFICATION

General note

ATTENTION		
U	Use only coolant as recommended in the current Operators Manual	
	Non compliance with the coolant specification	
Step	Procedure	
1	When a incorrect coolant is used, then the coolant system has to be flushed.See Chapter 12-20-00 section Flushing the cooling system.	
2	Fill expansion tank with new coolant (highest point of the coolant system). See Chapter 12-10-00 section Coolant check/replenish.	

Non compliance with the coolant specification	
Step	Procedure
3	Re-install the radiator cap.
4	NOTE
	Run engine for a minute and replenish as required.



EXCEEDING THE MAX. PERMISSIBLE OIL TEMPERATURE

General note

ATTENTION

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.



Figure 5.14: Overview and proceed

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 accord- ance with the BRP-Rotax 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 oil system must be inspected, repaired or overhauled in accord- ance with the BRP-Rotax 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.

OIL PRESSURE BELOW MINIMUM VALUE

General note

ATTENTION

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.





Figure 5.15: Overview and instruction

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.

If the oil pressure falls below the minimum value up to max. 0.5 bar (7.25 psi) 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(7.25 psi) max. 1 min. in flight	
Step	Procedure
1	Inspect all oil lines for restrictions and clear passage.
2	Verify oil quantity.
3	Inspect pressure sensor and connector.
4	Inspect indicating instrument to specifications of the manufacturer, replace as required.
5	Inspect crankcase pressure (See Installation Manual, latest issue.).
6	If no cause for the low oil pressure is found after the above checks, carry out an oil change.

Table 5: Oil pressure below minimum permissible oil pressure up to max. 0.5 bar(7.25 psi) max. 1 min. in flight	
Step	Procedure
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-Rotax instructions for continued airworthiness.
8	Inspect all systems for correct functioning.
9	Carry out detailed inspection of the affected engine components.

ATTENTION

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

Minimum oil pressure in flight more then 0.5 bar (7.25 psi).

Consequent damage can be expected if the oil pressure falls below the minimum value by more than 0.5 bar (7.25 psi).

Table 6: Oil pressure below minimum permissible value more than 0.5 bar (7.25 psi) in flight	
Step	Procedure
1	The whole cooling system must be inspected, repaired or overhauled in accordance with the BRP-Rotax 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.



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 for the engine type 915 i A 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 Chapter 12-20-00 section Purging the oil system.
8	Run engine for approx. 1 hour and change oil and oil filter once more, see Chapter 12–20–00 section Oil change.





Figure 5.16: Position of the plug screw

- 1 Plug screw M22x1.5
- 3 Oil filter

- 2 Plug screw M16x1.5
- 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-Rotax 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 for the engine type 915 i A Series.
6	Replace oil filter.
7	Inspect the contact surfaces camshaft / hydraulic valve tappet.
8	Drain oil completely from oil cooler.



Oil specification not respected	
Step	Procedure
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 Chapter 12-20-00 section Purging the oil system.
12	Run engine for approx. 1 hour and replace oil and oil filter once more, as stated above.

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. cylinder 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 borescope. If parts are damaged, the engine must be inspected, repaired or overhauled in accordance with the BRP-Rotax 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 compression check. See Chapter 12-20-00 section Checking the compression.
7	Change oil and oil filter.

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.

Independent of subsequent following inspections are required:



Non compliance with fuel quality	
Step	Procedure
1	Visual inspection of engine.
2	Empty the fuel system according to the instructions of aircraft manufacturer.
3	Flush fuel system.
4	Check cylinder differential pressure.
5	Engine test run.

SMOOTH PERFORMANCE OF THE ENGINE

General note

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

Inspection Inspection of smooth performance of the engine should be performed at a temperature about 0 °C to 60 °C (140 °F).

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 (111 ft.lb). If the maximum torque is exceeded, perform the following inspections: Carry out detailed inspection of the affected gearbox components Carry out detailed inspection of crank drive





Figure 5.17: Inspection of smooth performance TYPICAL

NOTE

Always use protection of propeller edge when doing this test.

SUDDEN DROP IN BOOST PRESSURE AND SPEED

General note

	ATTENTION	
If there is damage to the turbocharger, the engine must be sent to the authorized over- haul facility for overhaul.		
Sudden drop in boost pressure and speed		
Step	Procedure	
1	Visual inspection of the engine, in particular	
	• Turbocharger	
	Air intake system	
2	Check wiring. See Chapter 12–20–00 section Check wiring.	
	NOTE	
	If no mechanical damage is detected during the visual inspection, check the boost pressure control. See chapter 76–00–00 of the Heavy Maintenance Manual.	
3	Check oil consumption.	
4	Oil level check. See Chapter 12–20–00 section Oil level check.	

