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3) Introduction

We are pleased you decided for a ROTAX® aircraft engine.

Before carrying out maintenance work on the engine, carefully read the Maintenance Manual. It provides you basic information on safe operation of the engine.

If any passages of the Manual are not understood or in case of any questions, please, contact an authorized Distribution- or Service Partner for ROTAX® aircraft engines.

3.1) Remarks

This Maintenance Manual is to acquaint maintenance service staff approved by the local aviation authorities with some basic maintenance and safety information for service works.

For competent maintenance and servicing, please, refer to the documentation provided in the Operator's Manual, Installation Instructions and Spare Parts List.

For additional engine-, maintenance- and parts information you may also contact the nearest ROTAX® aircraft engine distribution partner.

3.2) Engine serial number

On all enquiries or spare parts orders, always indicate the engine serial number, as the manufacturer makes modifications to the engine for further development. The engine serial number is on the top of the crankcase, magneto side (see Pic. 005).

4) Safety

Although the mere reading of such an instruction does not eliminate a hazard, the understanding and application of the information will promote correct use.

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

ROTAX® reserves the right at any time to discontinue or change specifications, designs, features, models or equipment without incurring obligation.

The illustrations in this Maintenance Manual show the typical construction. They may not represent in full detail or the exact shape of the parts which have the same or similar function.

Specifications are given in the SI metric system with the USA equivalent in parenthesis. Where precise accuracy is not required, some conversions are rounded off for easier use.

- Cleaning the engine with lye or alkaline solutions is forbidden, as a matter of principle. Use of a high pressure cleaner may cause engine failures and rust formation.
- When working on the electric system and on the engine, first detach the cable of the minus-pole and then of the plus-pole of the battery! When connecting the cables, first connect the plus- and then the minus-pole.
- Firmly attach engine removed from aircraft on an assembly trestle.
- Do not let the engine run in a closed room (poisoning hazard)!
- Always observe the engine while running from a secure place.
- When stopping the engine, switch ignition off and remove ignition key.
- Before refuelling, always stop the engine and remove ignition key. Do not refuel in closed rooms. Immediately clean off spilt fuel.
- At handling of fuel be very careful - increased fire danger! Never refuel in the vicinity of open flames or sparks able to ignite. Do not smoke when refuelling.
- Only use oil and fuel of the specified quality and store them in approved containers only.

4.4) Technical documentation

The information given in the

- Installation Manual
- Operator's Manual
- Maintenance Manual
- General Overhaul Manual
- Spare Parts List
- Service Bulletins
- Service Informations
- Service Letter

is based on data and experience that are considered applicable for professionals under normal conditions.

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

◆ NOTE: The illustrations in this Maintenance Manual are stored in a graphic data file and are provided with a consecutive irrelevant number.

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

4.4.1) Use for intended purpose

- The engine ROTAX® 914 F 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.
- This is a certified aircraft engine tested as per aeronautical standards for safety and lifetime. It was developed to the latest state of the art and intensively tested.
- Use for intended purpose also means respecting the prescribed operational- maintenance- and repair conditions. This also increases the engine lifetime.
- **Never** run the engine without propeller, this causes inevitably engine damage and hazard of explosion.

4.4.2) Instruction

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

Technical documentation and directions are useful and necessary complementary elements for personal instruction, but can by no means substitute theoretical and practical instructions. These instructions should cover explanation of the technical context, advice for operation, maintenance, use and operational safety of the engine.

- This engine must only be operated with accessories supplied, recommended and released by ROTAX®. Modifications are only allowed after consent by the engine manufacturer.
- Before longer standstill (longer than 2 months) observe without fail the instructions for engine "out of use". Protect fuel- and carburetor system against contamination.

■ CAUTION: Spare parts must meet with the requirements defined by the engine manufacturer. This is only warranted by use of GENUINE ROTAX® spare parts and/or accessories (see spare parts list).

They are available only at the authorized ROTAX® Distribution- and Service partners.

If using other than GENUINE ROTAX® spare parts and/or accessories, any warranty by ROTAX® gets void (see Warranty Conditions).

5) List of the current pages

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6) Table of amendments

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no.	chapter	page	date of change	remark for approval	date of approval from authorities	date of inclusion	signature
0	1 ÷ 5	1 to 19	97 02 01	not required		97 02 01	KD/Me
0	7 ÷ 11	22 to 87	97 02 01			97 02 01	KD/Me
0	13 ÷ 17	124 to 274	97 02 01			97 02 01	KD/Me
0	6	20 to 21	97 02 01	english version	german version	97 02 01	KD/Me
0	12	88 to 123	97 02 01	not required	6. 2. 97	97 02 01	KD/Me
1	0, 5, 13	1, 18, 19, 194, 195	98 07 01	not required		98 07 01	AA/HeC
1	6, 12	20, 89	98 07 01	english version not required	german version 1. 7. 1998	98 07 01	AA/HeC
2	5, 6, 13	19, 20, 195	98 11 01	not required		98 11 01	AA/HeC
3	6, 12	20, 94, 114	99 01 01	english version not required	german version	99 01 01	AA/HeC
3	1, 2, 5, 8, 9, 13, 15, 17	18, 19, 26, 38, 39, 54, 57, 143, 149, 196 bis 202, 205, 208, 209,215, 240, 263, 265, 270 bis 272	99 01 01	not required		99 01 01	AA/HeC
4	6, 12	20, 89, 113, 114	02 01 01	english version not required	german version 22. 3. 2002	02 01 01	AA/HeC
4	5, 9, 11, 13,	18, 19, 42, 82, 83, 128, 142, 182, 190, 216, 252	02 01 01	not required		02 01 01	AA/HeC
5	1,2,4,5 13,14,16 17	5,8,11,16,18,19,128 140,162,248, 267-272	2003 03 01	not required			
5	6,20	20,89,94,101,111 123	2003 03 01	english version not required	german version 01. 07. 2003		

12.2) Maintenance Schedule

The following maintenance is planned and necessary for ROTAX® 914 F:

Description	25 hrs [1]	every 50 hrs [4]	every 100 hrs [2]	every 200 hrs	every 300 hrs	every 600 hrs	every XXXX hrs [3]	every 2 years	every 5 years	XX years [3]	see Chapter
Engine cleaning	x		x	x	x	x					12.3.1)
Visual engine check	x		x	x	x	x					12.3.2)
Leakage check	x		x	x	x	x					12.3.3)
Inspection of engine suspenion	x		x	x	x	x					12.3.4)
Check of external engine parts	x		x	x	x	x					12.3.5)
Check of waste-gate position	x		x	x	x	x					12.3.6)
Check of waste gate cable bowden			x	x	x	x					13.5.4.2)
Check of gearbox	x		x	x	x	x					12.3.7)
Oil level check	x		x	x	x	x					12.3.8)
Oil change	x	x	x	x	x	x					12.3.9)
Oil filter renewal	x	x	x	x	x	x					12.3.10)
Inspection of magnetic screw	x			x	x	x					12.3.11)
Check of cooling system	x		x	x	x	x					12.3.13)
Rinsing of cooling system				x		x					12.3.13.1)
Renewal of coolant								x			12.3.13.2)
Inspection of air filter	x		x	x	x	x					12.3.14)
Check of carburetors	x			x		x					12.3.15)
Check of cables	x		x	x	x	x					12.3.16)
Check of V-belt	x		x	x	x	x					12.3.17)
Renewal of spark plugs			x	x	x	x					12.3.18)
Security check of spark plug connectors				x		x					12.3.19)
Check of compression				x		x					12.3.20)
Inspection of fuel filter, fuselage side	x		x	x	x	x					12.3.21)
Conduct engine test run	x		x	x	x	x					12.3.22)
Renew rubber parts									x		12.3.23)
Check of overload clutch						x [5]					12.4.2)
Overhaul							x			x	12.3.24)
Description	**25 hrs [1]**	**every 50 hrs [4]**	**every 100 hrs [2]**	**every 200 hrs**	**every 300 hrs**	**every 600 hrs**	**every XXXX hrs [3]**	**every 2 years**	**every 5 years**	**XX years [3]**	**see chapter**

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Pic. 38

Comment to [1]: To be carried out after the first 25 operating hours.

