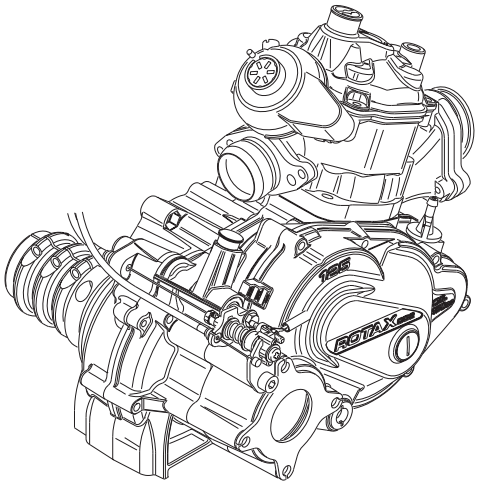
ROTAX®

Repair Manual

for ROTAX®Engine Type **125 MAX DD2**



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Foreword

This Repair Manual contains instructions for all the necessary repair and maintenance work on the Rotax®Engine Type 125 MAX DD2. A special feature of the engine is the chainless and maintenance-free direct drive, which is coupled to a straight-toothed, two-speed gear box.

This Repair Manual is based on information and the state-of-knowledge of BRP-Rotax of the product current at the date of issue.

BRP-Rotax reserves the right to make modifications to the engine series without prior notification and to reflect such changes in this repair manual.

All the work, information and instructions contained in this repair manual satisfy the prerequisite, that they are presented in accordance with the best knowledge and intent. However, BRP-Rotax accepts no liability for damages, which arise as a result of information gained from these repair instructions, nor is responsibility accepted for errors in these instructions.

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IMPORTANT INFORMATION

Attention captions

Throughout this Repair Manual emphasis is placed on specific information, which the user must unconditionally adhere to, through the use of the following captions:

▲ **Warning:** Signifies information, which if not followed, could result in injury to the driver, the technician or other persons and ultimately in their death.

■ **Attention:** Signifies information, which if not followed, could result in major damage to the engine. Likewise, a risk to the health of the driver, the technician or other persons, cannot be excluded.

◆ **Note:** Useful information designed to provided assistance in the execution of a work instruction or inspection/test step.

⇨ Signifies a work instruction

✔ Signifies an inspection/test step

General preAttentionary and safety measures

▲ **Warning:** The ROTAX Engine Type 125 MAX DD2 has been designed and developed exclusively for use in a Kart. Any other use renders the BRP-ROTAX factory limited warranty null and void.

■ **Attention:** The information provided in this repair manual is based on the experience of experts over many years. This information also applies to the specialist under regular operating conditions. The guidelines are sensible and necessary. However, they cannot take the place of expert theoretical and practical instruction.

■ **Attention:** All spare parts used must satisfy the technical requirements specified by BRP-ROTAX. This condition can only be guaranteed by using original ROTAX spare parts. In the event of the use of non-approved spare parts the BRP-ROTAX limited warranty is rendered null and void.

■ **Attention:** Non-approved modifications to the engine and associated components likewise releases BRP-ROTAX from its warranty obligations.

■ **Attention:** A routine repair can only be guaranteed provided the prescribed special tools, devices, securing means, seals and sealing agents and lubricants are used.

■ **Attention:** The prescribed tightening torques must be unconditionally adhered to.

■ **Attention:** When repairing engine components and undertaking engine maintenance work, dismantled seals and retaining rings must always be replaced by the prescribed and BRP-ROTAX approved new parts.

■ **Attention:** Dismantled nuts, bolts and other fixing elements must be reassembled in a cleaned and rust-free condition or replaced by new parts of equivalent quality.

■ **Attention:** Correct observance of the prescribed maintenance interval and careful attention to the technical documentation is decisive for the life and serviceability of the engine.

■ **Attention:** A fundamental requirement is that on removal of the engine for repair or maintenance purposes it should be secured on the Special Tools No. 876 762 (Trestle support) and No. 676 052 (Trestle adapter) obtainable from BRP-ROTAX.

■ **Attention:** After assembly of the engine, inspect all components for correct seating, tightness and correct function.

■ **Attention:** Eliminate small defects as soon as they are discovered, in order to avoid the possibility of major engine damage.

■ **Attention:** Adhere unconditionally to the safety recommendations of the Kart manufacturer.

Technical data

Engine Type	125 MAX DD2
Bore/stroke	54.0 mm / 54.5 mm
Displacement	125.0 cm^3
Nominal power (max.)	24 kW at 12,500 rpm
Torque (max.)	21 Nm at 10,500 rpm
Idle speed	1,500 rpm
Highest permissible speed	13,800 rpm
Ignition unit	Contactless, DENSO digital coil ignition
Spark plug	DENSO IW27, M14x1.25
Electrode gap	0.4 - 0.6 mm (DENSO)
Fuel	SUPER unleaded fuel
RON (min.)	95 Octane
Cooling	Liquid cooling: Cooling circuit with integrated coolant pump
Injection quantity of the coolant pump	22 Litres at 11,000 rpm.
Coolant mixture	50% Anti-freeze (Aluminium compatible) and 50% Water (Distilled)
Coolant capacity	0.9 Litres
Engine lubrication	Oil-in-gasoline lubrication, synthetic 2-Stroke oil
Mixture ratio	1:50 (2%)
Lubrication of the differential drive	SAE engine oil 15W-40
Engine oil capacity	150 ml
Clutch	Centrifugal clutch, in oil-bath
Engagement speed	approx. 4,000 rpm
Power transmission between the centrifugal clutch and the rear axle of the Kart	Unsynchronized two-speed drive
Weight (Dry)	approx. 16.5 kg without intake silencer, carburetor, fuel pump, radiator, exhaust and battery.

Table 1

Visual inspection and servicing intervals of the engine components

Component	Inspection or Service Interval	Inspection, Remedial action
General	Inspect before every operation of vehicle	Inspect overflow tank, empty if necessary
		Inspect overload clutch
		Inspect spark plug, replace if necessary
	Every 50 hours of operation	Replace spark plug
Cooling system	Inspect before every operation of vehicle	Inspect water pump for sealing, in the event of egress of oil or coolant from the overflow orifice, have the pump repaired by an authorised service center
		Inspect the cooling water connections on the cooler housing and cylinder head cover for tightness and sealing
		Inspect the radiator hoses and hose clamps on the engine and radiator for tightness and sealing
Carburetor and intake silencer	Immediately after every collision	Inspect the carburetor connections to the engine and to the intake silencer for tightness
	Every 10 hours of operation (Depending on the conditions of use)	Clean the filter element in the intake silencer and lubricate with oil, replace damaged filter element
Fuel filter	Inspect before every operation of vehicle	Inspect for dirt, replace if required
	Every 10 hours of operation	Replace
Exhaust system	Inspect before every operation of vehicle	Inspect exhaust system for sealing and tightness, lubricate with oil to prevent corrosion
	Every 10 hours of operation	Replace the baffle in the exhaust system silencer
Outlet control	Every 10 hours of operation	Clean the outlet slider check for free movement
Gearbox	Every 2 hours of operation	Check the oil level, top up if necessary
	Every 5 hours of operation	Renew gear oil
Starter drive	Every 50 hours of operation (Depending on conditions of use)	Inspect for wear, replace if necessary
Clutch	Every 10 hours of operation	Inspect clutch drum needle bearing for wear, replace if necessary
		Inspect the friction linings of the centrifugal weights for wear, replace if the lining thickness <1.5 mm
		Clean the soiling groove in the secondary wheel
Engine inspection	Every 50 hours of operation	Engine inspection by authorized service center, replace defective parts

Table 2

▲ W**arning:** All repair and maintenance work must only be carried out by a qualified technician.

SPECIAL TOOLS, LUBRICATION AND SECURING DEVICES

Overview of the special tools required

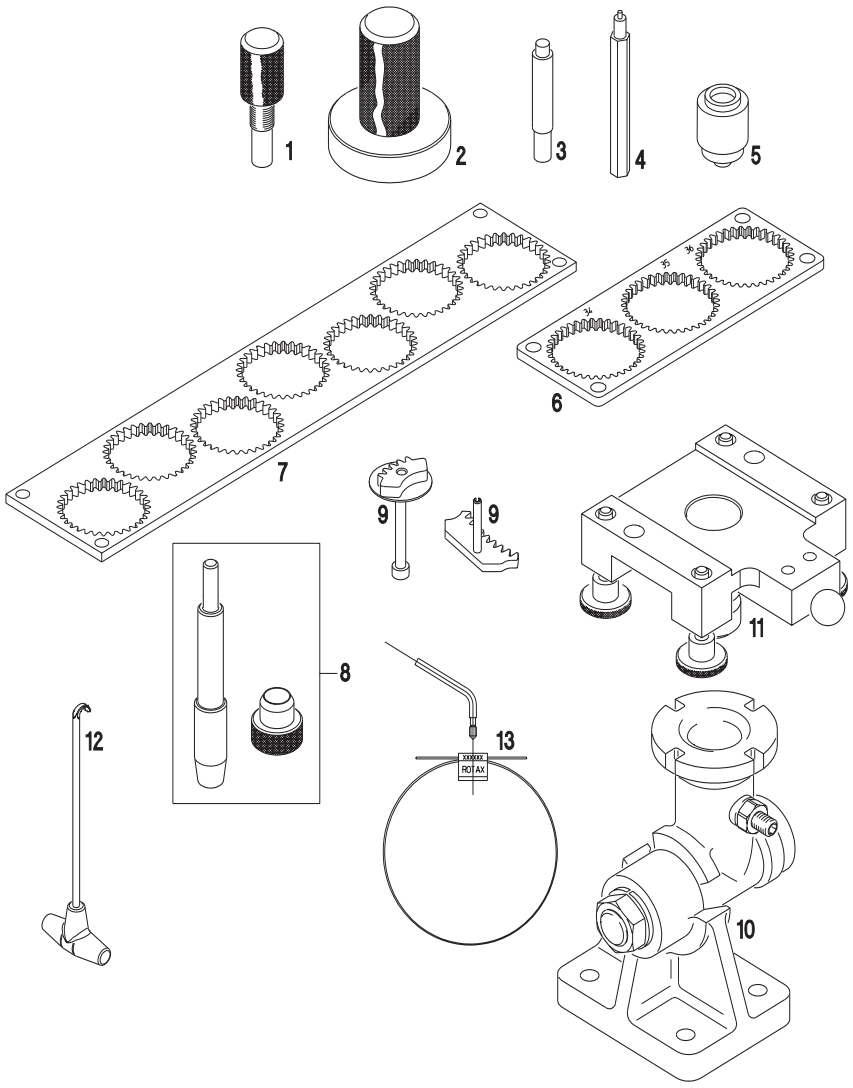


Fig. 1

Pos.	ROTAX Part No.	Description	Use
1	277 380	Locking tool	Locking the crankshaft
2	676 022	Installation tool	Shaft seal, hollow shaft
3	676 030	Installation tool	Bearing sleeve, E-Starter
4	676 032	Installation tool	Clamping sleeve WP impeller
5	676 021	Installation tool	Shaft seal, water pump
6	676 190	Locating/locking device	for primary gear wheels 34, 35, 36 teeth
7	676 192	Locating/locking device	for primary gear wheels 32, 33, 37, 38 teeth
8	676 035	Installation tool	Piston pin circlips
9	676 200/202	Locking device assy.	for locking starter toothed ring
10	876 762	Trestle support assy.	Engine support device for servicing and repair work
11	676 052	Trestle adapter	for ROTAX engine FR 125 MAX DD2
12	251 680	Spring hook	Engine
13	297 040	ROTAX logo	with registered serial number

Table 3

Overview of the lubricants and securing devices

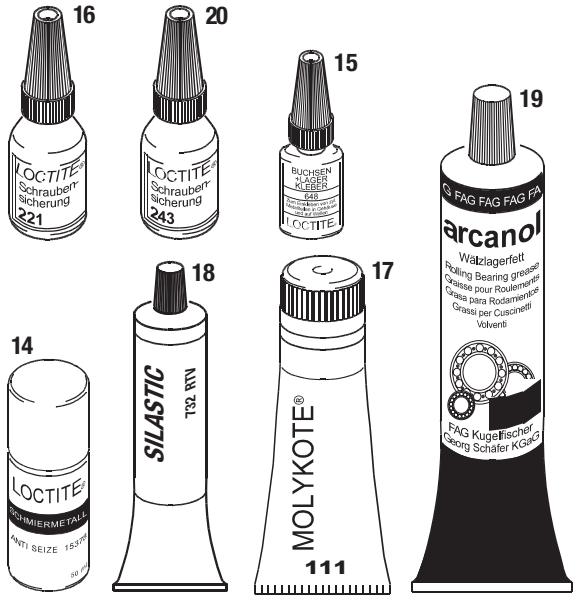


Fig. 2

Item	ROTAX Part No.	Description	Use
14	297 434	Loctite Antiseize 15387	
15	899 788	Loctite 648	Screw locking
16	899 785	Loctite 221	Screw locking
17	897 161	Molykote 111	
18	297 386	Silastic 732	Sealing
19	897 330	Lithium base grease	Roller bearing grease
20	897 651	Loctite 243	Screw locking

Table 4

Location of the engine number

The engine number is stamped on the clutch side housing half, see Fig. 3. This information is required for the unambiguous ordering of spare parts and for enquiries.

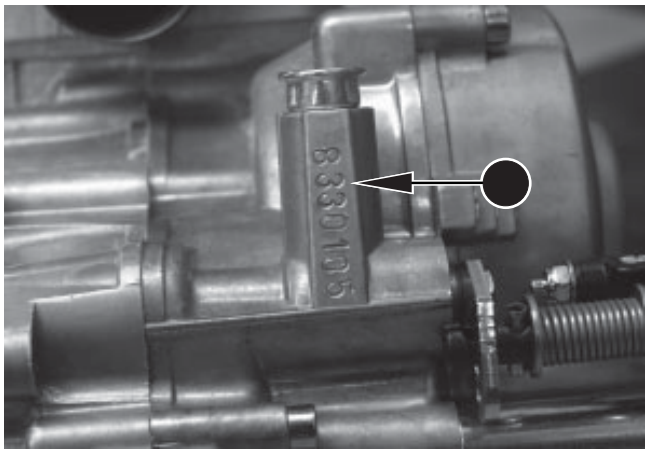


Fig. 3

DISMANTLING THE ENGINE AND GEARBOX

◆ **Note:** Adhere to the operating and installation instructions of the Kart manufacturer. The following basics apply: First allow the engine to cool adequately and switch off all electrical power to the Kart.

◆ **Note:** Remove the leads from the battery terminals.

▲ **Warning:** When disconnecting the battery leads proceed as follows - first free the negative pole, then the positive pole. Remember, that the ignition unit is under a high voltage (25KV) during operation, therefore removal of the spark plug connector during operation is not permissible.

Dismantling the exhaust system

⇨ Free the exhaust system attachments in accordance with the instructions of the Kart manufacturer. See also Fig. 104 and the installation manual.

⇨ Detach the exhaust springs, loosen the nuts on the shock mountings and remove the exhaust system.

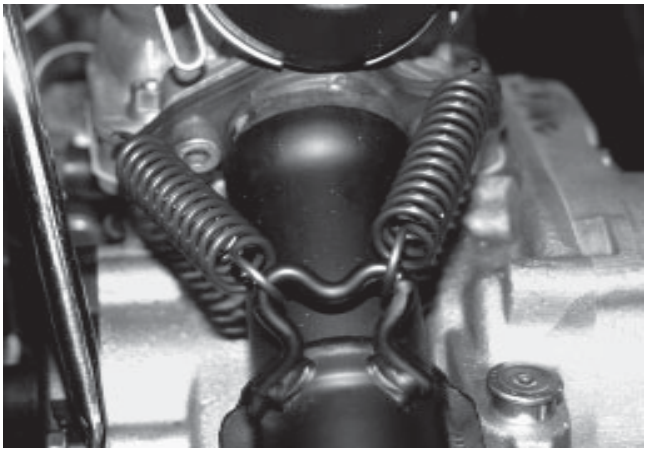


Fig. 4

Dismantling the ignition unit

⇨ Pull the spark plug connector (Item 1) from the spark plug.