SUDDEN INCREASE IN BOOST PRESSURE AND SPEED

General note

Non-compliance can result in serious injuries or death!

The engine must not be taken into operation before having corrected the cause of deficiency.

ATTENTION

If the permissible operating limits are exceeded or values fall below the minimum, the corresponding checks must be also be carried out.

Sudden drop in boost pressure and speed	
Step	Procedure
1	Visual inspection of the engine, in particular
	Turbocharger
	Air intake system
2	Check wiring. See Chapter 12–20–00 section Check wiring.
	NOTE
	If no mechanical damage is detected during the visual inspection, check the boost pressure control. See chapter 76–00–00 of the Heavy Maintenance Manual.

PERIODIC RISE AND FALL IN BOOST PRESSURE AND SPEED (VIBRATION OF TURBO CONTROL UNIT)

General note

Non-compliance can result in serious injuries or death! The engine must not be taken into operation before having corrected the cause of deficiency.

ATTENTION

If the permissible operating limits are exceeded or values fall below the minimum, the corresponding checks must be also be carried out.

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Periodic rise and fall in boost pressure and speed	
Step	Procedure
1	Visual inspection of the engine, in particular
	Turbocharger
	Air intake system
2	Check wiring. See Chapter 12–20–00 section Check wiring.
	NOTE
	If no mechanical damage is detected during the visual inspection, check the boost pressure control. See chapter 76–00–00 of the Heavy Maintenance Manual.

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

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

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



REPORTING

General note

I

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 ROTAX® Authorized Aircraft engines distributor or their independent Service Center. This is valid for all ROTAX® Aircraft engines types (certified – according to the regulation of EASA part 21A.3 / FAR 21.3) (non-certified – ASTM compliant, etc...).

NOTE

The form is also available from the official ROTAX® AIRCRAFT ENGINES Website in electronic version. **www.flyrotax.com**



istomer Service Info	rmation Report ROTAX.	BRP
Vhen / Where / What		
Accident / Incident Date:	State:	
Location Of Occurrence:		
Headline:		
Narrative:		
Aircraft identification		
Aircraft registration:	Aircraft catetory:	
Manufacturer:	Model / Series:	
Serial number:	Aircraft total time:	
Flight details		
Flight details Flight phase:	Operator:	
Flight details Flight phase: .ast departure point:	Operator: Planned destination:	
Flight details Flight phase: .ast departure point: Engine information	Operator: Planned destination:	
Flight details Flight phase: .ast departure point: Engine information Type:	Operator: Planned destination: Serial number:	
Flight details Flight phase: Last departure point: Engine information Type: Time since new [h]:	Operator: Planned destination: Serial number: Time since overhaul [h]:	
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Flight details Flight phase: Last departure point: Engine information Type: Time since new [h]: Date overhaul: Propeller information	Operator: Planned destination: Serial number: Time since overhaul [h]: Date inspection / maintenance:	
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Figure 5.18: Form



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Chapter: 12–00–00 MAINTENANCE OF THE SYSTEMS

TOPICS IN THIS CHAPTER

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 Chapter 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.

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Chapter: 12–10–00 REPLENISHING OPERATING FLUIDS

TOPICS IN THIS CHAPTER

Servicing points on the engine	2
Fluid capacities	3
Cooling system	4
Coolant check/replenish	4
Lubrication system	7
Oil level check/Replenish	7

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

ENVIRONMENTAL NOTE

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

SERVICING POINTS ON THE ENGINE

Overview



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Figure 6.1

- 1 Expansion tank
- 3 Oil filter
- 5 Oil dipstick

- 2 Radiator cap
- 4 Oil tank

FLUID CAPACITIES

General note

ATTENTION

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





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

NOTE

BRP-Rotax can give an approx value on the fill capacity depending on aircraft design and positions of radiators and tanks. The volume may differ from this value. Always check the relevant specifications provided by the aircraft manufacturer.



COOLING SYSTEM

General note

▲ WARNING

Risk of burns and scalds. Hot engine parts.

Always allow engine to cool down to ambient temperature before starting work.

▲ WARNING

Risk of Burns!