Comment to [2]: 100 operating hours or after 1 year, whichever comes first.

Comment to [3]: The actual TBO of engines at the time of delivery has to be taken out of SB-914-027, latest issue.
Extension or exceeding of the TBO by 5 % or 6 months is allowed.

Comment to [4]: Using leaded fuel the oil change has to be carried out every 50 h. See SI 19-1997 latest edition.

Comment to [5]: Gear box of engine configuration 3 (with slipper clutch) and using leaded fuel in access of 30% of operation.

12.3) Maintenance Instructions

12.3.1) Engine cleaning

If necessary, clean the engine carefully. If leaks are noticed, they have to be traced before cleaning. As a principle, clean engine only when cold. Use of commercially available cold cleaning agent is recommended.

■ CAUTION: For cleaning of engine do not use highly inflammable liquids or caustic cleaning agents.

Never clean an engine with a high pressure cleaner. This is detrimental for the electrical installations and the oil seals. Oxidation of the various components and failures are the consequence!

After each cleaning procedure blast all electrical components, like battery, ignition unit, spark plug connector, clamp connections etc. with compressed air, to prevent leaking current.

■ CAUTION: When cleaning the engine, the dissolved residues of fuel, oil and other environment-contaminating agents are rinsed off. Collect the cleaning water and dispose of it in an environment-friendly way.

12.3.2) Visual check of engine

See Pic. 38/1.

General visual inspection of the engine for damages and anomaly.

■ CAUTION: Take note of temperature related variations not conform with standard operation.

Pay special attention to the following items:

- Exhaust system and turbocharger inclusive attachment

  Notes to turbo charger:
  The turbo charger is free of maintenance, requires only visual inspection
  Inspect turbo wheel for damage and verify easy rotation.
  Visually inspect compressor and turbine housing for cracks.

- **Engine suspension** - refer to chapter 13.5)
- **Airbox** - refer to chapter 13.1)
- **Fuel and oil lines** - refer to chapter 13.1) and 13.2)
- Check the two **heat protection tubes**
  (water pump - cyl. head 1 and 2) for physical damage
- **Turbo control unit (TCU)** - consult chapter 13.6)
- **Servo motor** - refer to chapter 13.6)
- **Pressure sensors**
- **Fuel pumps**
- **Air pressure hoses** airbox - fuel pressure control
  airbox airbox pressure sensor

12.3.6) Check of the waste gate

See Pic.

Inspect servo cable of waste gate actuation ❶ for physical damage and wear.

■ CAUTION: Use of a damaged servo cable is not permitted. Even with only one of the strands worn through, the cable has to be renewed. See chapter 13.5)

Check also cable engagement and spring.

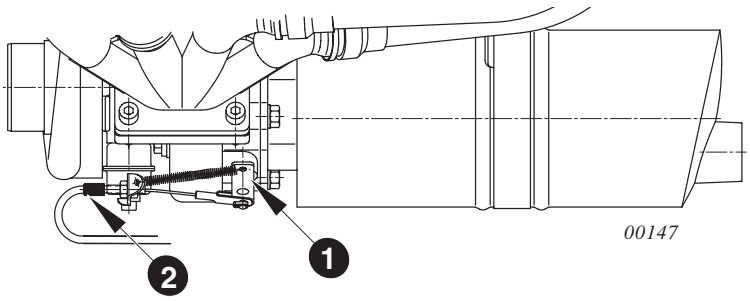
Verify adjustment of waste gate.

◆ NOTE: After engine stop, the servo motor will move into closed position.

The same happens after switching on the TCU. The servo motor rotates approx. half a turn and will then remain in the closed position.

In this position the waste gate has to be completely closed. If necessary reset by adjustment screw ❷. See chapter 13.5)

Pic. 39



12.3.7) Checking of propeller gearbox

Checking of backlash

With engine at standstill, the propeller can be turned by hand by approx. 15° taking into consideration a slight friction torque. Thereby no odd noises or irregular resistance must be noticeable. Otherwise repair is necessary.

Checking of the friction torque

Within the backlash the torque by friction is 15 to 45 Nm (130 to 400 in.lb). This value is calculated by the indication of the spring scale multiplied by length of lever arm (N x m = Nm). If the above mentioned friction torque is not achieved, remove gearbox and inspect it. See Chapter 14.4).

12.3.8) Oil level check

It is an advantage to check the oil level before oil change to be informed about oil consumption. Before oil level check turn the propeller manually several times in engine turn direction to pump the oil from engine into the tank. The procedure is complete if also air flows back into the oil tank. This is noticeable with opened oil tank seal as a rush. Stop engine and check oil content on oil gauge of oil tank. The oil level in the oil container should be between the 2 marks (max. / min.) and must never be below the minimum mark.

Difference between max. and min. mark = 0,45 litre (0.95 liq pt).

12.3.9) Oil change

See Pic. 39/1.

Change the oil only when engine is warm.

Remove oil drain screw from oil tank, drain old oil and dispose of it as per environmental regulations. See Chapter 10.2) and Pic. 013.

▲ WARNING: Careless draining of hot engine oil may cause scalds! Dispose of used oil and filters respecting the environmental regulations!

◆ NOTE: At every oil change also exchange the oil filter.

Only in case of extraordinary oil contamination the oil tank must be opened and the interior be cleaned. Then refit drain screw and torque to 25 Nm (220 in.lb) and wire secure. Install new genuine oil filter.

Refill with 2 litres (.53 US gal) oil. Start the engine and make an oil level check.

■ CAUTION: Only use oil of a registered brand according to the current Operator's Manual.

▲ WARNING: Pay attention to specifications in the Operator's Manual.

■ CAUTION: Venting the lubrication system, see section 13.2.10).

12.3.13) Check of the cooling system

Inspect all coolant hoses. Check all connections on cylinder head top- and bottom side and on the water pump. Check expansion tank for damages. Check protection rubber at bottom of the tank for tight fit.

Check gasket of radiator cap as well as the pressure control valve and return valve. The pressure control valve opens at 0,9 bar (13 psi).

Check coolant with tensiometer or glycol tester. If necessary, replenish with coolant of same composition. Remarkably discoloured or thickened anti-freeze has to be renewed.

◆ NOTE: 50 % antifreeze concentrate with anti-corrosion additives and 50 % water is recommended. Sufficiently satisfactory results were achieved with "BASF Glysantin Anticorrosion". This or equivalent coolant has to be used.

▲ WARNING: Pay attention to specifications of operating media in Operator's Manual.

As long as there is no boiling problem after engine stop, water may be added up to approx. 50 %.

▲ WARNING: Never open radiator cap when cooling system is hot. For safety's sake, cover cap with a cloth and open cap slowly. Sudden opening of the cap would provoke exit of boiling water and in consequence scalds.

12.3.13.1) Rinsing of cooling system

At the 200 hours check rinse the cooling system. This can be done with a water hose at maximum pressure of 2 bar (30 psi). For this procedure open the coolant hose at the lowest position. See Pic. 10.