⇨ Detach the plug connections on the ignition transformer (Item 4), on the spark generator (Item 3) and on the electric starter (Item 2) by pressing the respective catch on the wiring harness.

■ **Attention:** Always pull on the connector, not on the cable.

⇨ Free the ground cable for the spark generator (Item 7) on 2 nuts (Item 15).

⇨ Free the starter ground cable fixing (Item 12) from the nut (Item 14) and washer (Item 13).

⇨ Loosen and remove the ignition transformer (Item 6) on the nut (Item 14), washer (Item 13) and 2 rubber mountings (Item 9).

⇨ Free the guard plate (Item 8) on the spark generator (Item 7) at the 2 screws (Item 10).

⇨ Loosen and remove the starter motor (Item 5) on the 2 screws (Item 11).

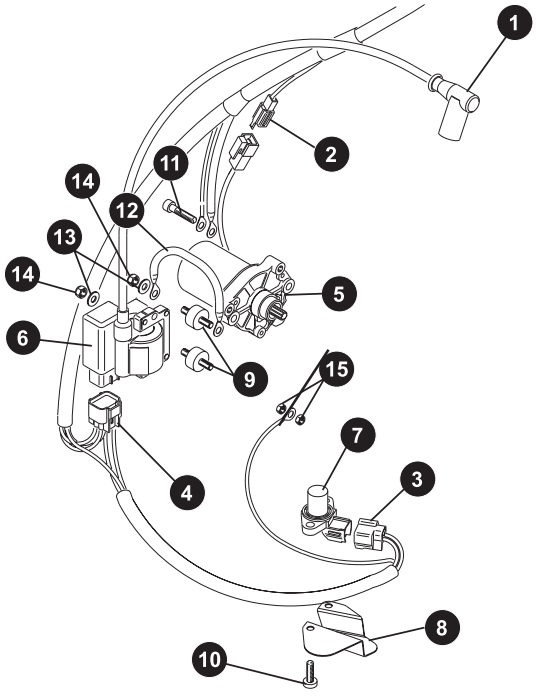


Fig. 5

Removal of the gear shift

⇨ Cut through the cable ties around the Bowden cables.

⇨ Unhook the gear shift actuator Bowden cables.

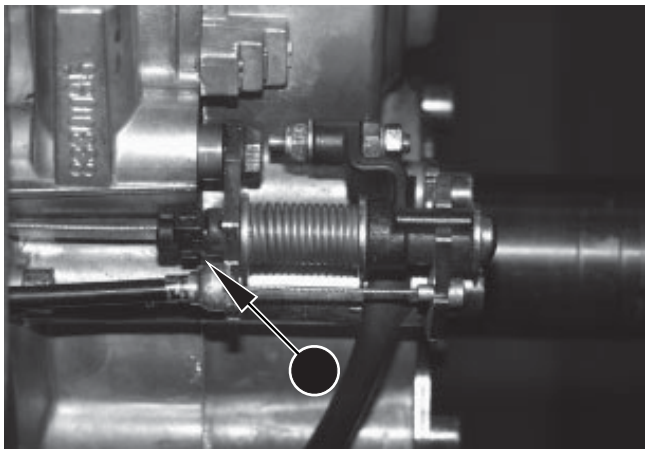


Fig. 6

Removal of the radiator hoses

⇨ Unscrew the radiator hose for the water pump from the connector component at the clamp shown in Fig. 7.

⇨ Collect the coolant in a suitable vessel and use again, if possible, on reassembly of the engine.

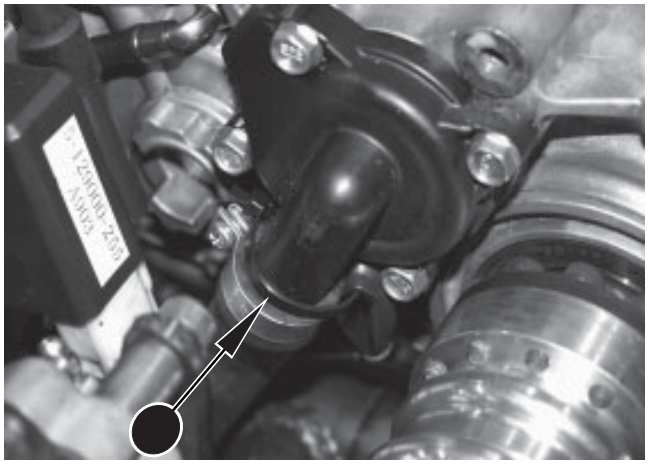


Fig. 7

⇨ Detach the radiator hose from the mounting on the cylinder head cover, after first unscrewing the clamp, as shown in Fig. 8.

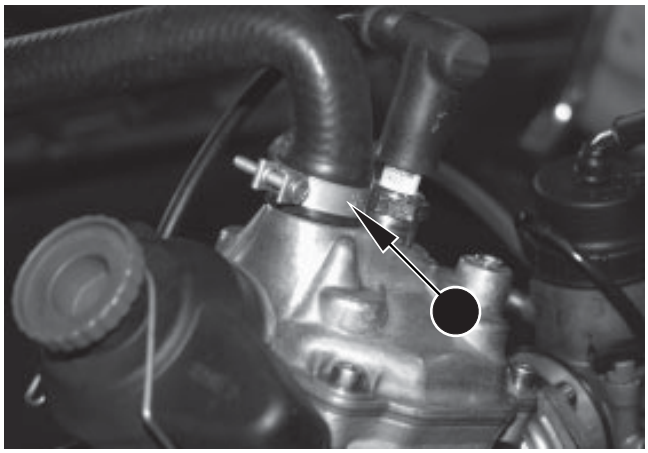


Fig. 8

Removal of carburetor and intake silencer

▲ W**arning:** Any spilt and overflowing gasoline must be immediately absorbed with the aid of a binding agent and correctly disposed of. Do not work with open flames or other sources of ignition. Gasoline must not be allowed to contact hot engine and assembly components - Risk of fire and explosion!

⇨ Detach the hose to the carburetor (Item 7), if necessary, unfasten the fuel hose.

⇨ Remove the impulse pipe (Item 8).

⇨ Dismount the fuel pump (Item 9).

▲ W**arning:** Fuel may spill out when removing the carburetor.

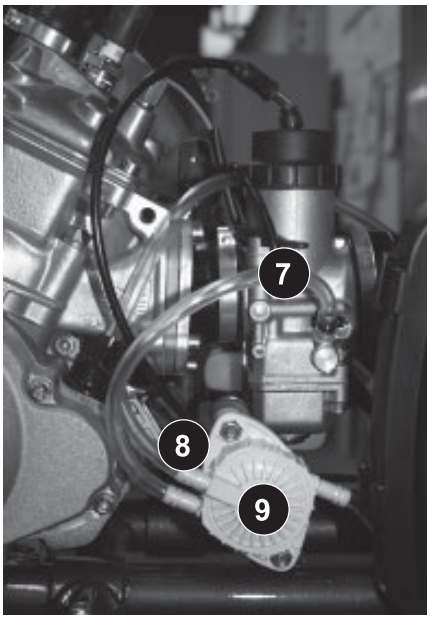


Fig. 9

⇨ Release the intake silencer fixing on the Kart frame, see also Fig. 101, page 57.

⇨ Release the intake screw hose clamp (Item 10) and remove the carburetor, complete with air filter box (Item 11).

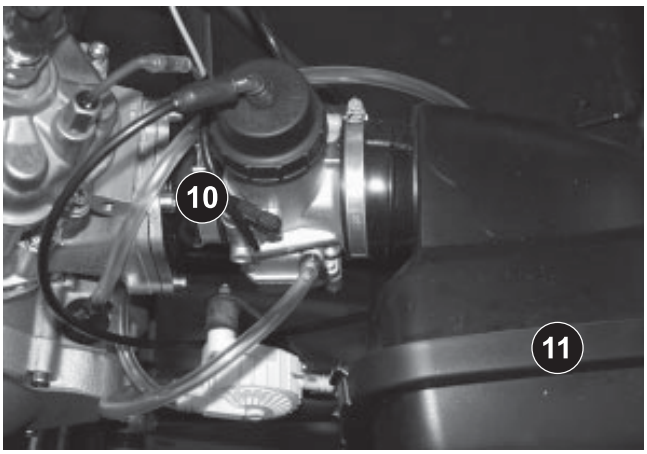


Fig. 10

Removal of overload clutch

⇨ Loosen the retaining ring Allen screws (Item 1).

⇨ Loosen all four slipper clutch socket head screws (Item 2) uniformly.

⇨ Remove the overload clutch from the hollow shaft by moving it towards the left.

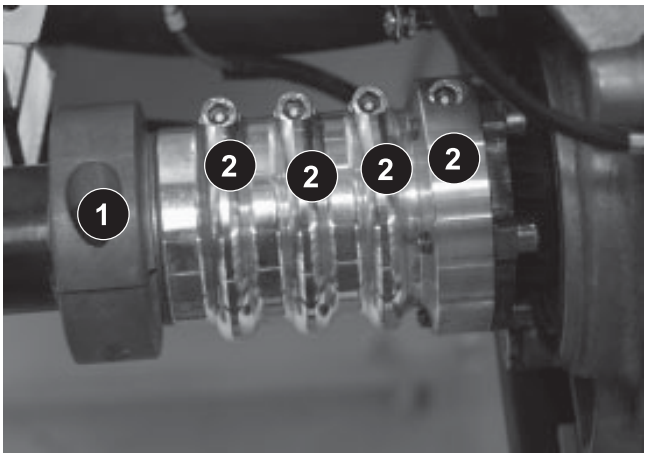


Fig. 11

Removal of the engine from the Kart chassis

⇨ Free the engine support following the Kart manufacturer's instructions.

⇨ Lift the engine from the Kart chassis using a suitable hoist.

Oil draining

⇨ Remove the oil drain screw (Item 1) with sealing (Item 2) from the crank and gearbox housing. Drain the oil into a suitable vessel and dispose of it in the correct manner.

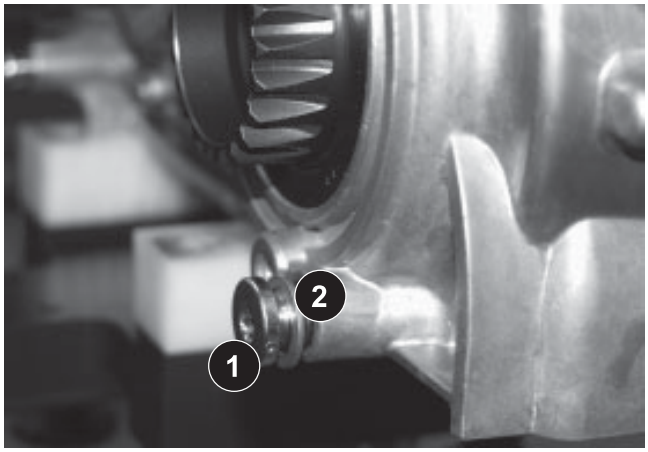


Fig. 12

Removal of the electric starter

⇨ Detach the electric starter (Item 1), complete, from the crank and gearbox housing (Item 3) by removing the 2 Allen screws (Item 2).Disassembly and inspection of the electric starter is described from page 38. Free the ground cable (Item 4) from the housing.

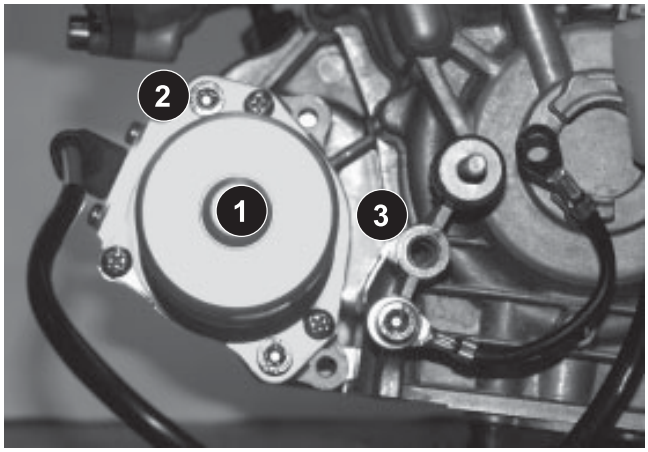


Fig. 13

Positioning the engine on the trestle mounting plate

⇨ Loosen the Hall probe fixing screws and remove the Hall probe from the engine housing.

⇨ Unscrew the base plate from the engine, position the engine on the trestle mounting plate, see Fig. 14, and fix it securely with the 4 fixing screws.

◆ **Note:** Special tool – "Trestle support, complete with trestle adapter mounting plate" ROTAX-No. : 876 762, 676 052.

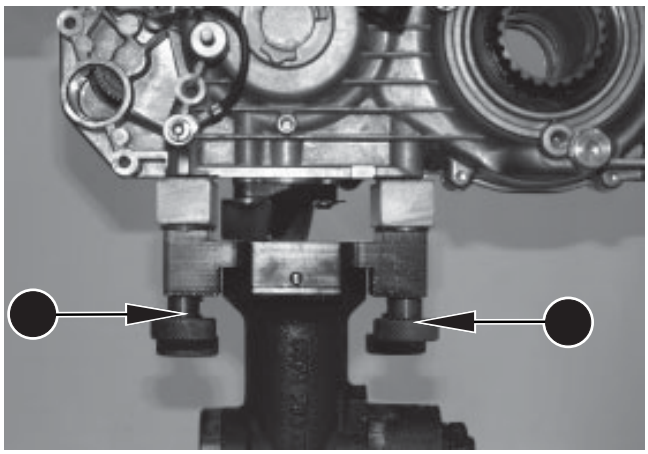


Fig. 14

Exhaust outlet slider function

◆ **Note:** The engine has a pneumatic exhaust outlet control to optimize the performance characteristics. Air pressure controls the slider bellows via the impulse bore. The slider piston pulls up the exhaust outlet slider and thus provides a longer outlet control time. The fuel throughput and therefore also the power is increased.

◆ N**ote:** Adjustment to determine the optimum opening of the outlet slider can only take place under load - on the track, during actual operation. The exhaust gas temperature has a decisive influence on the opening behavior of the outlet slider. The temperature curves during driving operation are completely different to those obtained on the engine test stand and during idling. Therefore the adjustment and changes to the adjustment of the outlet slider during idling are not suitable for predicting performance behavior during actual driving operation.

Disassembly of the exhaust outlet slider

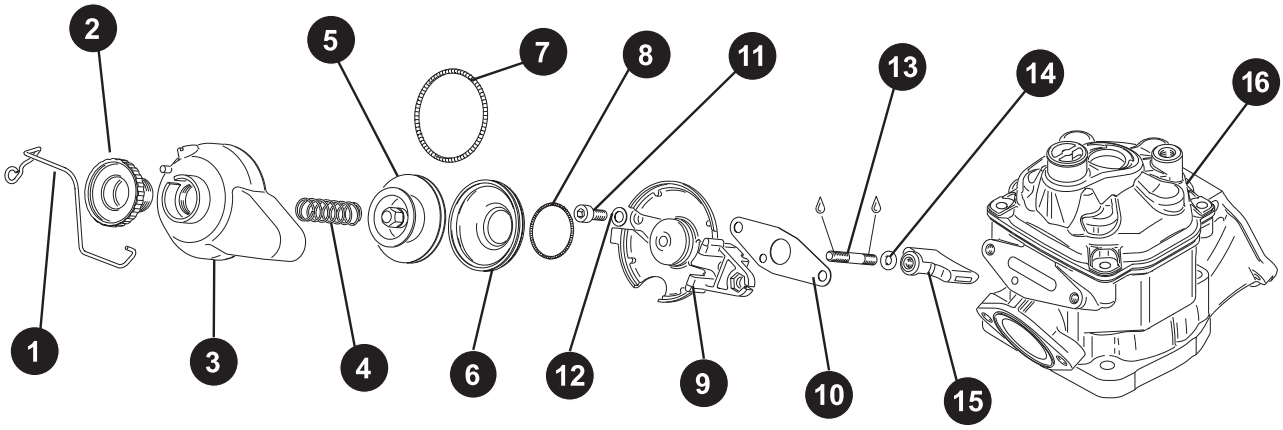


Fig. 15

⇨ Release the spring clip (Item 1).