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

ENVIRONMENTAL NOTE

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

COOLANT CHECK/REPLENISH

Special tool For accomplishment the following special tool is required.:



Figure 6.2: Special tool

Part number	Description
part no. n.a	Densimeter (1)
part no. n.a	Glycol tester (2)



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Instruction 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).
3	Inspect coolant with densimeter or glycol tester. Strongly discolored or thickened coolant must be replaced.

ATTENTION

Use only coolant as recommended in the current Operators Manual

Step	Procedure
4	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.



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Figure 6.3: Coolant check/replenish TYPICAL

1 Radiator cap

2 Expansion tank



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 $^{\circ}$ C (122 - 160 $^{\circ}$ 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.



LUBRICATION SYSTEM

General note

Risk of burns and scalds. Hot engine parts.

Always allow engine to cool down to ambient temperature before starting work.

Risk of electric shock!

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

ENVIRONMENTAL NOTE

Protect the environment. Do not harm the environment by spilling oil. Dispose of oil in an environmentally friendly manner.

OIL LEVEL CHECK/REPLENISH

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

Instruction 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	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 es- cape via the venting passage. Difference between "max." and "min" mark = 0.45 I (0.95 liq.pt).

ATTENTION

For longer flights replenish oil to max. mark to warrant more oil reserve.

ATTENTION

Only use brand name oil in accordance with the latest Operators Manual and the latest Service Instruction "Selection of suitable operating fluids" of the respective engine type.

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



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Figure 6.4: Oil level check/Replenish

1 Oil tank cover

2 Oil dipstick


Engine test run An 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.



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Chapter: 12–20–00 SCHEDULED MAINTENANCE

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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.



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ENGINE CLEANING

General note

ENVIRONMENTAL 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 them in an environmentally sound way.

ATTENTION

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 Chapter 05-00-00 section Consumable Materials.

Cleaning

ATTENTION

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.

ATTENTION

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. Plug openings as required before cleaning.

After each cleaning

After each cleaning procedure, dry all electrical components such as

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

by use of compressed air to prevent leakage current.





VISUAL INSPECTION

General note General visual inspection of the engine for damage or abnormalities. For definition and scope of visual inspection. See Chapter 05-20-00 section Visual inspection.

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)
- Engine suspension frame
 Heat shrink sleeve
 Sensor technology
 Oil filter
 Coolant hoses
- FUSE BOX

- ECU

NOTE

On turbocharger

· Turbocharger with attachment

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.

CHECKING THE ENGINE SUSPENSION

General note

ATTENTION

Be sure to use the recommended tightening torque for the specified fastener.

Checking the engine suspension

- 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.



CORROSION

Definition

Corrosion is a natural process which attacks and potentially damages metals via an electrochemical 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".



LEAKAGE CHECK

General note

ATTENTION

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.

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).

NOTE

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

Step	Procedure
1	Clean 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 °- 158 °F).
3	Switch "OFF" ignition and secure engine against unintentional operation. Secure aircraft against unauthorized operation.
4	For a period of 1 minute after the engine has been stopped, no coolant must drip down.

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

Hose clamps,
kinksCheck all hoses, particularly in the area of the hose clamps and hose connections, for po-
rosity, damage and kinks. If damage is detected, replace hose immediately.

Fuel line Inspect fuel line (steel), their connections and screw fasteners. Look for scuffing marks or other damage.

ATTENTION

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.





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Figure 7.1: Connections and fuel lines

- 1 Fuel rail 2/4 outlet line
- 3 Fuel rail
- 5 Fuel injector

- 2 Fuel rail 1/3 feed line
- 4 Fuel hose assy.
- 6 Pressure regulator



DIFFERENTIAL PRESSURE CHECK

General note

WARNING

Risk of electric shock! Ignition "OFF" and system grounded!



Figure 7.2: Checking the compression. TYPICAL

1 Adaptor

Manometer/Test gauges set 2

Compressor

4

3 Orifice jet

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

Part number	Description
n.a.	Compressed air approx. 6 bar (80 psi).
n.a	2 pressure gauges.
n.a	Orifice jet*, of 1 mm (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 foreign 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 (80 psi) 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 45 %.

Procedure if maximum permissible pressure drop is out of range:

Recheck the readings after operating the engine in a test run for at least 3 minutes. This will allow the piston rings to be wetted with oil. Measure the pressure drop again as described in the differential pressure test procedure. If the pressure loss is still out of range, valve seat debris removal procedure must be carried out.