12.3.13.2) Coolant renewal

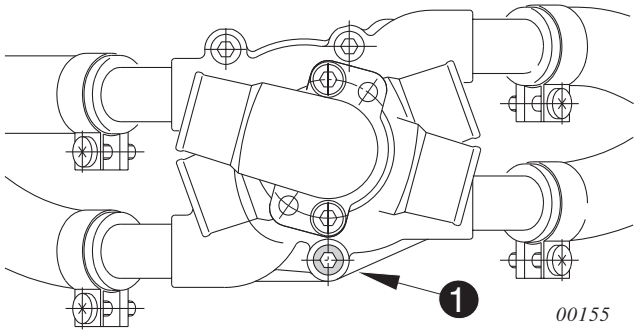
See Pic. 49.

The cooling liquid (mixed with 20 % water) has to be changed every 2 years. For this purpose open the radiator cap, remove the bottom fixation screw ❶ (with sealing ring) for water pump, and drain the cooling liquid. If the radiator is fitted lower than the engine, detach the coolant hose.

Refill newly mixed coolant into expansion tank (highest position in cooling system).

◆ NOTE:

Let engine run for a short time and then, if necessary, replenish with pure coolant.



Pic. 49

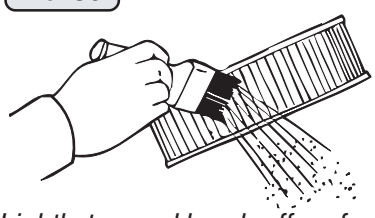
12.3.14) Check of the air filter

See Pic. 50 and 51.

Inspect dry type air filter according to maintenance plan. Clean dirty filter to maintenance directives of aircraft builder. When used in heavy dust condition clean air filter at shorter intervals accordingly. If filter mat is damaged, renew air filter.

■ CAUTION: A dirty filter will not only reduce the engine performance but might also promote premature wear of the engine.

Pic. 50



Lightly tap and brush off surface dirt.

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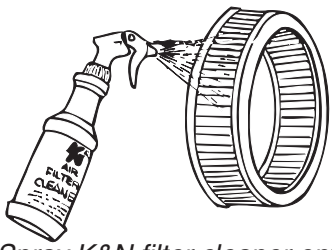
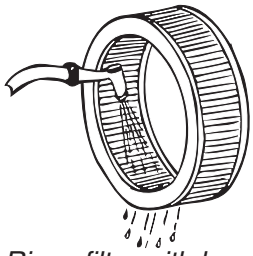


Spray K&N filter cleaner onto entire element and let soak for approx. 10 min.



Rinse filter with low pressure water from inside to outside and let element dry naturally.

Cleaning of dry air filter

■ CAUTION: Never use gasoline, steam, caustic liquids, detergents or high pressure cleaning.

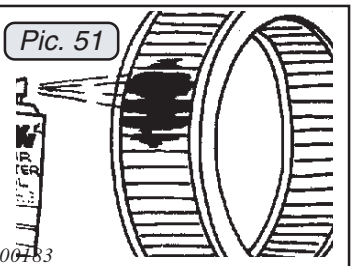
After soaking period, rinse with cold water from inside to outside, shake off and let it dry naturally.

▲ WARNING: Do not dry over naked flame or with hot air gun. Excessive heat will shrink the pores of the filter mat.

After cleaning, lubricate filter element evenly with K&N filter oil spray or K&N filter oil, part no. *897 870*, to achieve optimum filtering effect.

◆ NOTE: Each pleat of filter element to be sprayed with oil.

Pic. 51



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After 5 to 10 min. the filter mat will be soaked with oil, noticeable on the uniform red colouring.

■ CAUTION: Never use gear oil, diesel or motor oil as they attract water.

▲ WARNING: Besides clamp attachment of the filters, wire-secure filter against loss additionally. Filter connection must be free of oil.

Renewal of dry type air filter

Only use dry type air filters which are specified by the aircraft manufacturer!

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

12.3.23) Renewal of rubber parts

Renew rubber parts acording to Maintenance check list.

All rubber hoses are subject to renewal. Affected are the venting ho ses of the carbs, air pressure hoses to fuel pressure control and pressure sensor, hoses on compensating tube as well as all rubber hoses of the cooling system.

Renewal of the diaphragm on both carburetors, see chapter 13.1).

12.3.24) Overhaul

The overhaul of engine is necessary after a **certain engine run time** or **period of time** from the first starting of engine (whichever comes first). *05615*

Engine Type description	engines affected engine s/n	TBO Time Between Overhaul	deliverables SB for extension of the TBO
914 F	up to and incl. 4,420.313	1000 h or 10 years, whichever comes first	SB-914-027 (1000 h to 1200 h or 12 years)
914 F	from 4,420.314	1200 h or 12 years, whichever comes first	none

[1)] An extension of the time between overhaul is possible and regulated through Service Bulletins (SB) for the respective engine type. Already done extensions can be taken out of the engine log book and/or the release certificate. Necessary modifications must be done by an authorized maintenance facility. See chapter 11.3)

For the overhaul remove engine from aircraft and send it in clean and preserved condition to an authorized overhaul facility.

If the engine is shipped to an overhaul facility, include the following in the shipment:

- engine log book
- service record (life act) of the engine
- **all** parts of equipment like carburetors, filter, intake silencer, ignition unit, vacuum pump, hydraulic governor, engine frame, fuel pumps, oil tank, external alternator
- indication of total time of operation
- statements to the aircraft used
- useful notes and observations regarding the engine.

At receipt of an engine for overhaul a test run is conducted, followed by tear-down inspection with recording of findings, and necessary repair work carried out afterwards.

The overhauled engine is subject to a running-in period and a final performance check.

The overhaul is indicated on the name plate. Each overhauled engine is accompanied by the report of engine repair with filled-in data sheets.

The overhaul of an engine is registered in the Overhaul Manual.

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12.4.18) Tight movement of engine

See Pic. 60/1.

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

▲ WARNING: Ignition "**OFF**" and system grounded! Disconnect negative terminal of aircraft battery.

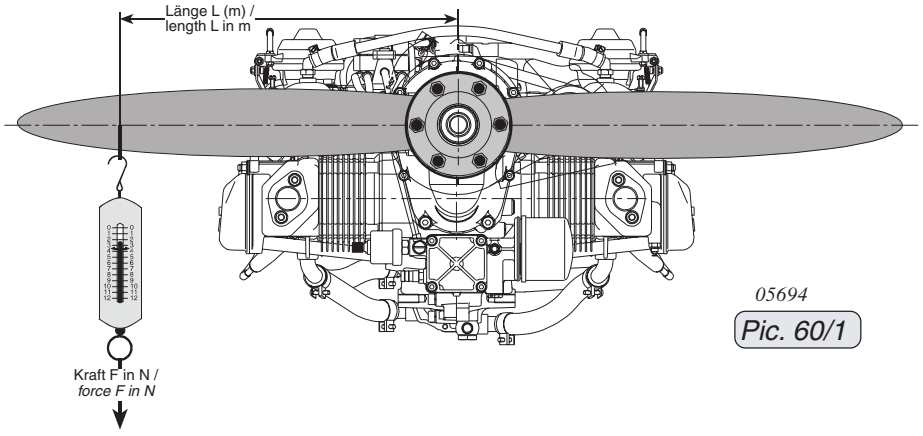
- Remove spark plug connector and disassemble 1 spark plug of each cylinder.
- Torque must be determined with a suitable jig.