⇨ Remove and store the slider cover (Item 3), complete with adjuster screw (Item 2) and pressure spring (Item 4).

⇨ Lift away the outer tubular spring (Item 7).

⇨ Unscrew the slider piston (Item 5) using a T-spanner.

⇨ Remove the inner tubular spring (Item 8) from the slider bellows (Item 6), push out the slider bellows from the slider piston.

⇨ Free the slider guide, lower portion (Item 9) from the cylinder (Item 16) by undoing the 2 screws (Item 11). Remove the gasket (Item 10) and washer (Item 12).

⇨ Remove the outlet slider (Item 15) with o-ring (Item 14) and stud bolt (Item 13).

◆ N**ote:** If the outlet slider or the stud bolt is replaced, on installation these must be secured with Loctite 221.

Removal of the exhaust gas flange

⇨ Free the flange (Item 1) at the 2 Allen screws (Item 2) from the cylinder (Item 3) and remove the gasket (Item 4).

◆ **Note:** A leaking connection between the outlet port and the exhaust system leads to a loss of performance.

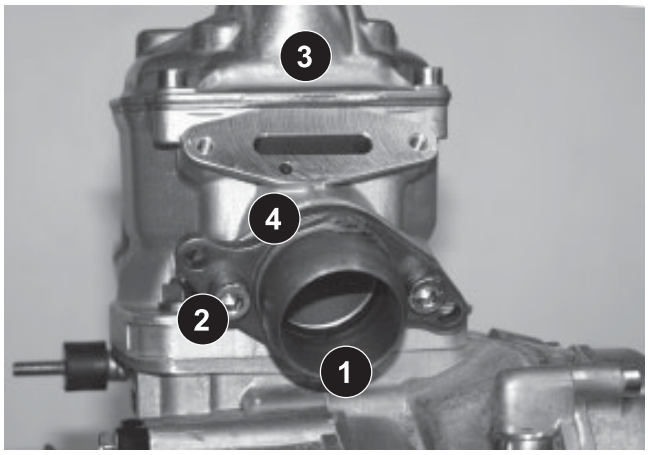


Fig. 16

Removal of the carburetor socket and valve fitting

⇨ Free the carburetor socket (Item 1) with the screw hose clamp (Item 3) from the cylinder (Item 2) by removing the 5 screws (Item 6).

⇨ Remove the valve fitting (Item 4) and gasket (Item 5) from the cylinder.

✔ Inspect the rubber parts for porosity.

✔ Check the reed valve (Item 8) for secure seating.

✔ Check the reed valve (Item.7) for damage and cracks.

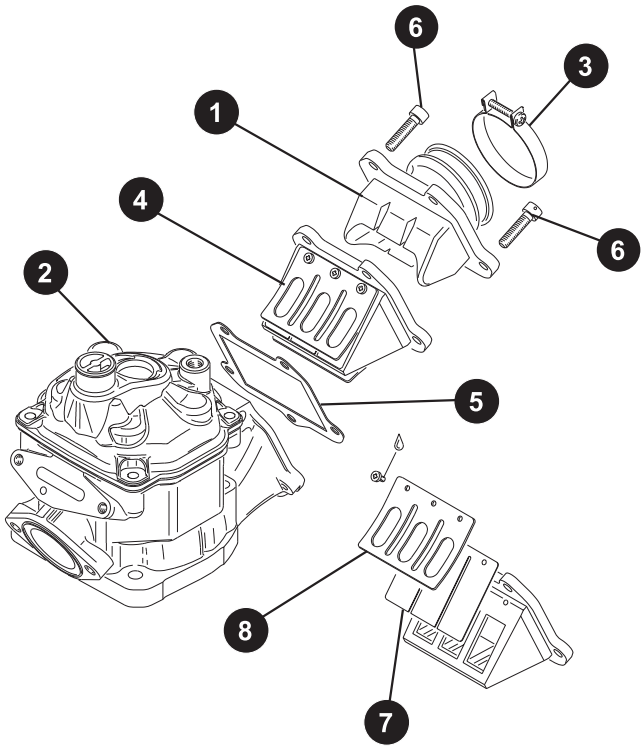


Fig. 17

Removal of spark plug

⇨ Unscrew the spark plug from its threaded socket with the spanner SW 16.

✔ Visual inspection of the spark plug for carbonization, oil fouling and discoloration of the electrode.

Fig. 18 shows the most frequently found examples of spark plug unserviceability, leading to replacement.

1 = normal

2 = fouled

3 = insulator breakage

4 = melted electrode

5 = oil carbon / deposits

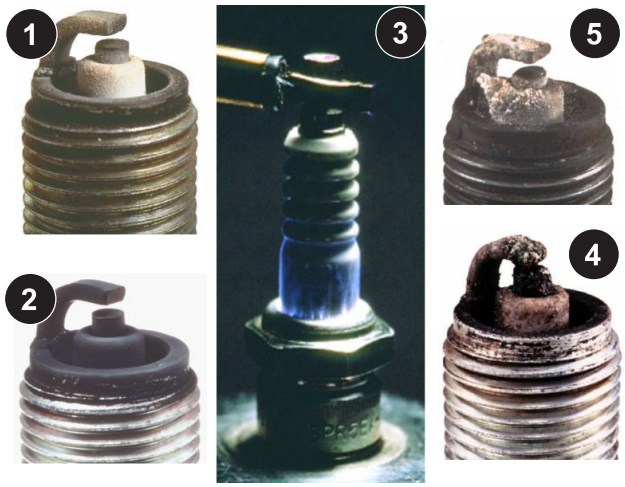


Fig. 18

Removal of cylinder head cover and combustion chamber insert

◆ **Note:** If only the components in the crankcase are to be replaced or inspected, then the cylinder can be removed, complete with the peripheral components: The exhaust socket, carburetor socket and outlet slider remain installed.

Removal of cylinder head cover

⇨ Free the cylinder head cover (Item.1) on removing the 4 screws (Item 5) from the cylinder (Item 2).

⇨ Lift away the cylinder head cover, complete with the shaped gasket (Item 3).

Removal of combustion chamber insert

⇨ Free the combustion chamber insert (Item 6), complete with spring washers, on removing the 5 hexagon head bolts (Item 8).

⇨ Lift away the combustion chamber insert with lower o-ring (Item 7) and upper o-ring (Item 10).

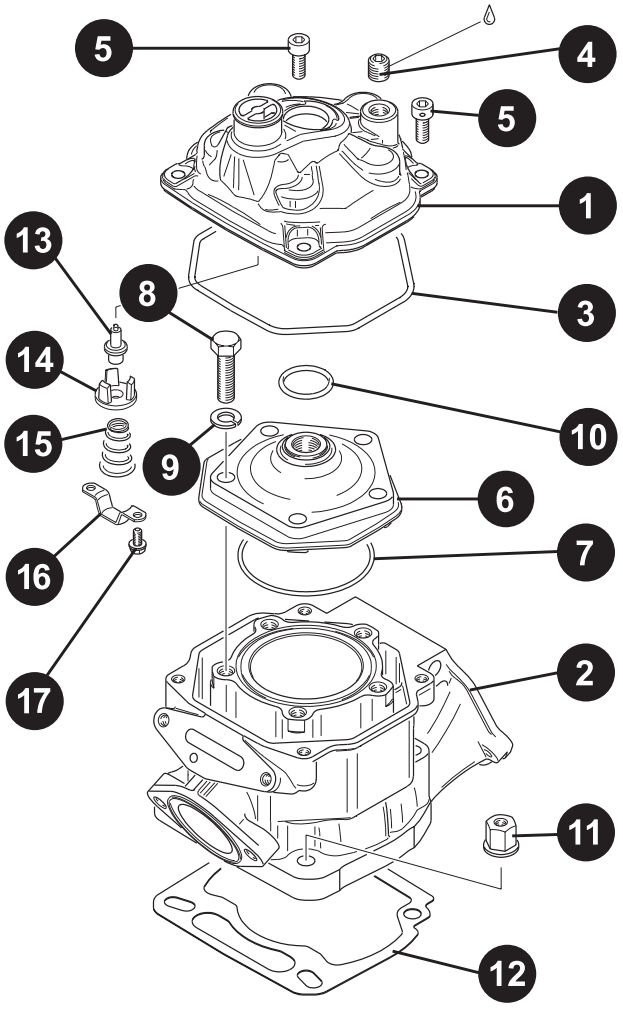


Fig. 19

Removal of coolant thermostat

⇨ Remove the coolant thermostat (Item 13) from the cylinder head cover on removing the 2 screws (Item 17) on the metal mounting bracket (Item 16).

⇨ Remove the thermostat from the support plate (Item 14).

⇨ Remove the coil spring (Item 15).

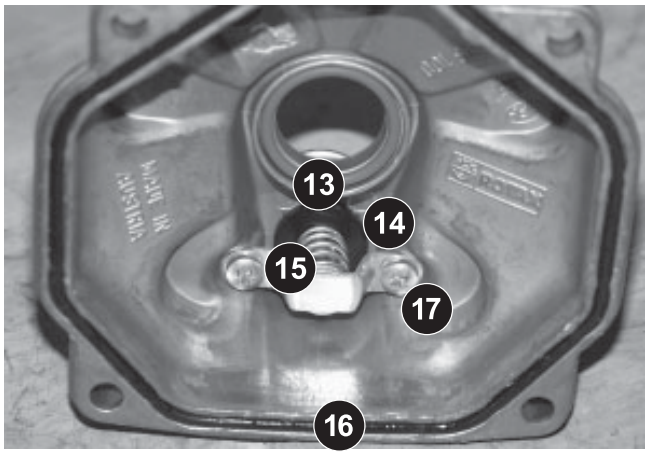


Fig. 20

Removal of cylinder

⇨ Release the cylinder by unscrewing the 4 flanged nuts (Item 11) from the crank and gearbox housing.

⇨ Remove the cylinder with base gasket (Item 12) from the crank and gearbox housing.

⇨ Only loosen the screw plug (Item 4) if it is not sealing or is damaged.

■ **Attention:** Do not damage the piston, piston ring and cylinder wall when dismantling these components.

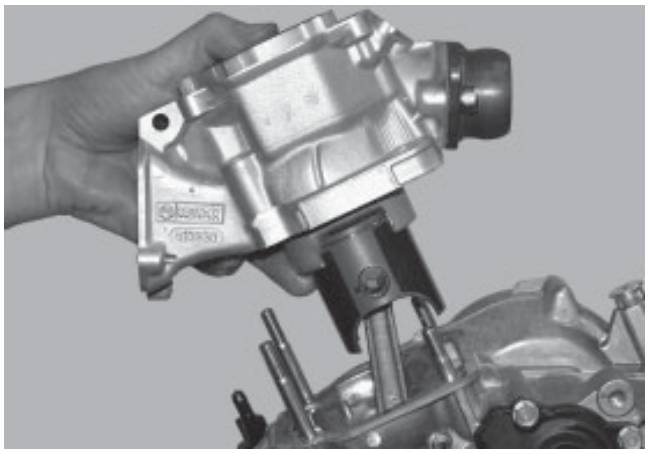


Fig. 21

Removal of the piston and piston ring

⇨ Push out the piston pin retainer ring with a suitable tool.

■ **Attention:** In order to protect the piston pin retainer ring from unintentional loss in the crankcase, a suitable clean cloth should be used to cover the open cylinder bore.

■ **Attention:** Always support the piston with the hand in order to avoid a bending moment on the connecting rod.

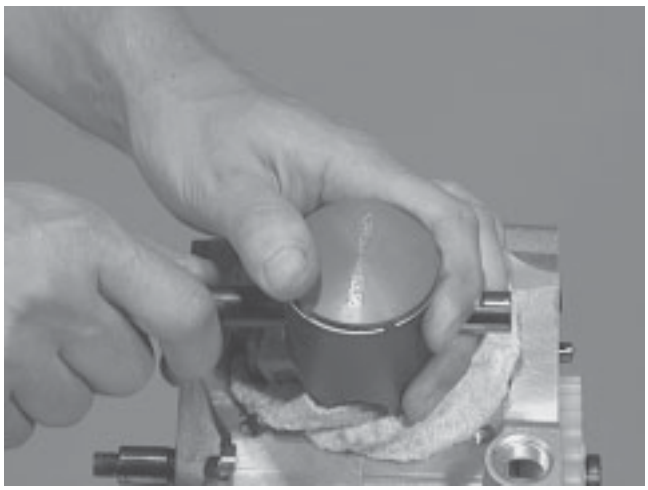


Fig. 22

⇨ Push the piston pin from the piston and conrod using the “Installation tool, complete“ special tool.

◆ **Note:** Use the Special tool - “Installation tool, complete“ - ROTAX part no. 676 035.

⇨ Remove the piston together with the needle bearing.

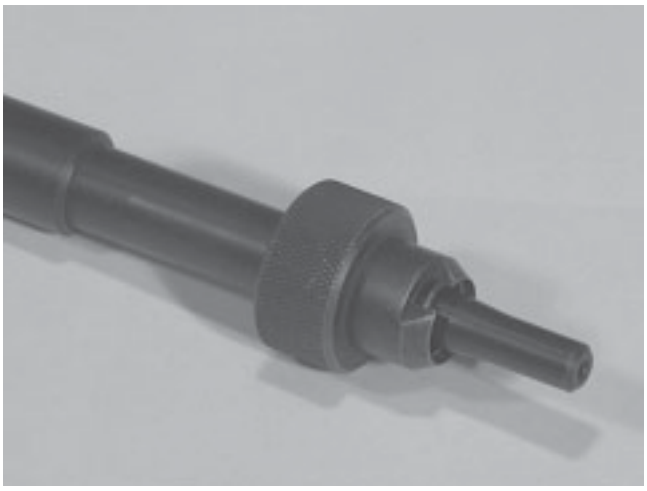


Fig. 23

Removal of the water pump shaft

⇨ Release the water pump flange (Item 1) with shaped sealing ring (Item 2) from the housing (Item 4) on unscrewing the 4 Taptite screws (Item 3). Unscrew the water pump shaft by rotating it clockwise.

⇨ Make sure that the pinion shaft is held and supported, see Fig. 73 page 45.

◆ **Note:** The water pump drive thread is a left-handed thread.

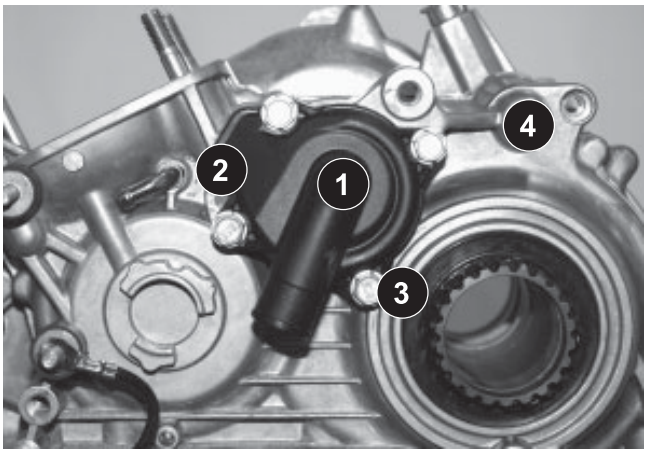


Fig. 24

Removal of the gear shift mechanism

◆ **Note:** The gear shift Bowden cables (Items 1+2) have already been detached before dismantling the engine, see page 14.