Valve seat debris removal procedure

Step	Procedure
1	Remove the valve cover according to the latest Maintenance Manual Heavy.
2	Turn the crankshaft into the position, so that the intake valve is closed.



Step	Procedure
3	Place a plastic drift (2) on the rocker arm (1) (directly over the inlet valve stem). See Fig. Valve seat debris removal.
4	Use a hammer to give a slight blow onto the fibre drift to dislodge any for- eign material between the intake valve face and seat. During this step the cylinder must be pressurized by using the setup used for the differential pressure test procedure to allow carrying away debris from the valve seat.
5	Turn the crankshaft into a position, so that the exhaust valve is closed and perform step 3 and 4 for the exhaust valve.
6	Install valve cover according to the latest Maintenance Manual Heavy.
7	Measure the pressure drop again as described in the differential pressure test procedure.



Figure 7.3: Valve seat debris removal

1 Rocker arm

2 Plastic drift

If the pressure drop value is still out of range, heavy maintenance must be carried out by authorized persons (iRMT, Level Heavy Maintenance). Following troubleshooting reasons might be applicable but are not exclusively limited to:

- · Excessive cylinder wall and/or piston ring wear
- Broken piston rings
- Burned valves
- Piston damage



ENGINE MANAGEMENT ECU

Safety notice

A WARNING Non-compliance can result in serious injuries or death! When working on the ECU, the general safety instruction must be observed. See chapter "INTRO".



Figure 7.4: Engine management ECU

- 1 ECU
- 3 Socket for APM-connector
- **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.

2 Rubber isolator

READ OUT THE ECU DATA MEMORY

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



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

NOTE

Connect and disconnect the B.U.D.S. USB-to-CAN Converter only if ECU is OFF. Non-compliance leads to entries in the error / event memory of the ECU.



LOCKING/LOOSENING OF THE CRANKSHAFT





Special tool

For accomplishment the following special tool is required:



Figure 7.5: Special tool

Part number	Description
240880	Thread bolt (1)

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 (4) into the crankcase. While doing so, move the crankshaft with the propeller until the locking screw engages in the recess of the crankshaft, and tighten to 10 Nm (89 in.lb).





Figure 7.6: Locking/Loosen of the crankshaft. TYPICAL

- 1 Plug Allen screw M8x20 (crankcase) with sealing ring 8x13
- 2 Thread bolt (locking pin)

3 Crankshaft

Loosening of the After completion of work/check: crankshaft

Step	Procedure
1	Remove the thread bolt (2) and refit crankshaft plug Allen screw M8x20 (1) along with a new sealing ring 8x13 (lock pin) with a dry torque of 15 Nm (133 in.lb).



TEST RUN OF ENGINE

General note

Da	anger of life threatening injuries caused by the propeller, rotating and stressed parts of the engine!
Al	lways 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



For the special checks, see Operators Manual for the engine type 915 i A Series .

Step	Procedure
1	Engine start according to latest Operators Manual.
2	After engine start, observe oil pressure. Oil pressure has to be built up with- in 10 sec.
3	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).
4	Check temperatures and oil pressure: At a steady oil temperature above 50 °C (122 °F) and oil pressure above 2 bar (29 psi) engine speed may be increased.
5	Ignition check as per the current Operators Manual.
6	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.
7	After full-load run, conduct a short cooling run to prevent formation of va- pour lock in cylinder heads. This is necessary to prevent steam locks in the cooling and fuel system after shut-down.



Step	Procedure
8	Shut engine down.
	NOTE
	Switch "OFF" lanes, fuel pumps and master switch
9	Inspect rotary seal for leakage.
	NOTE
	Due to the design of the rotary seal, the manufacturer tolerates a certain amount of leakage. If the leakage is in excess of the limit ro- tary seal must be renewed.
	Tolerated leakage: For this check the engine must be operated until all temperatures have sta- bilized for a period of 5 minutes. At that point shut down engine and ensure the ignition is switched off and engine secured against unintentional opera- tion. Coolant must not drip through leakage bore, located at the base of the ignition housing, for a period of 1 minute after the engine has been stopped. In case this leakage test can not be passed, the rotary seal must be replaced.

Engine oil and coolant

A WARNING

Risk of Burns!