  Therefore determine the maximum appearing torque on the propeller shaft, which is necessary to move the whole crank drive.

  The torque must be max. 150 Nm (1328 in.lb).

▲ WARNING: At exceeding of the given value do not start engine before trouble is found and rectified.

- Carry out detailed inspection of affected gearbox components.
- Carry out detailed inspection of crank drive.



Pic. 60/1

13) Maintenance of the various systems

13.1) Fuel system

Besides the maintenance work prescribed, see Chapter 12), and description of the fuel system, Chapter 9.2), further maintenance procedures are described as follows:

13.1.1) Removal of carburetors, carburetor flanges, fuel tubes and drip trays

See Pic. 61.

For check or maintenance the carburetors have to be removed.

◆ NOTE: Due to the drip tray ❶ the float chamber ❷ cannot be removed from carburetors installed.

To remove the carburetors, loosen the tube clamps ❸.

Remove fuel tubes ❹ by removal of banjo screws M10 ❺ with sealing rings ❻. Loosen clamps ❼ of pressure tubes ❽ on carburetor (float chamber venting) and fuel pressure regulator ⓱ and remove tubes.

Remove spring ❾ for carburetor suspension with suitable tool.

Now the airbox ❿ can be withdrawn towards back from the carburetors.

◆ NOTE: If required, remove 2-pole plug connector of temperature sensor ⓫ and/or loosen air intake hose ⓬.

Remove 3-pole connector of throttle valve potentiometer.

Remove clamp ⓭ from carburetor flange ⓮ and remove carburetor by gentle turning and swivel motion along with fuel tubes.

Withdraw aluminum spacer ⓯ 36/43/4,2 from carburetor flange and close intake openings. Remove hose clamp ⓰, union nut ⓱ and fuel tubes.

For disassembly of carburetor flanges ⓮ only the 2 hex. screws M8x25 with shims have to be removed. Then the carburetor flanges ❶ and the drip tray ❺ can be removed.

13.1.2) BING constant depression carburetor: Check and maintenance

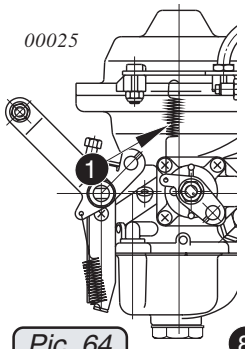
13.1.2.1) General

■ ATTENTION: In principle no modification must be made on the carburetor calibration. The determination of the main jet is carried out on a dyno at 300 m (1000 ft) above Mean Sea Level.

Modification is allowed to be carried out to our specifications only by aeronautical personnel or authorized test staff.

Before removal of the carburetors for a precise inspection, close the fuel cock and remove the fuel feed lines, collect possibly emerging fuel and ensure proper disposal.

■ ATTENTION: To avoid contamination in the fuel system proceed with great care and cleanliness. Put carburetor and parts removed on a clean surface.



Pic. 64

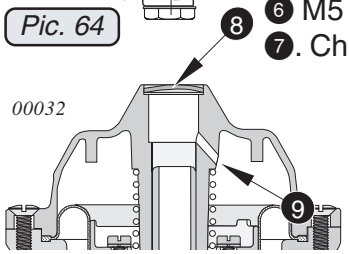
13.1.2.4) Diaphragm

See Pic. 63/64 and 65.

Unhook spring ❶ of choke from start lever ❷ and chamber top ❸.

◆ NOTE: The diaphragm ❹ is linked to the plunger (carburetor piston). Depending on the pressure prevailing, the plunger is moved up or down.

For checking, remove the 2 countersunk screws ❺ M5x12 and Allen screw ❻ M5 along with nut and shim, remove the chamber top ❸ and the spring ❼. Check tight fit of the cover ❽ on chamber top.



Pic. 65

Wash chamber top with cleaning agent and blow the inside venting bore ❾ with compressed air, then check visually. See Pic. 65.

◆ NOTE: The diaphragm ❹ is fixed by the retaining ring ❿ to the carburetor piston ⓫.

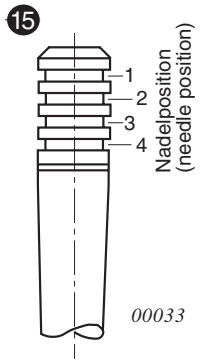
Remove plunger from the carburetor housing and remove 4 Allen screws ⓬ M4x12.

■ ATTENTION: The position of the carburetor piston is controlled via the diaphragm. On the diaphragm there are 2 positioning noses**.** The nose ⓭ fits exactly in the recess in the plunger, nose ⓮ must engage in the recess in the carburetor housing.

Check diaphragm for cracks or brittleness, replace if necessary.

13.1.2.5) Jet needle, carburetor piston

See Pic. 63/66 and 67.



Pic. 66

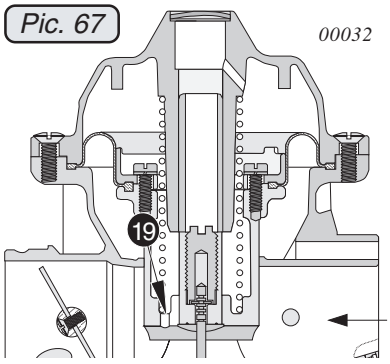
The jet needle ⓯ controls the fuel consumption at part load. It may be regulated by choosing position of jet needle between 1 and 4.

Modifications are allowed only after consultation with the engine manufacturer.

◆ NOTE: A **higher** position causes "deeper plunging" of the jet needle into the needle jet ⓰ ❹ smaller flow diameter ❹ leaner mixture.

Lower position ❹ richer mixture.

Pic. 67



Remove fixation screw ⓱ and check jet needle ⓯ with circlip ⓲ for wear. Pay special attention to the grooves and the taper of the needle. At visible wear the jet needle must be exchanged and refitted in the same position.

■ ATTENTION: The jet needle fitted must move freely.

Visually check outside of plunger ⓫ and the two inside compensation bores ⓳.

13.1.2.6) Float chamber, floats

See Pic. 63 and 69.

Remove safety wiring and plug screw ⑳ (tightening torque 5,5 Nm (40,6 ft lb))with sealing ring ㉑ 16/22/1.

Remove float chamber ㉒ with gasket ㉓ and clean float chamber.

Check both floats ㉔ for free movement on the guide pin ㉕. When the float is at its lowest position it still must have clearance and must not stick on the float chamber wall.

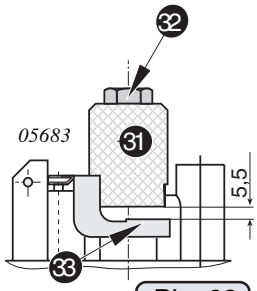
Check if both distance pieces ④ are in position.

■ CAUTION: A float stuck causes the carburetor to flood.

Check wear of guide sleeves ㉖ inserted in the float. Check the pins ㉗ for float support ㉘ for wear due to excessive vibration. At noticeable wear replace both floats and if necessary also the float suspension brackets ㉙.

13.1.2.7) Float suspension

See Pic. 63/68 and 69.