⇨ Remove the spring-supported gear shift actuator (Item 5) after removing the screw (Item 11) and freeing the bracket (Item 14). Note the washer (Item 10).

⇨ Remove the rear bracket (Item 6) after removing the screw (Item 8) and washer (Item 7). Retain the thrust washers (Item 9) and coil spring (Item 3).

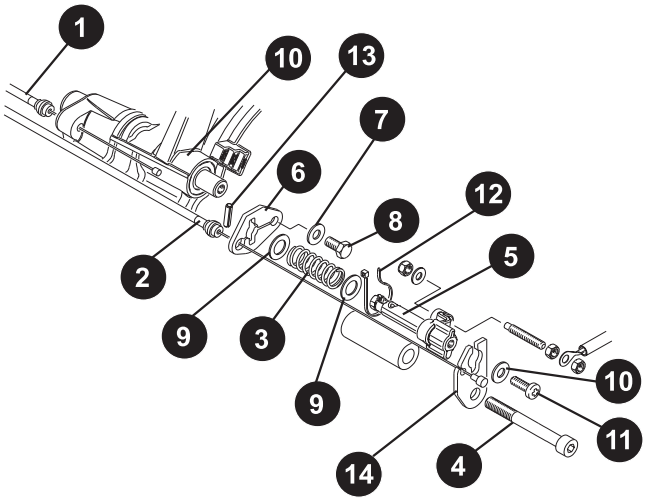


Fig. 25

Disassembly of the clutch, primary and balance drive

Overview of clutch components

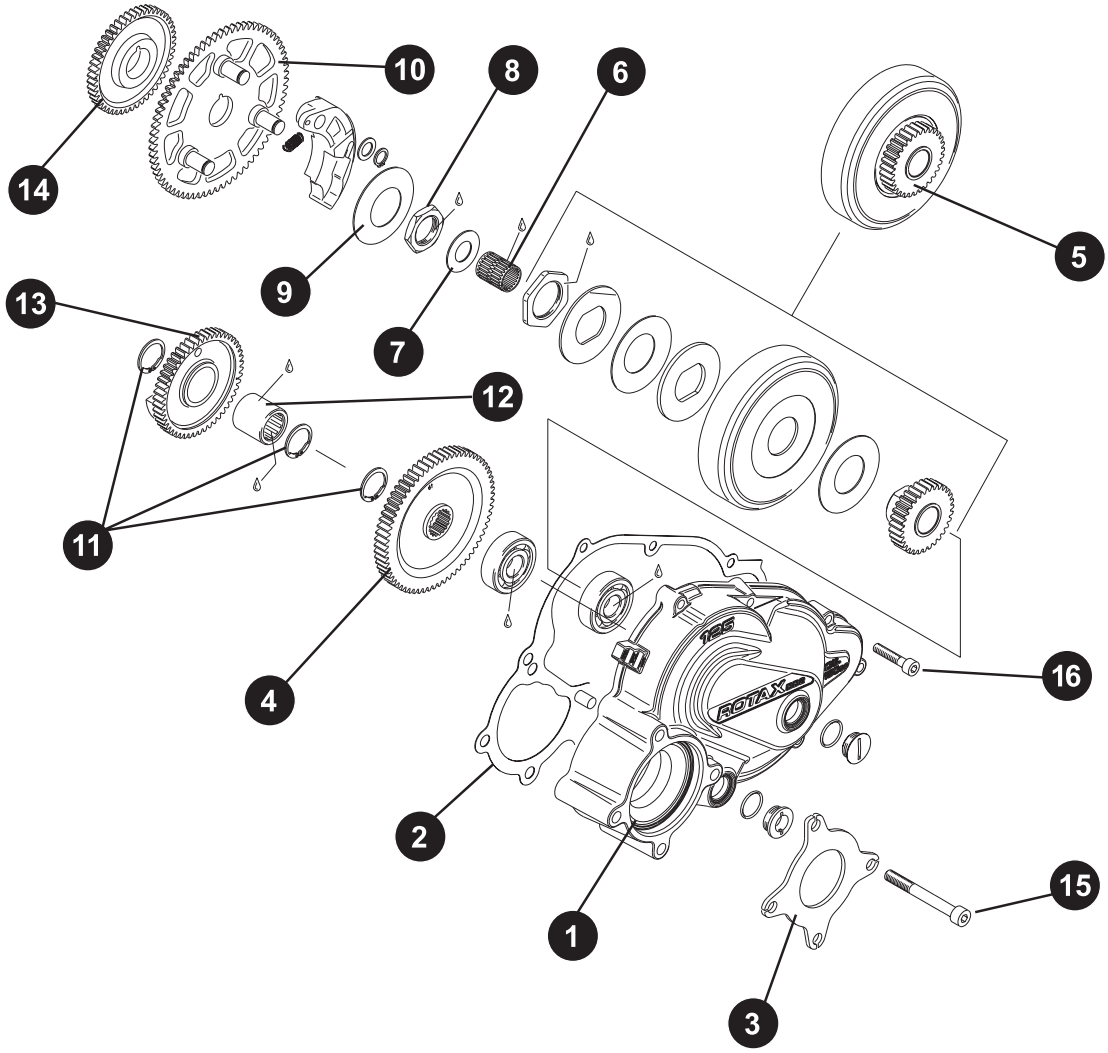


Fig. 26

- ⇨ Free the gearbox casing cover (Clutch cover, Item 1) with 6 screws (Item 16), bracket (Item 3) with 4 screws (Item 15) and remove gasket (Item 2).
- ⇨ Remove the secondary gear wheel (Item 4) from the pinion shaft.
- ⇨ Remove the shaft circlips (Item 11) with a suitable pair of pliers.
- ⇨ Remove the clutch drum with drive gear (Item 5) from the crankshaft.
- ⇨ Remove the needle bearing (Item 6) from the crankshaft.
- ⇨ Remove the thrust washer (Item 7) from the crankshaft.

⇨ Secure the locking device (A) on the starter toothed ring with a fixing bolt.

◆ **Note:** Use the special tool - “Locking device, complete“ - ROTAX part no. 676 200 or 676 202.

⇨ Unscrew the M22x1.5 hexagon nut of the centrifugal clutch attachment (Item 8).

⇨ Remove the disc spring (Item 9).

◆ **Note:** The assembly and disassembly of the clutch drum are described from page 36.

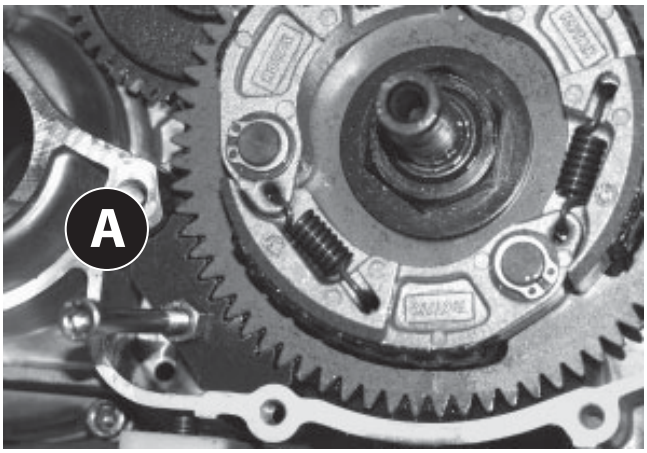


Fig. 27

⇨ Pull the starter toothed ring (Item 10) from the crankshaft.

⇨ Pull the starter drive, Fig. 28 (Item 1) and adjusting washer (Item 2) from the gearbox casing (Item 3).

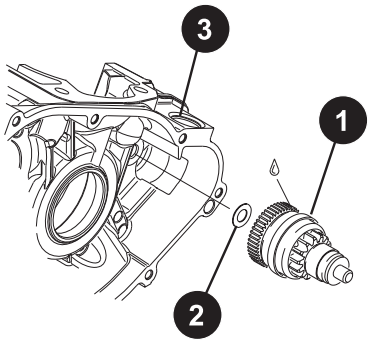


Fig. 28

◆ **Note:** All item numbers on this page relate to Fig. 26.

⇨ Remove the balance drive gear wheel (Item 14) from the crankshaft.

⇨ Remove the second shaft circlip (Item.11) from the pinion shaft.

⇨ Remove the balance gear wheel (Item 13) with needle bearing (Item 12) from the pinion shaft.

⇨ Remove the third shaft circlip (Item 11) from the pinion shaft.

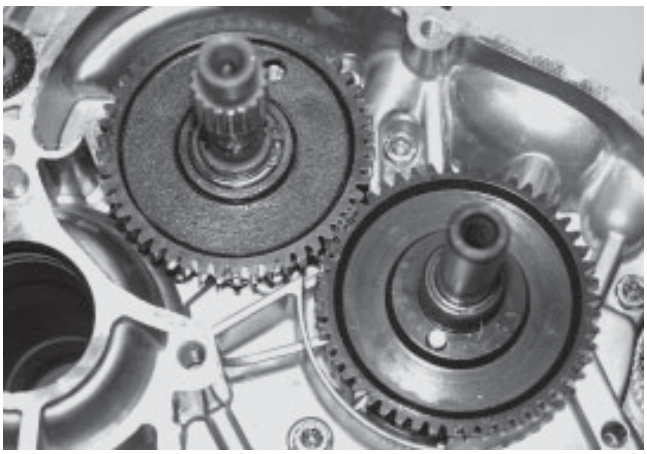


Fig. 29

Disassembly of the crank and gearbox housing

◆ **Note:** 2 M6 x 60 screws are required to push the two halves of the housing apart.

Overview of the crank and gearbox housing components

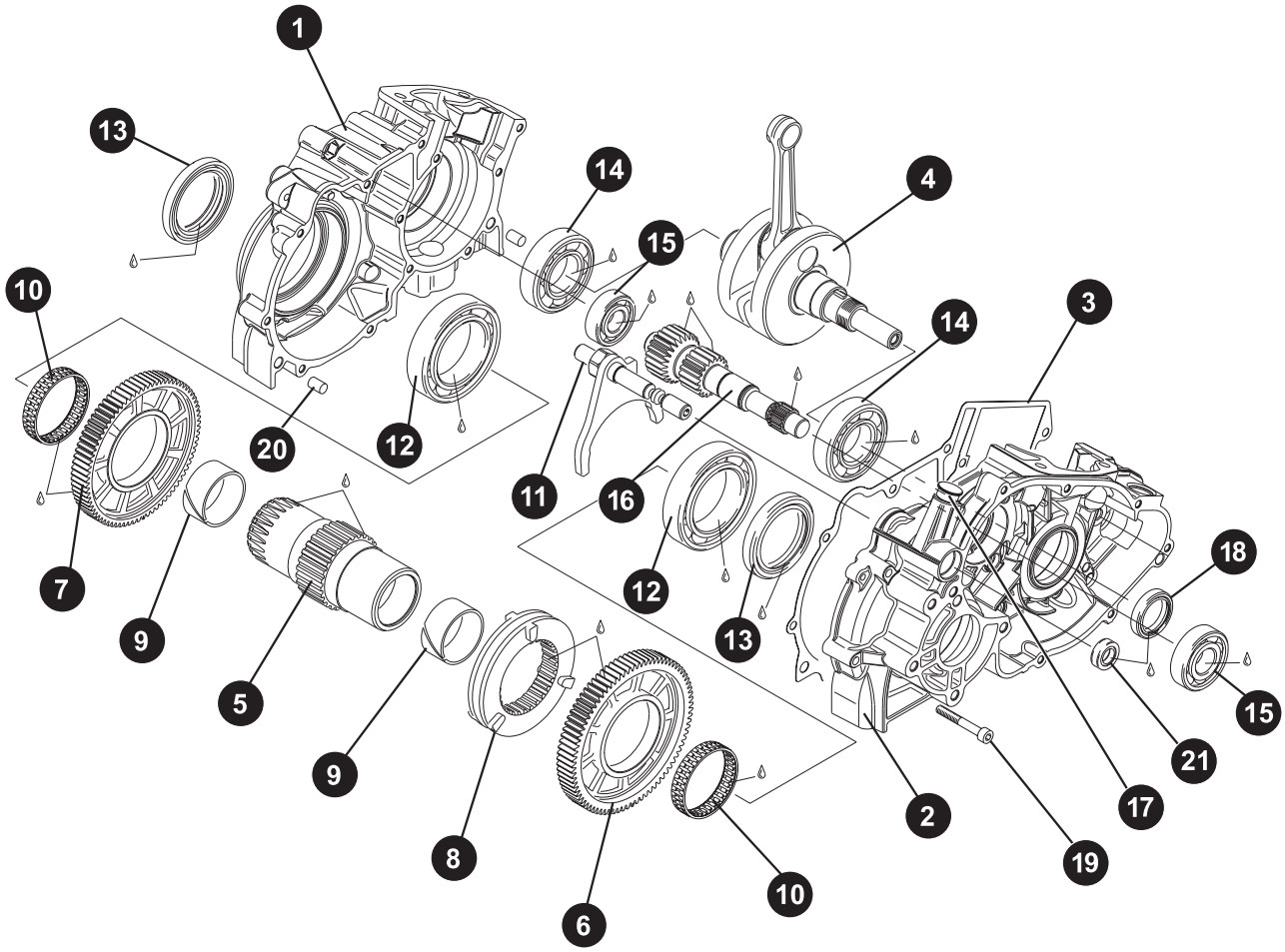


Fig. 30

⇨ Unscrew all 12 screws (Item 19) from the crank and gearbox housing (Item 2).

⇨ Remove the housing from the trestle mounting plate.

⇨ Screw in 3 M8 x 70 fixing screws (Item 15, Fig. 26) from the support plate (Item.3, Fig. 26) equally, for use as leveling feet, see Fig. 31.

⇨ Position the ignition side of the housing over the 3 screws on the work bench.

■ **Attention:** Increased risk of injury due to slipping. On no account damage the housing sealing surface with the tool.

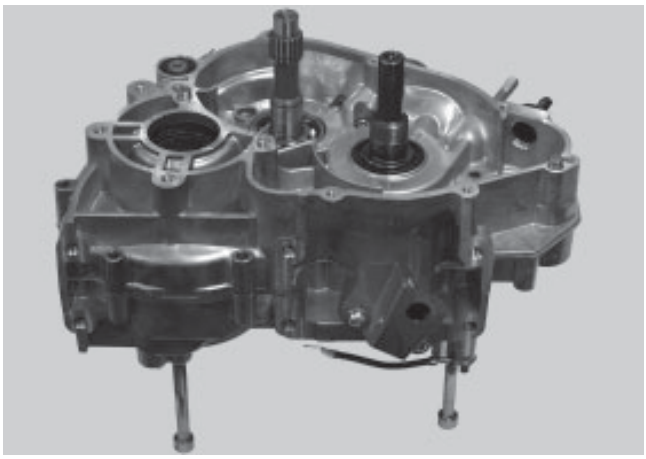


Fig. 31

◆ **Note:** The item numbers used in the following section relate to Fig. 30.

⇨ The forcing screws indicated in Fig. 32 must be screwed equally into the respective threads.

⇨ Force the housing halves from the ball bearing seatings by targeted striking with a plastic hammer.

⇨ Set the upper housing half (Item 2) to one side, remove the gasket (Item 3) and remove the components from the lower housing half (Item 1) in the following sequence.