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

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

Oil filter

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

Check of leaks

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



COOLING SYSTEM



Figure 7.7: Overview

- 1 Coolant hoses
- 3 Expansion tank
- 5 Coolant temperature sensor
- 2 Water pump
- 4 Radiator cap with gasket

CHECKING THE COOLING SYSTEM

General note See Figure Overview.

	Risk of burns and scalds. Hot engine parts. Always allow engine to cool down to ambient temperature before starting work.
Coolant hoses	Carry out visual inspection of all coolant hoses (1) for damage, leaks, hardening as a re- sult 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 Chapter 12-20-00 section Expansion tank, Radiator cap.

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.

ATTENTION

Use only coolant as recommended in the current Operators Manual

ENVIRONMENTAL NOTE

Protect the environment! Do not harm the environment by spilling coolant. Dispose coolant in an environmentally friendly manner.

Instruction

To replace the coolant the following steps are necessary:





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Figure 7.8: Replacing the coolant TYPICAL

- 1 Attachment screw (stainless steel)
- 2 Gasket ring

3 Water pump

Step	Procedure
1	Open the radiator cap on the expansion tank.
2	Remove the bottom attachment screw (1) (with sealing ring (2)) of water pump (3).
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 (89 in.lb).
5	If the coolant is being replaced with a different type,
	(conventional coolant, waterless coolant) the cooling system must be flushed. See chapter 12-20-00 section Flushing the cooling system.
6	Refill newly mixed coolant into the expansion tank (highest point of the cool- ing system). See chapter 12-10-00 section Coolant check/replenish.



Step	Procedure
7	Fit radiator cap.
8	NOTE
	Run the engine briefly and replenish with clean coolant as required.

FLUSHING THE COOLING SYSTEM

4

NOTE

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.

Instruction

To flush the coolant the following steps are necessary:

Procedure
The system is flushed using pure water at a pressure of 2 bar (29 psi).
NOTE
For the flushing, open the lowest located coolant hose (either at water pump or radiator).
Refill newly mixed coolant into the expansion tank (highest point of the cool- ing system). See Chapter 12-10-00 section Coolant check/replenish.

ATTENTION	
Where water-free coolant is used, the cooling system must be flushed and re- filled with conventional coolant.	
Step	Procedure
3	Fit radiator cap.

Run the engine for a minute and replenish coolant as required.



EXPANSION TANK, RADIATOR CAP





FUEL SYSTEM



Figure 7.10: Overview

- 1 Fuel rail 2/4 outline line
- 3 Fuel rail
- 5 Fuel injector

- 2 Fuel rail 1/3 feed line
- 4 Fuel line assy.
- 6 Pressure regulator



LEAK TESTS

General note

ATTENTION

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

Instruction

To check the following steps are necessary:

Step	Procedure
1	Inspect all fuel lines (steel on engine), their connections and unions.
2	Inspect the fuel lines (steel on engine) for sign of chafing.

CHECKING THE FUEL LINES

General note

See Chapter 05–10–00 section Time limit for parts.

Instruction

Step	Procedure
1	Check fuel line (of steel).

CHECKING THE FUEL PRESSURE REGULATOR

General note

Step	Procedure
1	Check the fuel pressure regulator (1) for damages and inspect the general condition.
2	Perform a leak test (Fuel pumps "ON").
3	Inspect all connections (2) for secure attachment.





Figure 7.11: Fuel pressure regulator

- 1 Fuel pressure regulator
- 2 Reference hose connection

FUEL INJECTORS

General note Check for leaks.

FUEL RAIL

General note Check for leaks.



LUBRICATION



Figure 7.12

- 1 Plug screw (Oil pressure relief valve)
- 3 Oil filter
- 5 Venting tube
- 7 Oil pressure sensor
- 9 Oil radiator

- 2 Oil pump
- 4 Oil tank
- 6 Oil temperature sensor
- 8 Turbo charger (finger screen on plug screw)



Overview

▲ WARNING

Risk of burns and scalds. Hot engine parts.

Always allow engine to cool down to ambient temperature before starting work.

Risk of electric shock!

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

NOTE

It is advisable to check the oil level prior to an oil change as it informs about oil consumption.

See Chapter 12-10-00 section Oil level check/Replenish.

Observe

ATTENTION

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.
 See Chapter 12-20-00 section Purging the oil system.
- 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 CHANGE

Instruction

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 slowly by hand to transfer the oil from the crankcase. See Chapter 12-20-00 section Purging the oil system.
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 matt. See Chapter 12-20-00 section Oil filter replacement and Inspection of the filter insert.
4	Dispose of oil filter according to environmental regulations.
5	Install oil drain screw with new gasket and safety wire.