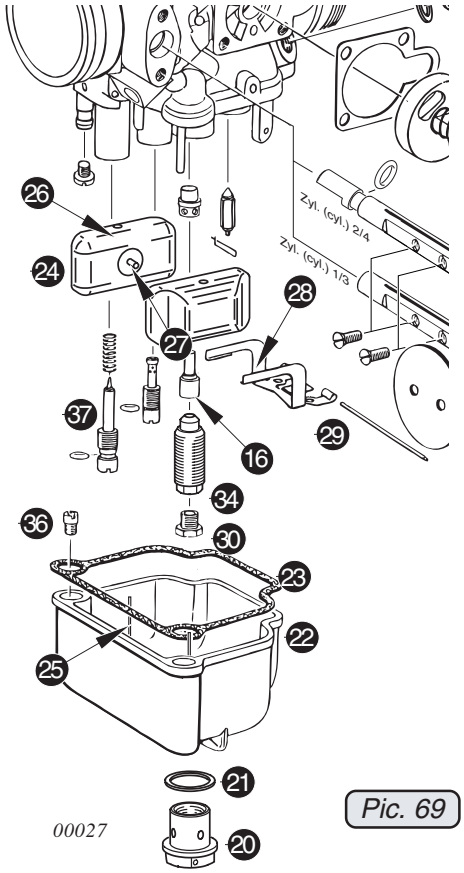


Pic. 68

Check if float suspension brackets ㉙ are parallel. To do so, remove main jet ㉚ and attach gauge ㉛, *part no. 877 730*, with a hex. screw ㉜ to the mixing tube. When the needle valve is closed, both brackets ㉝ of the float suspension must be of equal distance of 5,4 ÷ 5,5 mm (0.21 ÷ 0.22 in.).

Renew float suspension always together with float needle valve.

At noticeable imperfection the float suspension can be bent for correction or be renewed. After the check remove the gauge and refit main jet.



Pic. 69

13.1.2.8) Jets

Carburetor jets, see Chapter 8, or latest spare parts list.

Remove main jet ㉚, mixing tube ㉞, needle jet ⑯, idle jet ㉟, start jet ㊱, and mixture screw ㊲. Clean carburetor and jets with fuel. Carefully blow through all jets and bores in the carburetor housing with compressed air and check for free passage.

Check inner diameter of needle jet if oval, replace if necessary. Check the size.

■ CAUTION: At all work on the carburetor proceed with optimum cleanliness.

The pressure connection tubes are of essential importance for safe operation of the engine. See Chapter 9.2) and 12.3.2).

Check all tubes for damage (mechanical, thermical, etc.) and leakage.

■ ATTENTION: All tubes are secured with clamps. Check them for security.

If the tubes have been detached or renewed, connect them correctly:

- ➪ hose nipple ❷ to T-piece ❸
- ➪ T-piece ❸ to fuel pressure regulator ❹
- ➪ T-piece ❸ to condensation water trap ❺
- ➪ condensation water trap ❺ to airbox pressure sensor
- ➪ hose nipple ❻ to 3-way solenoid valve ❼ (towards 2-pole electric connector ❽)
- ➪ hose nipple ❾ to 3-way solenoid valve ❼ (towards opposite side of electrical connector ❽)
- ➪ 3-way solenoid valve ❼ (top connection) to T-piece ❿
- ➪ T-piece ❿ to float chamber venting of carburetor 1/3
- ➪ T-piece ❿ to float chamber venting of carburetor 2/4

Secure all tubes with clamps 8 ⓫.

An exception are the 3 tubes on 3-way solenoid valve which, due to the dimensions of the valve, have to be secured with clamps 6,8 ⓬.

The tubes for float chamber venting are to be fitted with cable strap ⓭ to the fuel tubes. Do not constrict!

■ ATTENTION: For all pressure connection tube, utilize the total slip-on length for tube connection, and secure tubes with suitable clamps.

Route the tubes so that scouring or kinks are avoided.

13.1.12) Reassembly of carburetors, carburetor flanges, fuel tubes and drip trays

See Pic. 88/89 and 90.

The drip tray ❶ is fitted together with the carburetor flange ❷.

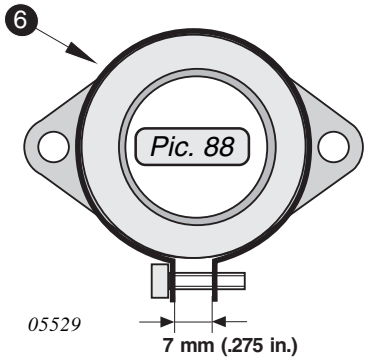
Fit carburetor flange, drip tray and new gasket ❸ with 2 hex. screws ❹ M8x25 and washers.

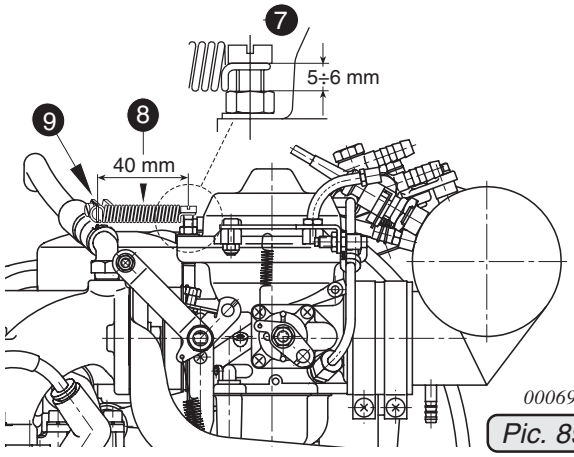
Secure screws with LOCTITE 221. Tightening torque 15 Nm (135 in.lb).

◆ NOTE: If leakage is noticed in the area of the drip tray, seal with SILASTIC.

Insert aluminum spacer ❺ 36/43/2,5 into carburetor flange. Fit carburetor in carburetor flange **free of grease and oil**, align and fix with tube clamp ❻. From 1999 on the spacer ring is cancelled (see SI-912-004/SI-914-006, latest issue).

■ CAUTION: Tighten the new carburetor flange only up to the prescribed gap of 7 mm (.275 in.). See Pic. 88.





Pic. 89

From field experience cases are known where the hose clamp was tightened excessively. This may cause the flange to be scoured at the inside by the carburetor rim possibly damaging it.

Check distance of 5 ÷ 6 mm (.20 ÷ .24 in.) on Allen screw ❼ as this is important to allow free movement of the spring ❽.

Engage spring with suitable tool on the bracket ❾.

■ CAUTION: To ensure efficient carburetor suspension, a distance of 40 mm (1.57 in.) between Allen screw and bracket must be respected.

◆ NOTE: Now fit the 2 fuel tubes as this will no more be possible with airbox mounted.

Fit fuel tube ❿ with union nut ⓫ on carburetor (fuel inlet). Support the tube with hose clamp ⓬ on carburetor bracket. Attach hose clamp with Allen screws ⓭ M5x12 and nuts ⓮. The tighten union nut to 10 Nm (90 in.lb).

Now the airbox ⓯ can be fitted on the connections of the carburetors. Do not damage the previously fitted fuel tubes and pressure connection tubes.