▲ **Warning:** Consider the respective weights of the shafts - increased risk of injury

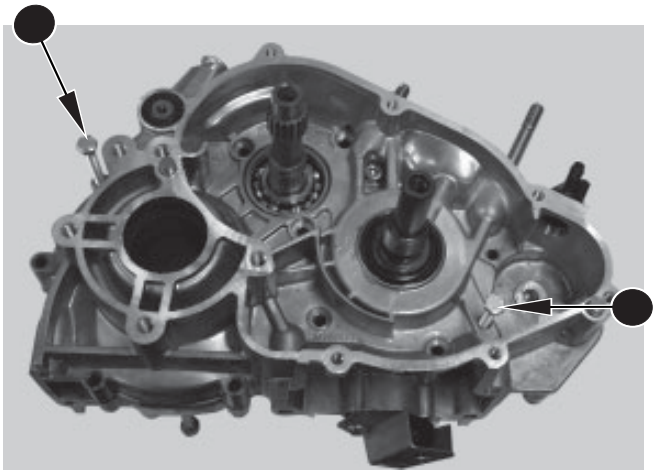


Fig. 32

⇨ Pull the first idling gear wheel (Item 6) from the hollow shaft (Item 5).

⇨ Pull the gear shift sleeve (Item 8) from the hollow shaft and shift fork (Item 11) downwards out of the housing.

⇨ Carefully pull or knock the hollow shaft from the ball bearing (Item 12). Do not damage the shaft sealing ring (Item 13), or it will have to be replaced on assembly.

⇨ Pull the second idling gear wheel (Item 7) from the hollow shaft.

⇨ Remove the retainer rings (Item 10) and bearing sleeves (Item 9) of the idling gears from hollow shaft.

⇨ Pull the crankshaft, complete (Item 4) from the bearings (Item 14).

⇨ Pull or knock the pinion shaft (Item 16) from the ball bearings (Item 15).

✔ Inspect the shift fork shaft seal (Item 17) for damage.

✔ Inspect the crankshaft seal (Item 18) for damage.

DISASSEMBLY , INSPECTION AND ASSEMBLY OF SPECIFIC COMPONENTS

▲ **Warning:** Components, which have reached or exceeded their wear limits, must be replaced. Components, which are found to be defective in the context of the visual inspection and might influence the engine's performance, must also be replaced.

◆ **Note:** **When making low tolerance measurements (s < 0.1 mm) and in measuring bearing and housing components, the temperature of the components and their surroundings must be in the range 20°C - 25°C.**

Carburetor

◆ **Note:** In the case of problems with the fuel supply the carburetor should first be cleaned and specific components inspected.

⇨ Disassemble the carburetor into the parts shown in Fig. 33 and clean the parts wit h fuel.

✔ Clean the fuel filter and inspect it for damage.

✔ Blow through the bores in the housing and the jets with compressed air and check that these passages are clear.

✔ Check for tight and correct seating of the retaining ring on the jet needle.

✔ Inspect the point of the needle of the needle valve for good condition.

⇨ Assemble the carburetor in reverse sequence to that followed for disassembly.

◆ **Note:** Use the gasket set ROTAX Part No. 293 834.

✔ Check the setting of the float bracket.

◆ **Note:** When the carburetor is held upside down, the float bracket must take up a horizontal attitude when free from load. The two pointed ends of the bracket must be at the same height - if necessary bend the ends to suit. In this check the float and float chamber should not have been fitted.

◆ **Note:** The lettering "Alto" = on the top of the floats must be visible in the installed condition.

◆ **Note:** Install and adjust the Bowden cable for the carburetor piston actuation in accordance with the operating instructions.

◆ **Note:** Set the adjusting screws 31 and 36 in accordance with the operating instructions.

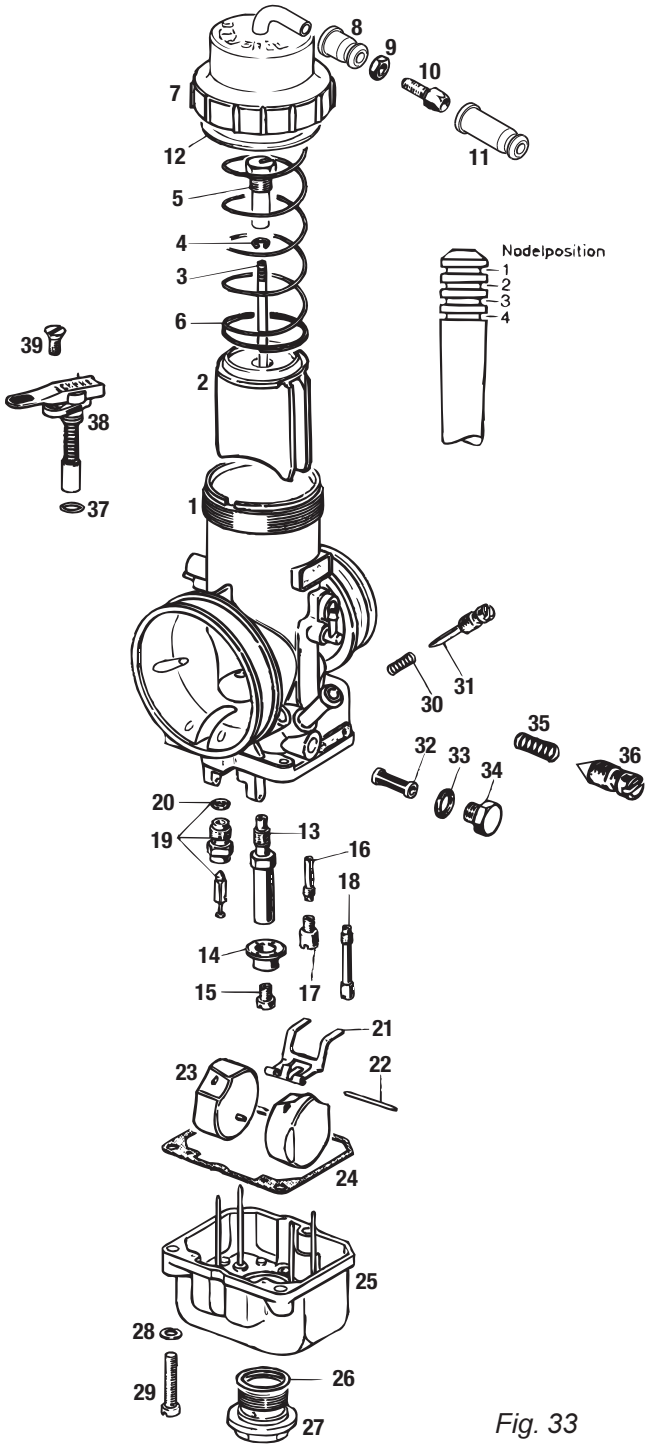


Fig. 33

Crank and gearbox housing

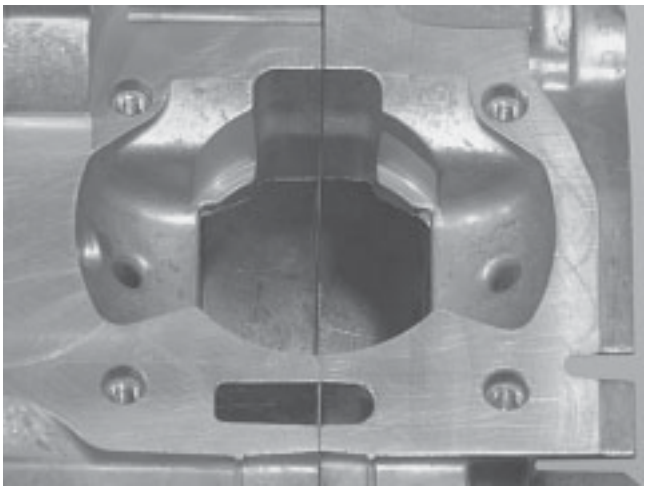


Fig. 34, figure similar

✔ Inspect both housing halves for cracks and damage.

✔ Inspect the sealing surfaces for damage.

✔ Inspect all threads for cleanliness and ease of running.

◆ **Note:** The cylinder attachment stud bolts must be screwed into the housing, longest thread first, after applying Loctite 221. The tightening torque is 5 Nm.

✔ Inspect the oil bores of the main bearing for ease of passage and clean using compressed air if necessary.

✔ Inspect the overflow hole for ease of passage and clean using compressed air if necessary.

✔ Inspect the ball and needle bearings for ease of running and erosion of material (Pitting).

Shaft seal, water pump

⇨ Remove both shaft seals from the water pump shaft with a suitable tool.

⇨ Grease the new shaft seals in the region of the seal lip with Molycote 111 before fitting.

⇨ Insert the new shaft seals as shown in Fig. 35 using the installation tool.

◆ **Note:** Use the special tool ”Installation tool” - ROTAX No. 676 021.

◆ **Note:** Note the installed position - the tubular spring of the outer ring seal must point outwards, the tubular spring of the inner ring seal is not visible, see Fig. 35.

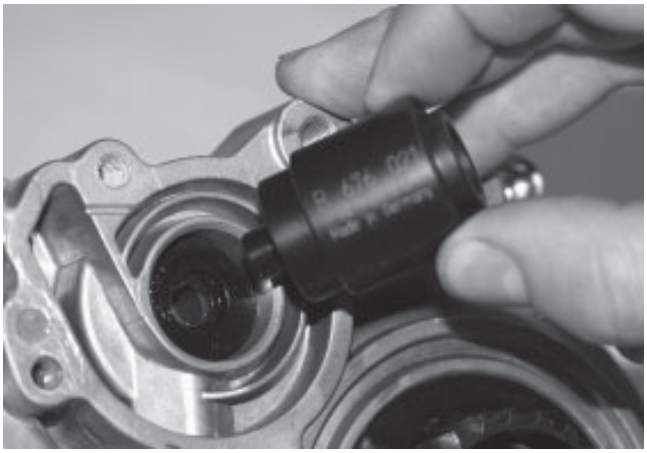


Fig. 35

⇨ Press in the outer shaft seal with the installation tool up to the detent, as shown in Fig. 36.

◆ **Note:** Use the special tool “Installation tool” - ROTAX No. 676 021.

◆ **Note:** Using the installation tool a shaft seal can also be replaced with the engine in the assembled condition.

Fig. 36

Other shaft seals

⇨ Using a suitable tool, pull the shaft seals from the bearing seats of the crankshaft, hollow shaft and shift(Fork)shaft.

⇨ Grease the new shaft seals in the region of the seal lip with Molycote 111.

⇨ Insert the shaft seal for the hollow shaft with the mounting sleeve, as shown in Fig. 37.

◆ **Note:** Use the Special tool "Installation tool" - ROTAX No. 676 022.

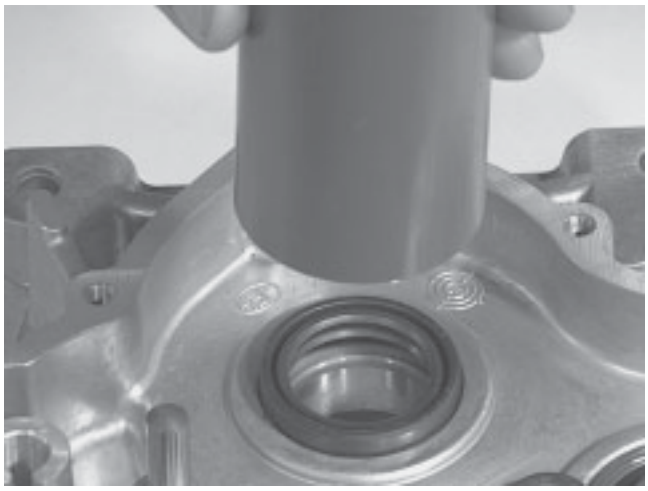


Fig. 37, figure similar

Needle and ball bearings

◆ **Note:** Before the inspection, lubricate the bearing with engine oil. The inner ring must be easy and free to turn. The bearing must not be 'noisy'..

◆ **Note:** If the bearing on one side is damaged, always replace both bearings.

◆ **Note:** Where shaft seals are installed behind the bearings (e.g. hollow shaft), these should also be replaced when the bearing is replaced.

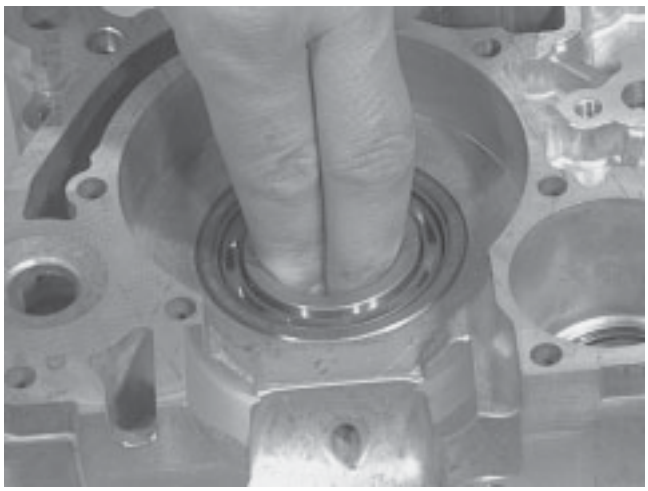


Fig. 38, figure similar

⇨ Unscrew the vent screw.

⇨ Unscrew the oil inspection screw using a suitable tool (e.g. 20 Cent coin).

◆ **Note:** Remove the remaining components on the housing in order to avoid damage during heating.

⇨ Heat up the housing halves with the defective ball bearings one after the other for 10 minutes at 150°C.

▲ **Warning:** When working with oven-heated components always wear heat resistant gloves.

Fig. 39

⇨ Take one housing half from the oven with the bearings facing upwards.

⇨ Turn the housing half over and swing it lightly onto a flat surface, preferably of wood.

⇨ In most cases it will be sufficient to unseat the ball bearings. If further attention is required to unseat the bearings, use a plastic hammer for the purpose.

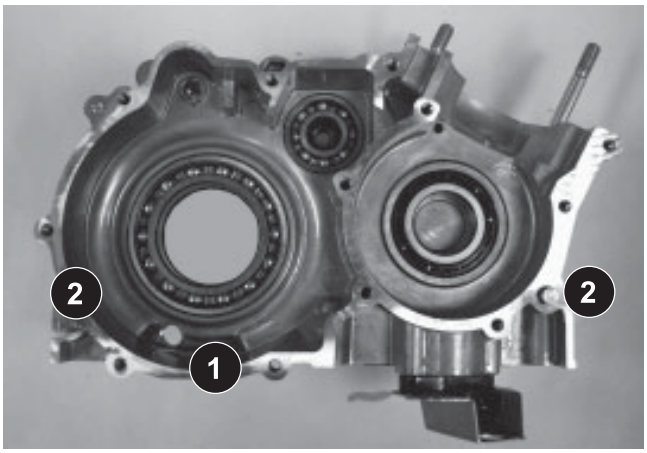


Fig. 40

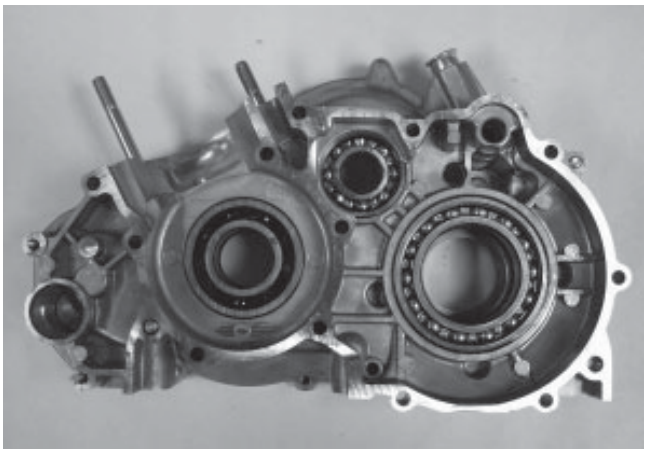
◆ **Note:** The ignition side housing half (Item 1) has two dowel pins (Item 2), see Fig. 40. Drill corresponding cutouts in the wood or plastic plate to accommodate these.

⇨ Carry out the same procedure with the clutch-side housing half, see Fig. 41.

⇨ Thoroughly clean the bearing seats.

✔ Measure the bearing seat.

✔ Measure the outer diameter of the bearing.



◆ **Note:** When measuring the fit of the bearings the housing halves must have cooled to room temperature (20°C).