ATTENTION

Only use brand name oil in accordance with the latest Operators Manual and the latest Service Instruction "Selection of suitable operating fluids" of the respective engine type.

ATTENTION

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 purging of the oil system).

ATTENTION

DO NOT use compressed air to blow through the oil system (or oil lines, oil cooler, oil pump housing, oil bores in the engine).

ENVIRONMENTAL NOTE

Protect the environment.

Do not harm the environment by spilling oil. Dispose of oil in an environmentally friendly manner.





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

OIL FILTER REMOVING

General note

A WARNING

Risk of burns and scalds. Hot engine parts.

Always allow engine to cool down to ambient temperature before starting work.

ATTENTION

To ensure correct functioning of the oil circuit and the forced flow lubrication, use ORIGINAL-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 tools To carry out the procedure the following tools are necessary:





02734

Figure 7.13: Special tool

- 1 Oil filter wrench part no. 877620* *or equivalent
- 2 Cutting tool part no. 877670

Procedure To remove the oil filter the following steps are necessary:

Step	Procedure
1	Remove used oil filter with oil filter wrench.
2	Clean the contact surface of the oil pump housing with a clean cloth.



INSPECTING OF THE OIL FILTER COMPONENTS

General note

ATTENTION

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	Oil filter cut open using spec	Oil filter cut open using special tool taking care not to produce chips.	
2	Remove anti-drain membran	e.	
3	Cut top and bottom edges of	f the mat with a knife.	
4	Remove filter mat, fold up an	d press remaining oil out.	
5	Unroll and inspect it for meta abrasion.	I chips, foreign matter, contamination and	
6	Pass over matt with a clean	magnet and inspect for metal.	
Steel chir)S	Bronze chips	
		Sliver of boaring material	

Possible foreig matter

oreign	Steel chips	Bronze chips
	Aluminium chips	Sliver of bearing material
	Remains of sealing compound	Plastic (thrust washer)
	Carbon fiber	Sliver or copper LOCTITE Anti Seize

Increased foreign 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-Rotax 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: Test run of engine.
4	Inspect the oil filter once more.



Contaminated

ATTENTION

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



Figure 7.14: Oil filter

- 1 Filter housing
- 3 Gasket ring
- 5 Filter matt

- 2 Filter cover
- 4 Anti-drain membrane



INSTALLING NEW 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.
	NOTE
	Mark 270° - check mark on oil pump housing to control tightening of oil filter.
5	Tighten oil filter with 3/4 turn (270°).
6	Inspection of the used oil filter. See Chapter 12-20-00 section Inspection of the filter insert.



Figure 7.15: Install oil filter

- 1 Contact surface
- 3 Gasket

- 2 Oil pump housing
- 4 Oil filter



CLEANING THE OIL TANK

General note NOTE

This procedure is optional and requires purging of the oil system. See Chapter 12–20–00 section Purging the oil system. 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.

Procedure

Procedure to clean the oil tank:

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

ATTENTION	
Incorrect assembly of the oil tank components might cause engine faults or en- gine damage.	
Step	Procedure
4	Fit hex. screw M12x12 with a new gasket ring. Tighten to 25 Nm (18 ft.lb).
5	Safety wire.
6	Reassemble the oil tank by following the same steps in reverse order.
7	Purge the oil system.





8 Oil tank



9 Safety wire
PURGING THE OIL SYSTEM

General note

ATTENTION 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 Installation Manual for the engine type Chapter 79-00-00 section Purging the lubrication system.

Purging the oilPurging the oil system is necessary:system

- · 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).

FLUSHING THE OIL CIRCUIT

General note

	Risk of electric shock! Ignition "OFF" and system grounded! Disconnect negative terminal of battery.
Oil tank	Clean the oil tank.
Temporary oil lines	Temporary oil lines (only for flushing) must be fitted so that the oil radiator is not con- nected. The return line is routed into a separate, clean receptacle and not back to the oil tank.
	NOTE
	This is done to prevent metal chips and other debris from entering the radiator or oil tank.
Filling	Fill the oil tank with approx. 3 I (0.8 gal (US)) of engine oil.
Procedure	The following steps have to be carried out after refilling:



ATTENTION

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

Step	Procedure
1	Turn engine by hand in direction of engine rotation to return the oil from the oil from the 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.
5	Purge oil system.