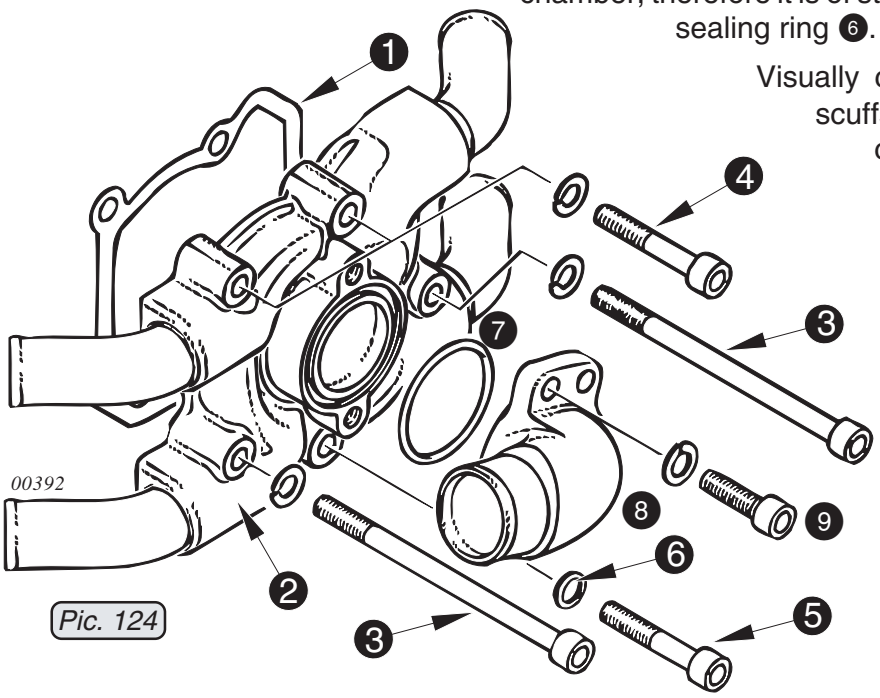
Pay attention that all faces of attachment are **free of grease**.

13.3.10) Water pump housing — reassembly

See Pic. 124.

Place gasket ❶ and attach water pump housing ❷ with 2 Allen screws M6x90 ❸ and 3 Allen screws ❹ M6x35 with lock washers to the ignition housing, torque to 10 Nm (90 in.lb).

■ ATTENTION: The bottom Allen screw M6x35 ❺ reaches into the water chamber, therefore it is of stainless steel and fitted with a sealing ring ❻.



Pic. 124

Visually check whether the impeller scuffs in the pump housing. This can be recognized by scuffing traces in the pump housing or on the impeller. If necessary, the axial position of the impeller can be corrected to achieve an optimum gap (see Chapter 13.3.8).

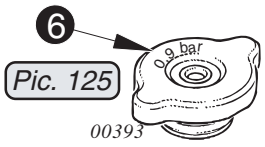
Insert O-ring ❼ into water pump housing and fit the water inlet elbow ❽ in the position marked before disassembly with 2 Allen screws ❾ M6x20 and tighten to 10 Nm (90 in.lb).

◆ NOTE: The water inlet elbow is symmetrical and can be fitted turned by 180° if required.

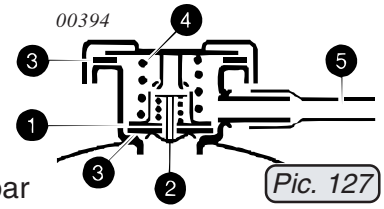
Fit coolant hoses and fix them with genuine hose clamps.

■ ATTENTION: Do not tighten hose clamps excessively in order not to damage the hose!

13.3.11) Expansion tank



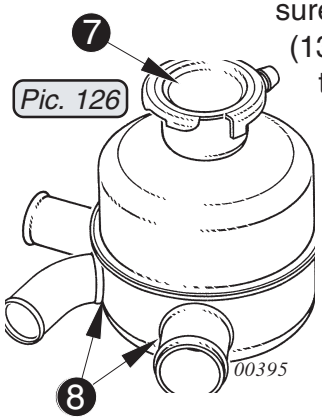
Pic. 125



Pic. 127

See Pic. 125/126 and 127.

To allow pressure compensation in the cooling system, an expansion tank is required. When due to heating of the coolant the pressure in the cooling system rises above 0,9 bar (13 p.s.i.), the excess pressure valve ❶ opens and the coolant can escape to the overflow bottle. When the liquid cools down, the return valve ❷ opens and the coolant is sucked back into the expansion tank.

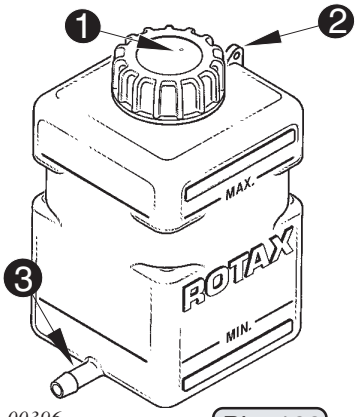


Pic. 126

Check seal ❸, spring ❹ and both valves of the radiator cap. If necessary, replace radiator cap to assure 0,9 bar (13 p.s.i.) ❻ opening pressure. ❺ = connection to overflow bottle.

Check sealing surface ❼ and hose connections ❽ of the expansion tank. Check for possible damages or chafing marks. A rubber plate is glued to the bottom side of the expansion tank. Attach expansion tank so that no scouring with neighbouring parts is possible.

13.3.12) Overflow bottle



Pic. 128

See Pic. 128

Check for damages. Check venting bore ❶ in the cover (see Service Bulletin SB-914-025, "Modifications or the overflow bottle", current issue). Check bracket ❷ for the safety wiring. Check tube connection ❸.

13.3.13) Radiator

Clean radiator elements and check for damages, straighten if necessary. Especially check the hose connections and the fixations. Check for tightness if leaks are suspected.

13.3.14) Radiator hoses

Visually check for damages, especially in the area of the hose clamps. If chafing spots are detected, replace coolant hose.

■ CAUTION: Only use temperature- and pressure resistant hoses meeting the aeronautical standards.

13.3.15) Hose clamps

Visually check. Do not tighten hose clamps excessively to avoid damage to the coolant hose. Position the lugs as to avoid collision and friction with neighbouring parts.

13.3.16) Cooling air baffle

The cylinders are ram-air cooled. The cooling air is pushed at flight and by the propeller into the engine compartment and is distributed by the air baffle equally to the single cylinders. Visually check for damages, cracks, chafing marks, burnt spots etc. At noticeable damages replace the air baffle.

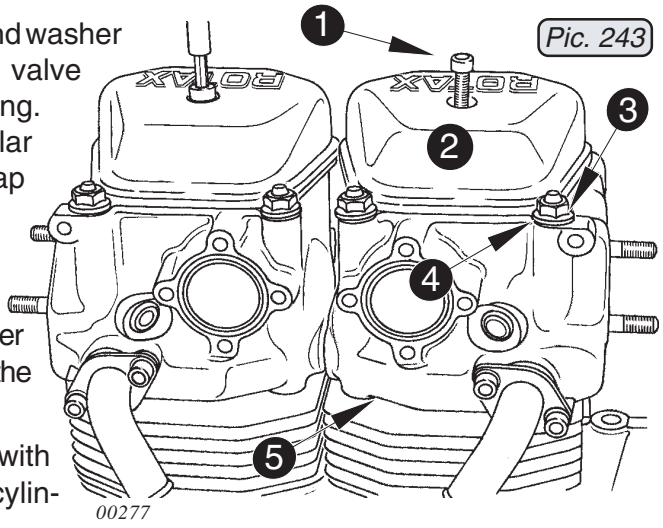
14.5) Cylinder head — removal

See Pic. 243 and 244.

If components of several cylinders are dis-assembled, they must be marked to ensure correct coordination at re-fitting.

Remove Allen screw M6x25 ❶ and washer from valve cover ❷ and lift off valve cover and large and small O-ring. Remove crosswise 2 each collar nuts ❸ with washers ❹ and 2 cap nuts M8. The cap nut is inside the valve cover and has a sealing edge.

◆ NOTE: There is no washer required under the cap nut.