■ **Attention:** The interference fit between the ball bearing and the bearing seat must be at least s = 0.01 mm.

■ **Attention:** If the interference fit is less than this the housing halves must be replaced.

⇨ Heat up the housing halves again to 150°C for 10 minutes.

⇨ Lay a housing half on a flat surface.

⇨ Insert the ball bearing in the bearing seat in the housing half.

✔ The closed side of a bearing faces the component, see Fig. 42.

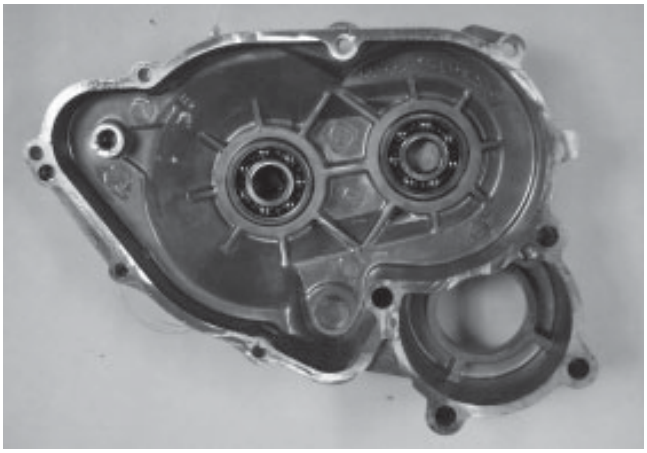


Fig. 42

■ **Attention:** Crankshaft main bearing: The closed cage side faces the crank web, see Figs 40 and 41.

◆ **Note:** Do not tilt the ball bearing when inserting it, allow the housing half to cool with the bearing inserted.

Gear box

✔ The following gearbox components must be checked for corrosion, damage and wear in the context of an engine inspection:

- ✳ Gear wheels, pinion shaft (Item 16),
- ✳ Idling gears (Items 6+7),
- ✳ Gear shift sleeve (Item 8),
- ✳ Shift fork (Item 11)
- ✳ Bearing sleeve (Item 9),
- ✳ hollow shaft (Item.5).

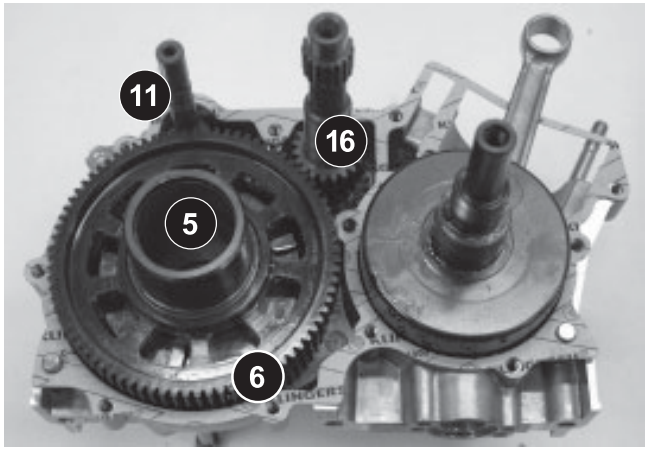


Fig. 43

◆ **Note:** The wear limits for the gear shift sleeve and idling gear are 0.3 mm in the area of the claws.

◆ **Note:** The wear limits for the shift fork and gear shift sleeve in the area of the thrust surfaces are 0.05 mm.

✔ Inspect all components for discoloration and traces of wear and check the gear teeth for pitting.

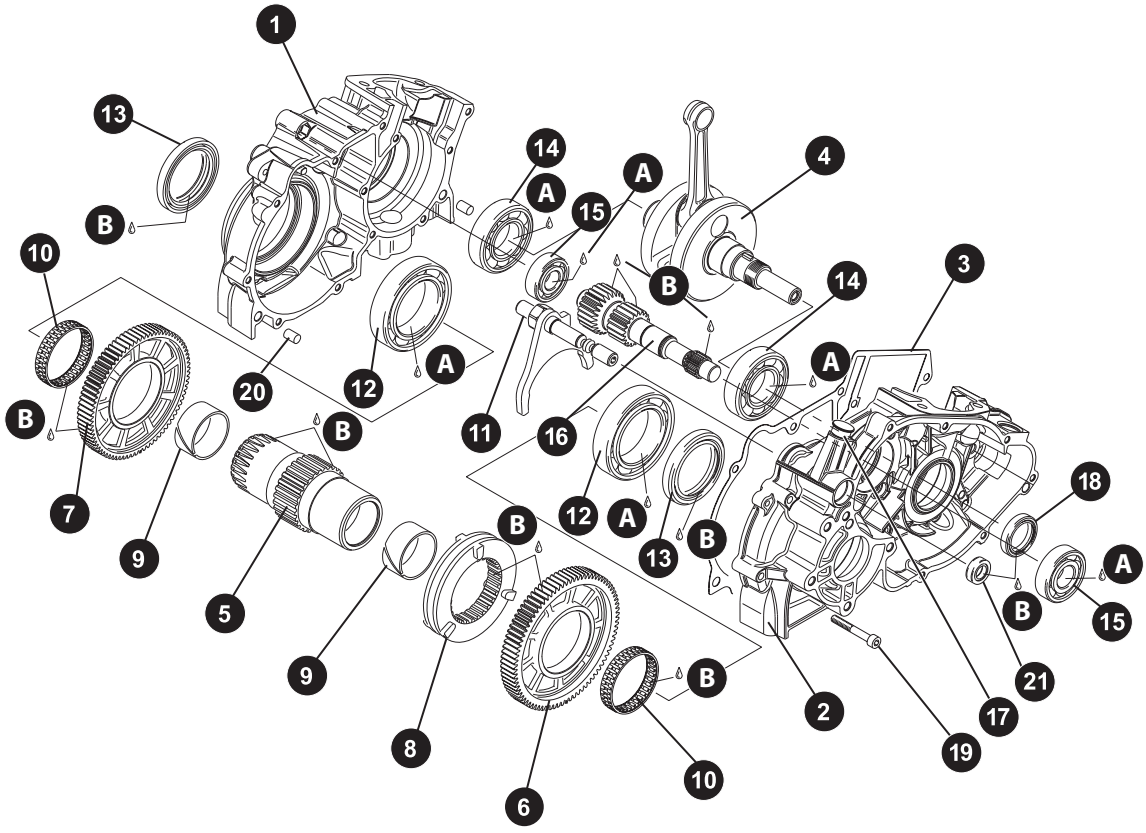


Fig. 44

Crankshaft

⇨ Thoroughly clean the crankshaft.

⇨ Clean the residues of the securing medium from the conical starter crown wheel.

✔ Inspect the crankshaft for visible damage and traces of wear:

- ✳ Conical thread,
- ✳ Bearing seats,
- ✳ Running surface of the bearing,
- ✳ Contact surface of the shaft seals,
- ✳ Woodruff key groove.

✔ Measure values for the two main bearing seats (M02), the bearing surface of the clutch (M03) and of the piston pin (M04).

✔ Determine the axial play of the connecting rod bearing (M05) using a feeler gauge.

✔ Determine the radial clearance of the connecting rod bearing (M06).

✔ Determine the radial run out of the crankshaft (M07).

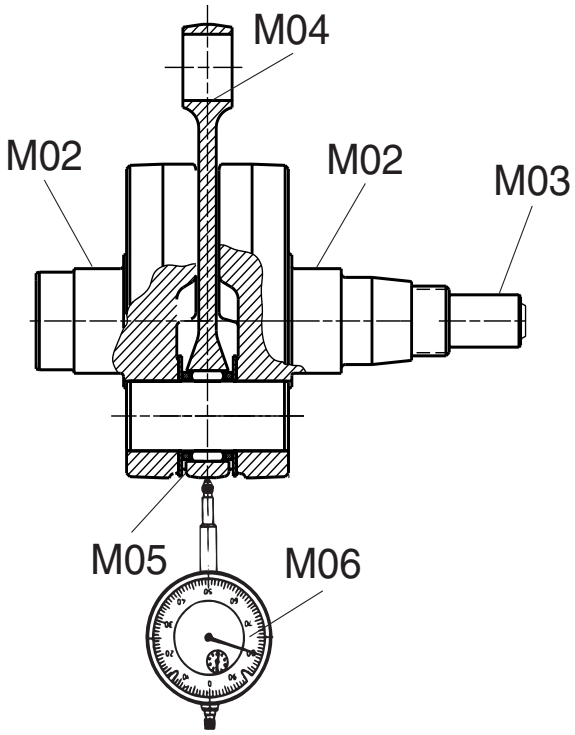


Fig. 45

- ✳ M02 = 29.96 mm;
- ✳ M03 = 14.95 mm;
- ✳ M04 = 18.97 mm;
- ✳ M05 = 1.0 mm;
- ✳ M06 = 0.05 mm;
- ✳ M07 = 0.03 mm;

◆ **Note:** If one of the named limit values M02 or M03 is reached, the crankshaft, complete, must be replaced. If a limit value M04 to M07 is reached,BRP-ROTAX recommends the use of the appropriate repair set.

◆ **Note:** If the limit value M07 is reached, in addition the crankshaft must be realigned.

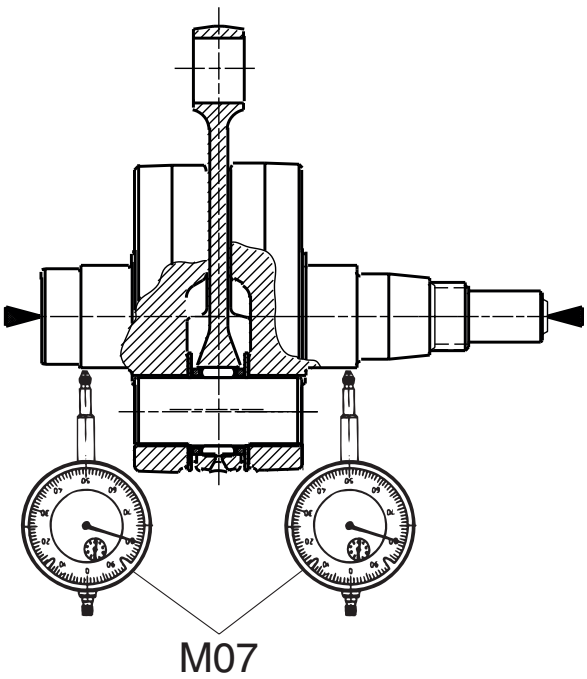


Fig. 46

Conrod set - Repair set

■ **Attention:** Repair of the crankshaft requires a special tool and must only be carried out by workshops with the appropriate experience and equipment.

⇨ Separate the crankshaft using a suitable press device.

✔ Inspect the bores in the crank webs for score marks.

◆ **Note:** If score marks are visible the crankshaft must be replaced.

◆ **Note:** The repair set comprises the conrod, crank pin, needle bearing and two thrust washers.

■ **Attention:** The parts in the repair set are paired together and must therefore be exclusively used together.

⇨ Lubricate the crank pin and both bores of the crank webs with grease.

⇨ Lay one crank web on the press device.

⇨ Press in the crank pin with a guide sleeve up to the detent in the crank web.

⇨ First fit the thrust washer, needle bearing, conrod and two thrust washers on the crank pin.

⇨ Press together the two crank webs in the press device to give the specified dimension M08 = 48.95 – 49.05 mm.

✔ Check the crankshaft for eccentricity.

◆ **Note:** The crank webs must be in exact alignment. The alignment can be adjusted using a plastic hammer.

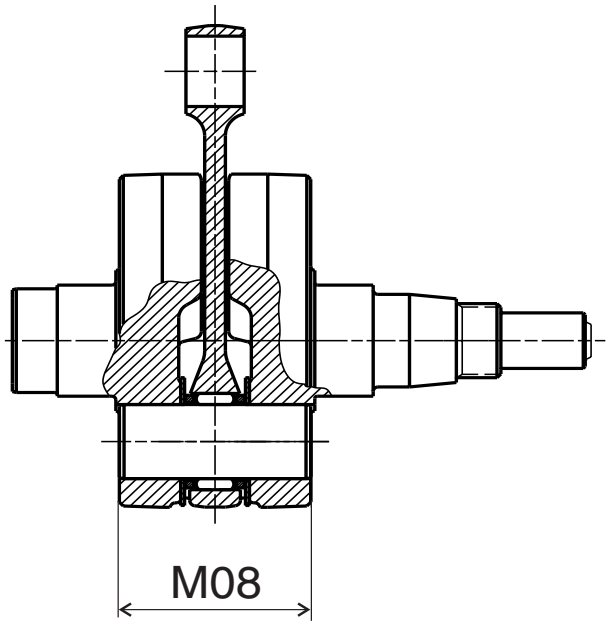


Fig. 47

⇨ Make targeted strikes on the unclamped crank web to achieve the desired alignment.

✔ Inspect the alignment of the crankshaft as shown in Fig. 46.

Piston and piston ring

✔ Inspect the piston for pressure points, cracks and signs of scuffing.

✔ Inspect the bore of the piston pin for damage and wear.

✔ Inspect the piston pin circlips for defects.

✔ Check for ease of movement of the piston ring in the ring groove.

◆ **Note:** If oil carbon prevents the free movement of the piston ring, the ring groove can be cleaned out with a discarded piston ring.

Fig. 48

✔ Carry out the measurement of the piston ring play in the ring groove, indicated in Fig. 49, using a feeler gauge.

◆ **Note:** If the piston ring clearance has reached the wear limit of 0.1 mm, the piston must be replaced.

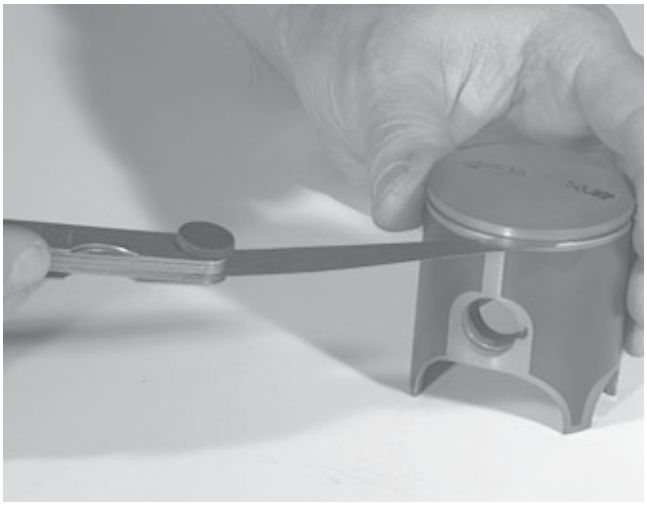


Fig. 49

⇨ Remove the piston ring and insert a feeler gauge into the cylinder parallel to the head sealing surface, as shown in Fig. 50.

✔ Using the feeler gauge, measure the end clearance.

◆ **Note:** If the wear limit of 0.8 mm has been reached the piston ring must be replaced.

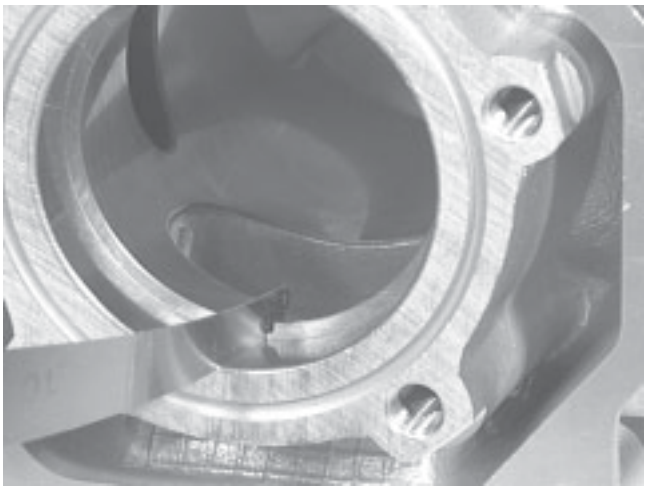


Fig. 50

✔ Check the piston ring locking pin for wear.