Reconnect negative terminal of aircraft battery. See Chapter 12–20–00 section Purging of the oil system.

Equipment

ATTENTION

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



INSPECTING THE MAGNETIC PLUG

General note	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 con- dition 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. Overview 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-Rotax instructions for continued airworthiness.		
Unclear findings	In the case of unclear findings:		

Step	Procedure
1	Rinse magnet in solvent and check again (the contamination may be moly from engine assy.)
2	Flush the oil circuit.
3	Fit a new oil filter.
4	Install the magnetic plug. See Chapter 12–20–00 section Installation of the magnetic plug.
5	Engine test run. See Chapter 12–20–00 section Test run of engine.
6	Inspect the magnetic plug once more.

Contamination

ATTENTION

If the oil circuit is contaminated, replace the oil cooler and flush the oil circuit. Proper judgement requires years of experience in repair of piston engines.

Trace the cause and remedy.





Figure 7.17: Overview TYPICAL

INSTALLATION OF THE MAGNETIC PLUG

Install

The following steps are necessary:

Step	Procedure
1	Clean the magnetic plug.
2	Install the magnetic plug. Tightening torque 25 Nm (18 ft lb.)
3	Secure with safety wire.

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



ELECTRIC SYSTEM



Figure 7.18: Overview

- 1 Spark plug connectors
- 3 Ignition cable
- 5 Plug connectors
- 7 Stator assy.

- 2 Double ignition
- 4 FUSE BOX
- 6 Crankshaft position sensor



CHECK OF WIRING

General note

Risk of electric shock!

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

Risk of burns and scalds. Hot engine parts.

Always allow engine to cool down to ambient temperature before starting 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, charg- ing 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 con- nections of all cables on rectifier-regulator for good contact, tight fit, corro- sion, discoloration 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.



REPLACEMENT OF SPARK PLUGS

General note

ATTENTION

Use of incorrect spark plugs can result in ignition problems and pre-ignition and consequent engine damage.

See Chapter 05–50–00 section Returning engine to service after submerging in water. 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.

Spark plugs



See Illustrated parts catalog for the engine type 915 i A Series.

REMOVE THE SPARK PLUGS

Remove Remove the spark plugs and store them according to cylinder and position.

INSPECTION OF SPARK PLUGS

Visual check Inspect all spark plugs for mechanical damage.

Electrode gap NOTE

Inspect the electrode gap also on new spark plugs before installation.

Electro	de gap
New	Wear limit
0.8 - 0.9 mm (0.031 - 0.035 in)	1.1 mm (0.043 in)

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

Spark plug face	Information
light tan- coloured	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



Spark plug face	Information
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

INSTALLATION OF SPARK PLUG



AE 5iS_0257

Figure 7.19: Spark plugs

1 Ground electrode

2 Head area

Cleaning



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



Effectivity: 915 i A Series Rev. 1

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

ATTENTION

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

ATTENTION

Heat conduction compound at the ground electrode or the head area 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 16 Nm (142 in. lb) on the cold engine.

FUSE UNIT (FUSE BOX)

General note Check plug connections and fuse plugs.



TURBOCHARGER

Checking the waste gate lever	Step	Procedure
	1	Check the waste gate lever for free movement. If it does not move freely, lubricate the axle of the waste gate with LOCTITE ANTI SEIZE 15378.



Figure 7.20: Turbocharger

CHECKING AND CLEANING PLUG SCREW (TURBO OIL SUMP ASSY.)

Procedure

To checking and cleaning the following steps are necessary: See Figure .7.21

Step	Procedure
1	Loosen the plug screw assy. M22x1.5 (1) with the O-ring 18x2.5 (2)
2	Drain the residual oil from the oil sump assy.
3	Inspect the plug screw assy. of metal particals.
4	Clean the plug screw with suitable clean agent.
5	Install plug screw assy. M22x1.5 with O-ring 18x2.5 into the oil sump assy
6	Tightening torque 20 Nm (15 ft.lb).





Figure 7.21: Oil sump assy.

1 Plug screw assy. M22x1.5 2 O-ring 18x2.5



PROPELLER GEARBOX



CHECKING THE PROPELLER GEARBOX

General note



For checking of the propeller gearbox see Maintenance Manual Heavy for Engine Type 915 i A Series.



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Type of aircraft

Aircraft registration no.

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