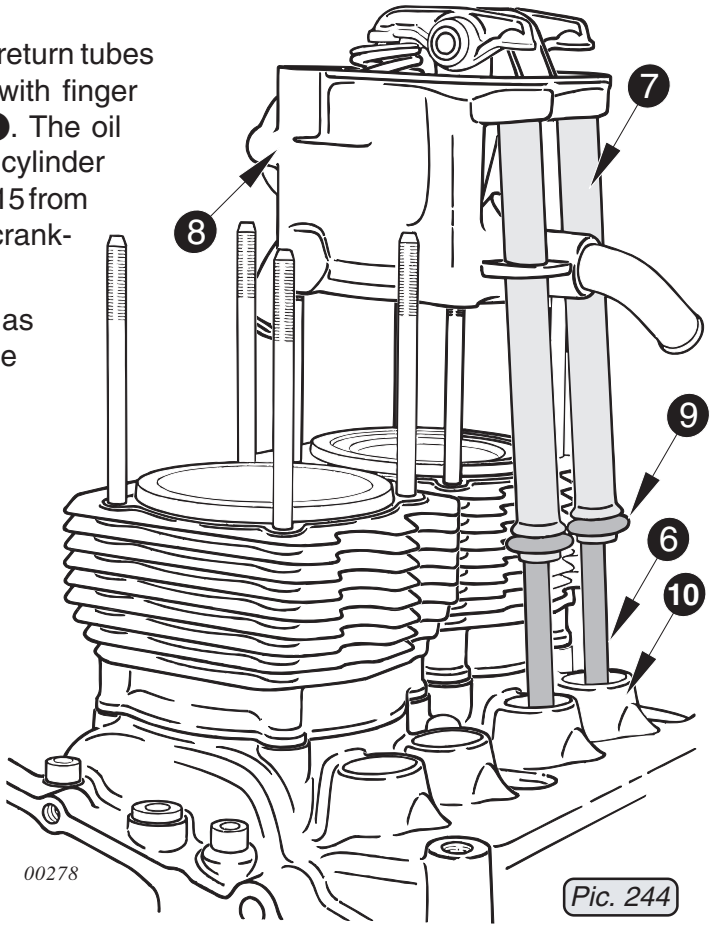
Pic. 243

Lever complete cylinder head off with screwdriver, levering between cylinder ❺ and cylinder head.

■ ATTENTION: Do not damage the sealing surface!

Keep both push rods ❻ in oil return tubes ❼ in position, seal oil bore with finger and remove cylinder head ❽. The oil return tubes remain with the cylinder head. Remove O-rings ❾ 16x15 from the oil return tubes or from crankcase ❿.

Lay aside cylinder head so as not to damage sealing surface and oil return tubes. Lift out oil filled push rods, stop oil from dripping by sealing with finger. Coordinate push rods with cylinder heads to prevent any mix-up.



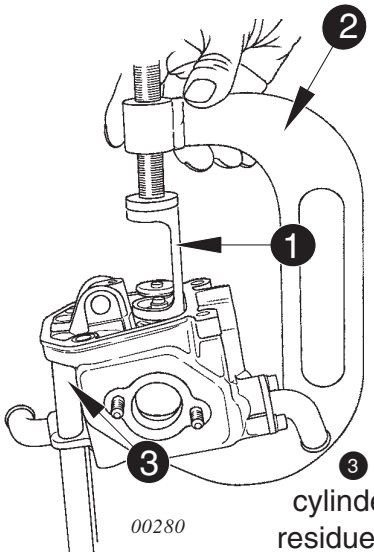
Pic. 244

14.5.1) Cylinder head - disassembly

See Pic. 245.

If the cylinder head is not removed but the rocker arms should be dismantled, turn crankshaft to set the piston of the respective cylinder to ignition T.D.C. and thus only little pressure remains on the rocker arm. Depress rocker arm with test lever *877 690* towards hydraulic valve tappet. Now the rocker arm is completely released and the rocker arm shaft can be removed.

◆ NOTE: The hexagon of the cap nut may be in an unfavourable position as to prevent removal of the rocker arm shaft. In this case loosen the nut.



Pic. 245

Withdraw rocker arm shaft and remove both rocker arms.

Compress valve springs utilizing valve spring mounting device ❶, part no. *877 380* and clamp ❷ or similar tool and lift out valve cotters. Release valve spring. Remove valve spring retainer and both springs, and withdraw valve.

◆ NOTE: Prior to removal of valves, clear burrs which may be present on valve stems to prevent damage to valve stem seal and valve guide. Mark valves coordinately.

Repeat procedure for the second valve. Clean cylinder head.

Check oil return tubes for leaks (visual check). If leaking in the area ❸ the respective tubes must be renewed. For this procedure heat the cylinder head to approx. 180° C (360° F). Extract tubes and remove any glue residues from bore. Apply LOCTITE 648 on oil tubes in the area of the two grooves and twist and push tube into position in the preheated cylinder head.

◆ NOTE: Apply LOCTITE only on the cold part!

At renewal of bent socket for coolant, mark its position, heat cylinder head to approx. 80° C (176 °F) and turn out socket. Remove residues of securing agent and check threads. Apply LOCTITE 648 on cylinder head and on bent socket and turn socket into the cold cylinder head. Let cylinder cure for approx. 10 minutes at 80° C (176° F).

If there are oil carbon residues on the sealing face with cylinder, remove them carefully. Check sealing face for planeness.

At slight wear, valve and valve seat may be seal-lapped, using emery paste.

Clean cylinder head and single components in gasoline or kerosine. Check sealing face of cylinder head, and if need be, true up along with cylinder, but only slight rework (max. 0,1 mm / 0.004 in. per side) is allowed.

Renew valve stem seals. If the engine has been "run hot", check in any case hardness of cylinder head and cylinder material, see Chapter 12.4.7).

ROTAX AIRCRAFT ENGINES

Prüfprotokoll für Zündanlage / *Inspection protocol for ignition unit*

(mit "Klammergeber" / *with "clamps pick up"*)

Formblatt Nr. 17-045/G—02 10 19

Kunde / *Client* :

Type, S/N / ***engine type, S/N:***		
Zündanlage, S/N.: ***Ignition unit, S/N:***		**TSN** / **TSO**
Sichtkontrolle: ***Visual check:***		**Bem. / rem.**

Geber-Zuordnung: ***Pick-up coordination:***	**Type**	Zündkreis / *Ignition circuit* A 1/2	A 3/4	B 1/2	B 3/4
Zündspule: Einschaltdrehzahl max. 220 1/min	**912**	1T / 2T	3B / 4B	1B / 2B	3T / 4T
	914	1T / 2T	3T / 4T	1B / 2B	3B / 4B
Ignition coil: *start r.p.m. max. 220 r.p.m.*					

Abstellkontrolle: Kreis **A** ***Ignition stop check:*** *Circuit* ***A***	Zündfunke "AUS" *Spark "OFF"*	
Abstellkontrolle: Kreis **B** ***Ignition stop check:*** *Circuit* ***B***	Zündfunke "AUS" *Spark "OFF"*	

Zündverstellung bei: (max. 1000 1/min) ***Ignition variation at:*** *(max. 1000 rpm)*	A 1/2	A 3/4	B 1/2	B 3/4

SMD-Modul oben.S/N,TNr: ***SMD-modul, top*** *S/N, p/n:*			**Bem. / rem.**
SMD-Modul unten S/N,TNr: **SMD-Modul bottom** *S/N, p/n:*			

Anschlußbelegung gem. Schaltplan GÜ-Handbuch Bild Nr.156 kontrolliert
wire connection checked according circuit diagram, overhaul manual fig.156

Bemerkungen / ***Remarks***:

Zündspannung kV / *Ignition Voltage / kV*

HV-Test: Geprüft mit 5 kΩ Stecker und 50 pF Kondensator, offen, kein Funkenüberschlag /
Tested with 5 kΩ spark plug connector and 50 pF capacitor, open, no flash over.