✔ Determine the piston diameter with a micrometer, as shown in Fig. 51. Conditions of measurement: Room temperature = 20 °C, Measuring position 20 mm from the lower edge of the piston, at right angles to the piston pin.

✔ Determine the piston clearance. The wear limit is 0.08 mm.

◆ **Note:** If this limit value has been reached, a piston of the same dimensional category must be fitted.

◆ **Note:** The permissible piston-cylinder pairings are given in the section on piston and cylinder sizes, see page 35.

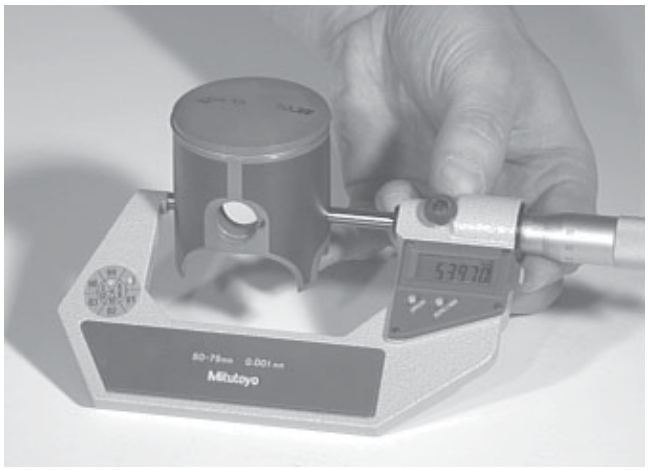


Fig. 51

◆ **Note:** The piston clearance of a new piston/cylinder pairing should be 0.04 - 0.05 mm.

◆ **Note:** On installation of a new piston the piston pin, needle bearing and the retaining rings should also be replaced.

Piston pin, needle bearing and retaining rings

✔ Inspect the piston pin (Item 4) for wear and discoloration.

✔ Inspect the needle bearing (Item 5) for cracks, material erosion and discoloration.

✔ The piston pin retainer rings (Item 3) are replaced each time a repair is carried out.

The piston (Item 1), piston ring (Item 2) and conrod (Item 6) have already been subjected to an inspection, see pages 31 to 34.

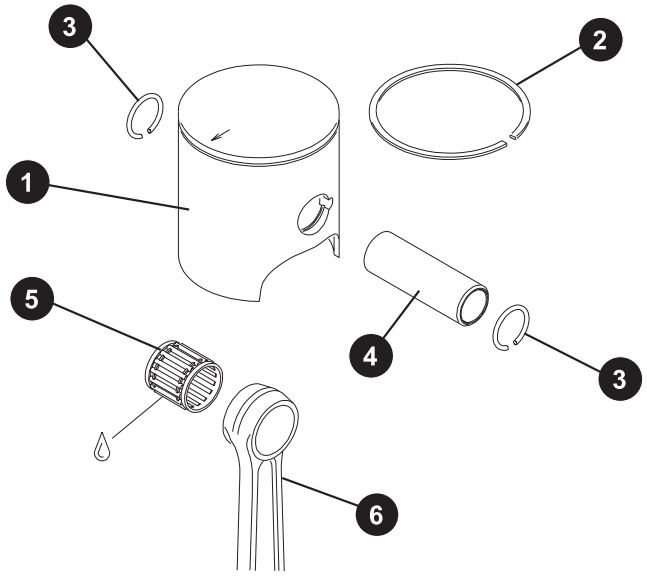


Fig. 52

Cylinder

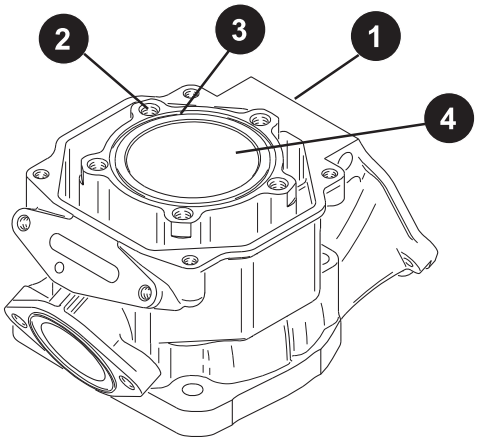


Fig. 53

⇨ Remove lime deposits from the water cooling jacket of the cylinder (Item 1).

⇨ Clean the exhaust gas and slider duct of combustion residues.

⇨ Clean the o-ring groove (Item 3).

✔ Inspect the threads (Item 2).

✔ Inspect the sealing surfaces, they must be clean and smooth.

✔ Measure the wear of the cylinder wall (Item 4), as well as the conicity and the ovality. The measurement is made in the area between the T.D.C. position of the piston ring and 3 mm above the upper edge of the outlet. The wear limit is 0.03 mm, respectively, above the installation dimension.

✔ Now measure the cylinder diameter 10 mm below the upper edge of the cylinder. This dimension dictates the selection of the matching piston and piston rings. If the dimension reaches the limit value of 54.035 mm, the cylinder must be replaced.

Piston and cylinder sizing

When installing a new piston and/or cylinder check the appropriate size category from the table.

◆ **Note:** A new piston has the size classification stamped on the piston skirt.

◆ **Note:** On new cylinders the size classification is stamped on the top.

Marking, cylinder	Cylinder dimension	Marking, piston	Piston dimension
Cylinder dimension A	54.000 - 54.010	53.97	53.965 - 53.975 (Standard)
Cylinder dimension AB	54.010 - 54.015	53.98	53.975 - 53.985 (Standard)
Cylinder dimension B	54.015 - 54.025	53.99	53.985 - 53.995 (Oversize)

Centrifugal clutch and starter crown wheel

⇨ Remove the 3 shaft circlips (Item 6) and the adjusting washers (Item 5) beneath them with a suitable pair of pliers, see Fig. 55.

⇨ Pull the centrifugal weights (Item 2) from the support bolts (Item 4) with a suitable tool, see Fig. 54.

◆ **Note:** Do not disconnect the springs (Item 3) with the centrifugal weights installed, since these would then become over extended and of no further use.

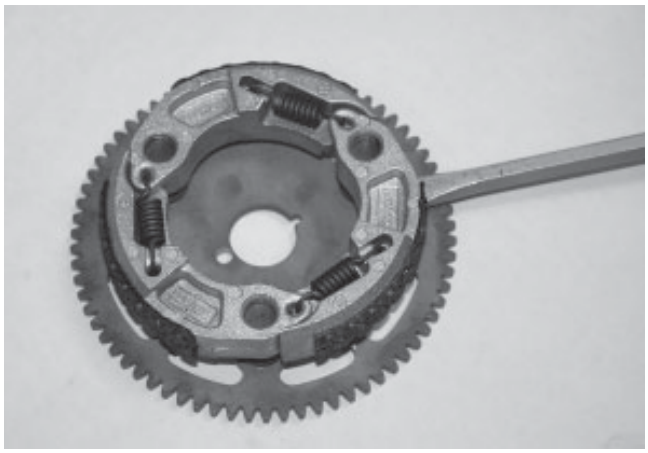


Fig. 54

⇨ Detach the springs (Item 3) from the centrifugal weights (Item 2).

✔ Inspect the bearing holes in the centrifugal weights.

✔ Inspect the friction lining of the centrifugal weights. The limit value is s = 1.0 mm. If one of the friction linings has reached this value at the thinnest position, then all the linings must be replaced using the centrifugal clutch repair set.

◆ **Note:** Use ”centrifugal clutch” repair set - ROTAX No. 281 430.

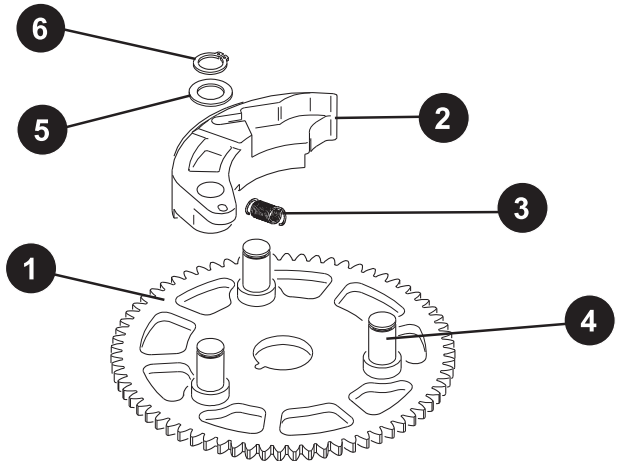


Fig. 55

✔ Inspect the teeth of the starter toothed ring for damage and deformation.

✔ Inspect the bearing bolts of the starter toothed ring and the riveted joint on the rear for damage and deformation.

✔ Inspect the recess for the shaft circlips of the starter toothed ring bearing bolts for damage.

⇨ Slide the centrifugal weights on the bearing bolts of the starter toothed ring.

⇨ Suspend the springs in the centrifugal weights using the appropriate pliers, see Fig. 56.

■ **Attention:** Be careful not to over extend the springs or they will be unusable.

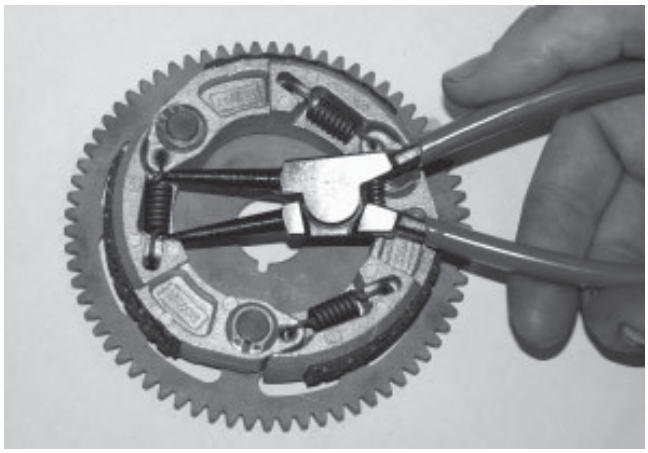


Fig. 56

⇨ Mount the adjuster washers and new shaft circlips on the centrifugal weights using the appropriate pliers, see Fig. 57.

◆ **Note:** The open side of the shaft retaining ring faces outward when installed.

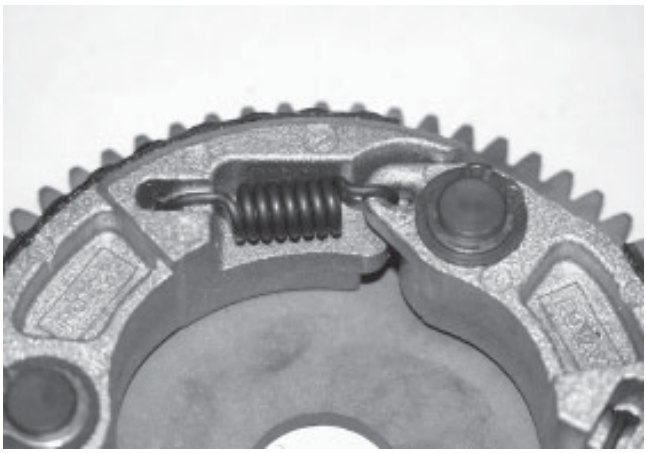


Fig. 57

Clutch drum with drive gear

⇨ Clamp the clutch drum in the special holding device, see Fig. 58.

◆ **Note:** Use special tool “Locking device“ ROTAX No. 676 190 or 676 192.

⇨ Bend the lock nut tab washer straight with a suitable tool.

⇨ Unscrew the lock nut SW1.5 inch with the appropriate spanner.

◆ **Note:** On assembly of the clutch drum the locking screw is secured with Loctite 648. The tightening value is 12 Nm plus 1 turn.

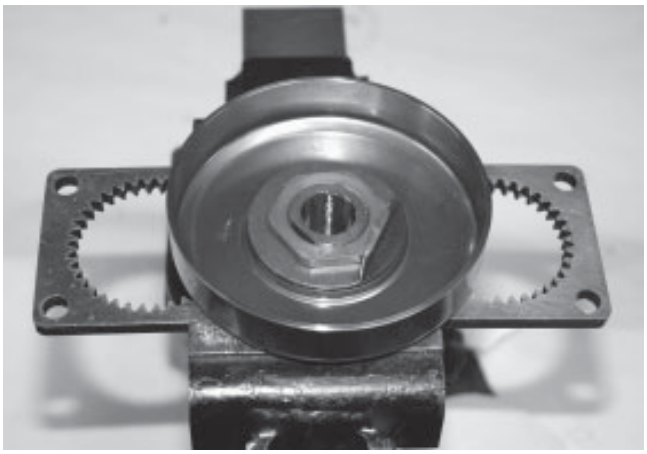


Fig. 58

⇨ Store the drive gear (Not shown in the figure), thrust washers (Items 1+2), disc spring (Item 3), tab washer (Item 4) and hexagonal nut (Item 5) individually.

✔ Inspect the thrust washers, needle bearing and disc spring for wear and replace as necessary.

✔ Inspect the drive gear for wear and corrugations in the bearing area, check for deformation and wear of the gear-tooth system.

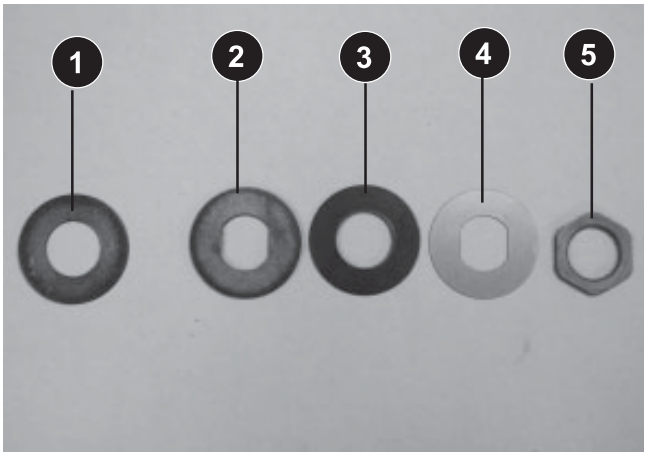


Fig. 59

Gear transmission

⇨ Dismantle the centering plate and clutch cover as described. See from page 42 for assembly.

✔ The dirt trap groove in the secondary gear wheel (Item 4, Fig. 76 on page 46) should be cleaned every 10 operating hours.

◆ **Note:** Various gear ratios are possible, see also the operating instructions BRP-ROTAX 125 DD2, ROTAX No. 297 152. Attention must unconditionally be paid to the correct number of teeth on the gear wheels used. The sum of the teeth of all the gear wheels is always 97.

■ **Attention:** Combinations other than those specified will lead to damage or destruction of the drive.

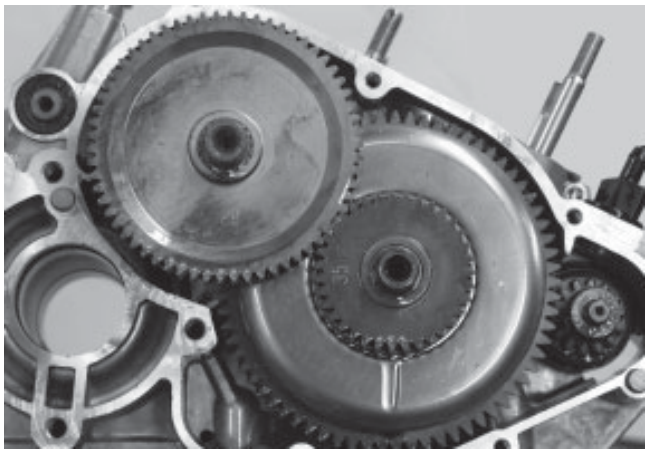


Fig. 60

Electric starter

⇨ Uninstall the electrical lead (Item 1) from the starter (Item 2).

⇨ Remove the ground cable (Item 3).