Zündkabel ***Ignition cable***	**n = 250**	**n = 500**	**n = 5000**
1 TOP			
2 TOP			
3 TOP			
4 TOP			
1 BOTTOM			
2 BOTTOM			
3 BOTTOM			
4 BOTTOM			
Mindestwerte / *min. values (kV)*	14	20	20

Stator mit Ohmmeter geprüft / *Stator tested with Ohmmeter:*

Ladespulen (2 Stück) *Charging coils (2 pieces)*	Kreis **A** *circuit* **B**	gegen Masse *against ground*	soll / *nom.* 3,2 ÷ 4,5 Ω	
Lichtspulen (8 Stk.) *Lighting coils (8 pieces)*	in Serie (gelb-gelb) / *in series (yel-yel)*		0,1 ÷ 0,8 Ω	
	gegen Masse / *against ground* ×			

Prüflauf mit Fremdregler und 12V 36 Ah Batterie (geladen)
test run with external regulator and 12V 36 Ah (loaded)

Drehzahl / *speed R.P.M.*	Lampenbelastung *load / bulbs voltage nomin.*	Spannungsanzeige soll	Spannungsanzeige ist *voltage actual*
4000 1/min	—	14,0 ± 0,3 V	
4000 1/min	150W	13,2 ± 0,5 V	

Geberwiderstand (weiß/gelb – blau/gelb) *Pick-up resistance (white/yel.– blue/yel.)* (bei offener Steckverbindung/ *with open connector)*		A 1/2	A 3/4	B 1/2	B 3/4	Drehz./rev.

Unterschrift Prüfer / *Signature Tester:* | Datum / *Date*: | Abt. / *Dept.:* | Auftr. Nr. / *order no.*:

Vert. / *Co.*: AA,

Druckdatum / *date of print*:

ROTAX AIRCRAFT ENGINES

Prüfprotokoll für Elektrostarter / *Inspection protocol for electric starter*

Formblatt Nr. 17-039/F—01 07 10

Kunde / *Client* :

Elektrostarter, TNr.: *Electric starter, p/n.:*	S/N: *S/N:*	Eingebaut in Motortype: *Installed in engine type:*	S/N: *S/N:*	TSN / *TSO*	Auftr. Nr.: *Order no.:*

Anker / *Armature:*

Kollektor / *Commutator*: neu / *new*: ø 28 mm min: ø 27,5 mm ist / *act.*: ø ____ mm Bemerkung/ *remark*:

Ankerwelle, Sichtkontrolle kollektorseitig / Armature shaft, visual check commut. side:

Ankerwelle abtriebseitig / *Armature shaft, drive side*: Verzahnung / *Teeth*:

Bemerkung / Remark:

Axialspiel / *axial clearance*
neu / *new*: 0,1÷0,4 mm
max. / *wear limit*: 0,7 mm
ist / *actual*: ____ mm

Kohlebürsten / *Carbon brush:*

	neu / *new*	minimum	ist / *actual*	
Länge der Plus-Kohle / *Plus brush:*	12,0 mm	8,5 mm	____ mm	Beide Kohlen werden bei der Grundüberholung erneuert! / *Both brushes are renewed at general overhaul!*
Länge der Minus-Kohle / *Minus brush:*	12,0 mm	8,5 mm	____ mm	

Bemerkung / *Remark*:

Kollektor / *Commutator*

	neu / *new*	ist / *actual*	Radialspiel / *radial clearance*	Bemerkung / *Remark:*
Lagerbüchse / *Bearing bushing:*	ø 9,82 mm	ø ____ mm	max. 0,06 mm	
Ankerwelle / *Armature shaft:*	ø 9,79 mm	ø ____ mm	ist / act. ____ mm	

Abtriebslager / *Drive bearing*

	neu / new	ist / actual	neu / new	Bemerkung / Remark:
Lagerflansch / *Bearing shield:*	ø 32,0 mm	ø ____ mm	max. 0,06 mm	
Lagersitz auf d. Welle / *Bearing seat on shaft:*	ø 15,02 mm	ø ____ mm	Preßsitz / *pressfit*: ____	

Rk-Lager / Ball bearing:

Startergehäuse / *Starter housing*:

Prüflauf / *Test Run*:

Bemerkungen / *Remarks:*

Unterschrift Prüfer / *Signature Tester:* Datum / *Date*: Abt. / *Dept.:* Auftr. Nr. / *order no.*:

Vert. / *Co.*: AA, Druckdatum / *date of print*:

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Pic. 285

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16.4) Form sheet for crack detection

05534 Pic. 206

ROTAX AIRCRAFT ENGINES

Materialprüfung / *Material Inspection*
bei Instandhaltung / *at repair*

Magnetpulver-Risseprüfung für Motor / Magnaflux inspection for engine	Type	TSN	Motor / engine S/N

Kurbelwelle / crankshaft						Propellergetriebe / propeller gear box					
TNr. / p/n		TSN		S/N		TNr. / no.:		TSN		S/N	

Bezeichnung / Description	S/N / S/N	Teile Nr. / part no.	Anzeichen / *Findings* nein / no	ja / yes	Bemerkung / remark

					soll / *nom.*	ist/*act*	soll/*nom.*	ist / act
Klauenrad / dog gear S/N								
Antriebsrad / drive gear S/N								
Propellerwelle S/N / Propeller shaft								
Magnetnabe S/N / magneto flywheel								
Turbogehäuse / turbo housing S/N								
Nockenwelle / cam shaft S/N					HV 10 min.680		900÷1100 N/mm²	

	1	2	3	4			soll *nom*		ist *act*	1	2	3	4
Zylinder / cylinder							soll *nom*	HB 90 ÷ 120	ist *act*				
Zyl. Kopf / cyl. head							soll *nom*	HB 85 ÷ 120	ist *act*				

Prüfer / tester	Labor / Magnaflux	Datum / date:	Abt. / dept.:	Kundenauftragskarte / client assignment no.:

Printdatum | Vert./*co.*: | **Layout: *Materialprüfung*** | Formblatt Nr. 17-086/A—2003 03 01

17) ROTAX® Authorized Distributors for Aircraft Engines

See latest Operators Manual chapter 14 or in the Internet at the official website **www.rotax-aircraft-engines.com.**

18) Reporting

According to the regulation of JAR / FAR 21.3 the manfacturer shall evaluate field information and report to the authority.In case of any relevant occurrences that may involve malfunction of the engine, the form on the next page should be filled out and sent to the responsible authorized ROTAX® distributor.

◆ NOTE: The form is also available from the official ROTAX® AIRCRAFT ENGINES website

www.rotax-aircraft-engines.com

in electronic version.

ROTAX®
AIRCRAFT ENGINES

CUSTOMER SERVICE INFORMATION REPORT

OPER. Control No.	
ATA Code	
1. **A/C Reg. No.**	

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

5. SPECIFIC PART *(of component)* CAUSING TROUBLE

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

6. ENGINE COMPONENT *(Assembly that includes part)*

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

Engine TSN	Engine TSO	Engine Condition	7. Date Sub.

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

Optional Information:

Check a box below, if this report is related to an aircraft

☐ Accident; Date _____ ☐ Incident; Date _____

DISTRICT OFFICE

OPERATOR DESIGNATOR

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

SUBMITTED BY:

TELEPHONE NUMBER: ( ) ____

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