⇨ Undo the 2 Allen screws (Item 4) and remove the starter housing from the crank and gearbox housing (Item 5), see Fig. 61.

⇨ Loosen the starter housing screw fittings (Item 6).

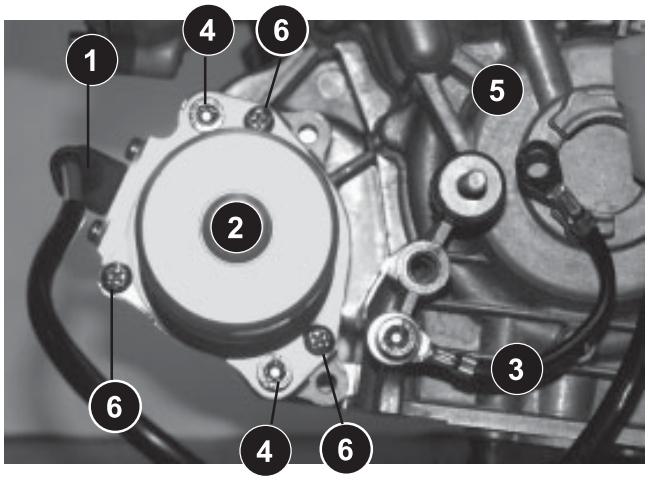


Fig. 61

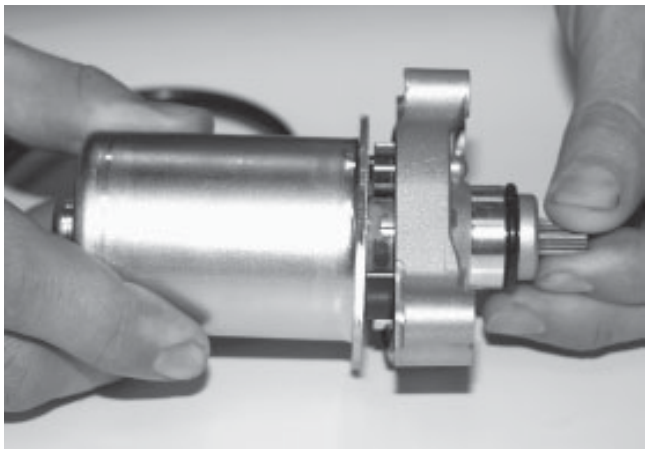


Fig. 62

⇨ Secure the rotor shaft with a suitable tool.

⇨ Pull off the housing, see Fig. 62.

⇨ Pull the rotor shaft from the starter motor support.

◆ **Note:** Take care that the spring-loaded wiper contacts are not lost.

⇨ Unscrew the bracket for the plus contact.

⇨ Press out the rubber grommet.

⇨ Extract the plus contact by pulling it inwards through the plastic ring.

◆ **Note:** If necessary, unscrew the rubber seal and the ground pole from the starter support and clean them.

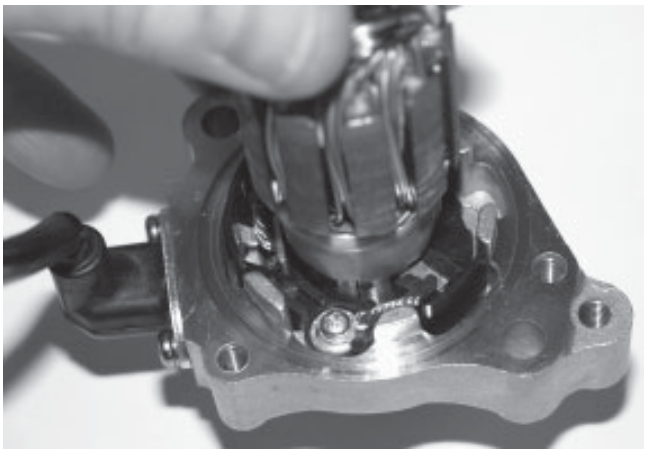


Fig. 63

✔ Inspect the carbon brushes and replace if necessary with new parts ROTAX No. 281 260.

⇨ Insert the plastic ring, so that it does not rotate, in the starter motor support.

⇨ Insert the plus contact from inside, through the plastic ring and the cutout in the starter motor support.

⇨ Secure the plastic ring with two recessed head screws and washers, the fixing provides the ground contact.

⇨ Install the rubber grommet over the plus contact.

⇨ Secure the bracket on the starter motor support.

⇨ Insert the coil springs in the cutouts of the plastic ring, press the brushes against them.

⇨ Carefully insert the rotor shaft.

✔ The brushes must contact the slip ring correctly.

⇨ Fill the starter motor support with Loctite 5910 in the region of the positive pole, see Fig. 64. This protects the fragile carbon brushes from vibration.

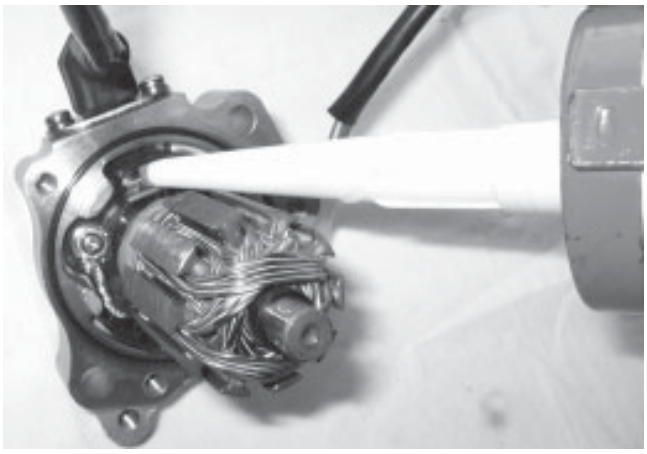


Fig. 64

⇨ Insert the o-ring in the starter motor support.

⇨ Hold the rotor shaft with a suitable tool and secure the housing on the starter motor support.

⇨ Tighten the starter motor, complete, with the two Allen screws to the prescribed torque of 10 Nm on the clutch and gearbox housing.

⇨ Attach and screw on the electrical lead to the electric motor. For connection see installation notes.

Radiator

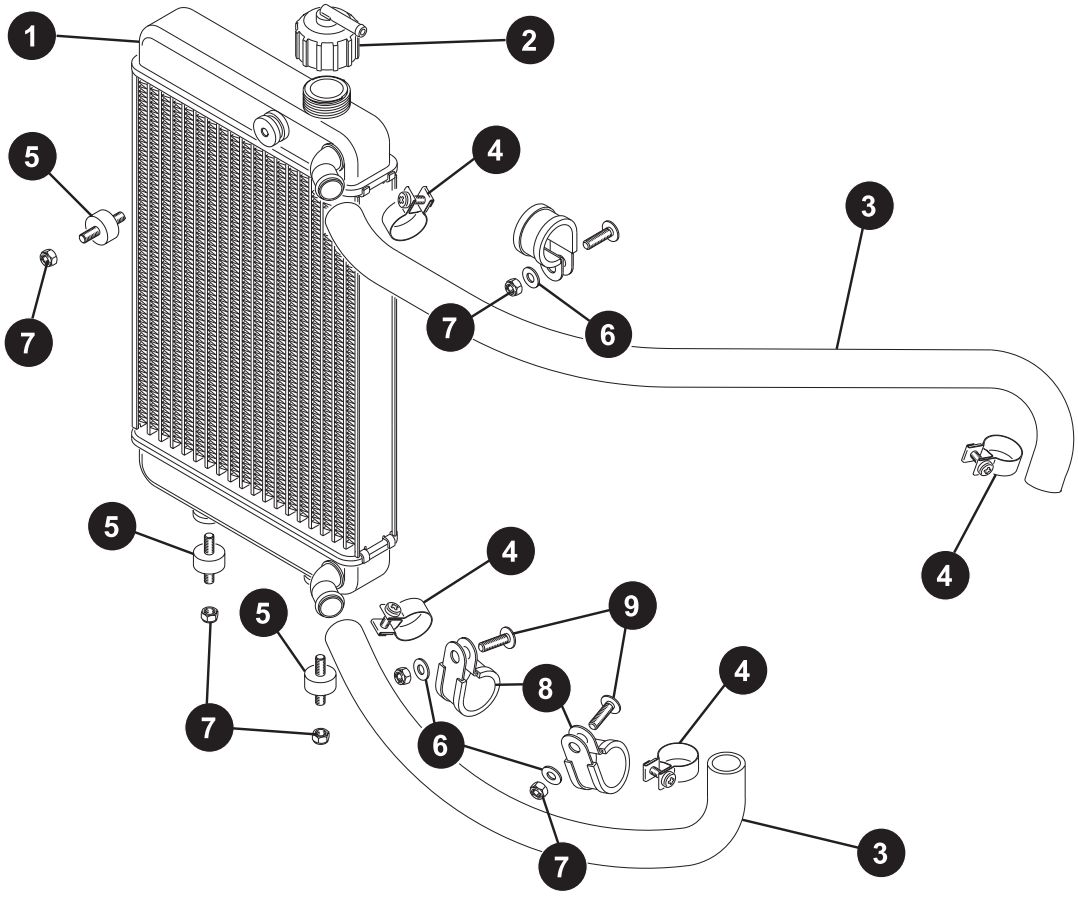


Fig. 65

The radiator is screwed to 3 rubber mountings (Item 5) and 3 cable clamps (Item 8) on the Kart frame. The coolant hoses are secured via 4 screw hose clamps (Item 4) on the radiator (Item 1) and secured to the engine connections.

✔ Check the coolant level: With the engine cold, the level should be 2 cm below the filler opening.

✔ Inspect the coolant hoses (Item 3) for any leaks, porosity and signs of torsional overloading.

✔ Check the radiator cap (Item 2) for correct seating and possible leakage.

✔ Inspect the rubber mountings for porosity.

✔ Check the screw hose clamps for correct fitting and tightness.

✔ Inspect the radiator cooling fins for soiling.

⇨ Clean the cooling fins with compressed air.

Overload clutch

◆ **Note:** The overload clutch is the coupling between the engine and the rear axle of the Kart. If a braking action briefly locks the rear axle, the loading that occurs is not transmitted directly to the engine. The overload clutch absorbs the forces and thus prevents the overloading of the engine and drive components.

⇨ Loosen the wheel-side clamping ring (Item 1, Fig. 97).

⇨ Loosen equally the 4 Allen screws (Item 2) of the overload clutch.

⇨ Loosen the front clamping ring (Item 7) - 9 screws (Item 4) - and remove the residue of the securing medium.

✔ Inspect all plastic bearings (Item 1) for wear and replace if necessary.

✔ Check the thrust washers (Items 5+6) for wear and replace if necessary.

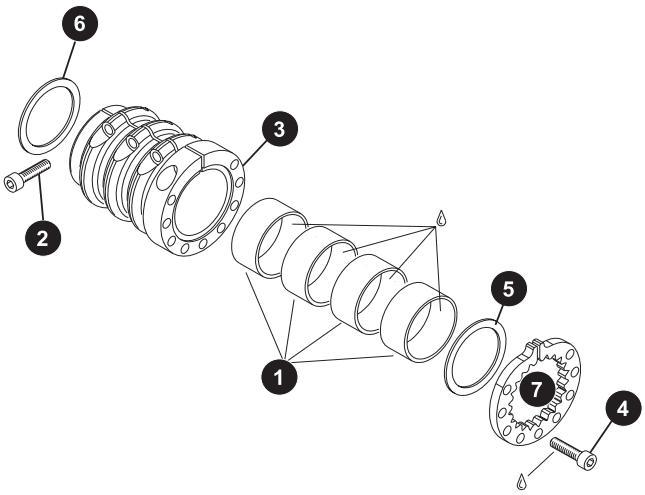


Fig. 66

⇨ Oil the 4 plastic bearings in the overload clutch before assembly (Use engine oil).

⇨ Tighten the clamping ring (Item 7) with the thrust washer (Item 5) with the 9 screws, to a tightening torque of 15 Nm in a crosswise sequence.

◆ **Note:** The screws used to attach the clamping ring are to be secured with Loctite 648.

⇨ Slide the clamping ring (Item 1, Fig. 97, page 55) and wheel-side thrust washer (Item 6) onto the rear axle.

⇨ Slide the overload clutch with the 4 plastic bearings onto the hollow shaft.

◆ **Note:** Under no circumstances must the overload clutch be mounted on the rear axle by means of a slot or keyway, since this leads to increased wear of the bearing bushing. Lightly oil the bearing sleeves in the hollow shaft in the engine (Engine oil SAE 15W-40) and carefully slide the engine onto the rear axle.

◆ **Note:** Do not yet secure the installation of the overload clutch and stop sleeve (See page 55, overload clutch).

ASSEMBLY OF GEARBOX AND ENGINE

■ **Attention:** On assembly, always install gaskets, seals and retaining rings as new parts.

Installation of the crankshaft and gearbox housing

⇨ Drive the crankshaft seal into the clutch-side housing half.

⇨ Drive a hollow shaft seal into both housing halves using the ROTAX Special tool “Installation tool“ Part No. 676 022.

◆ **Note:** For installation of the water pump-shaft seals see page 27

◆ **Note:** For installation of the needle and ball bearings see page 28

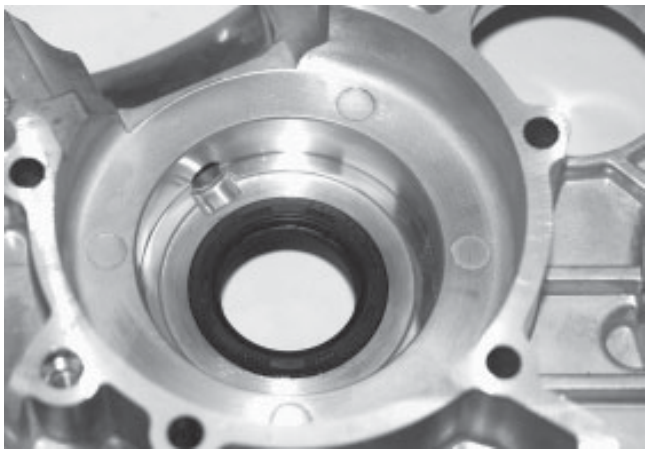


Fig. 67

⇨ Lay the ignition-side housing half on a flat surface, see Fig. 68.

⇨ Lubricate all bearing areas with copper grease.

⇨ Lubricate ball bearing with engine oil.

◆ **Note:** For inspection and assembly of the crankshaft, complete, see from page 31

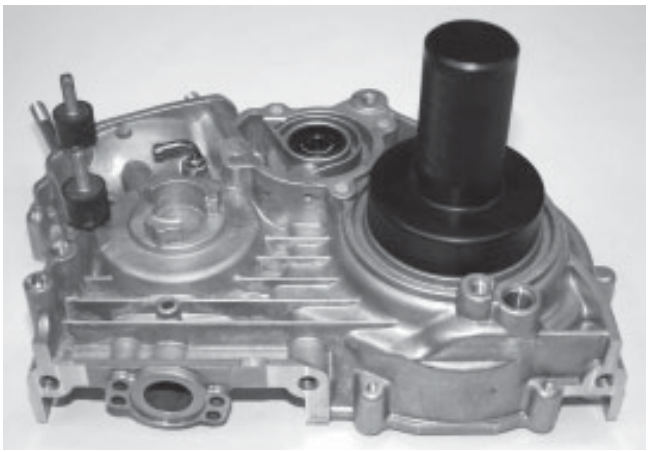


Fig. 68

⇨ Insert the crankshaft in the ball bearing in the ignition-side housing half.

⇨ Insert the pinion shaft in the ball bearing in the ignition-side housing half.

⇨ Assemble together the hollow shaft with bearing sleeves, needle bearings, shifting claw and gear wheels and insert the assembly into the ball bearing in the ignition-side housing half.

Note: First insert the hollow shaft with the gear teeth into the ignition-side ball bearing - to avoid possible damage to the shaft seal.

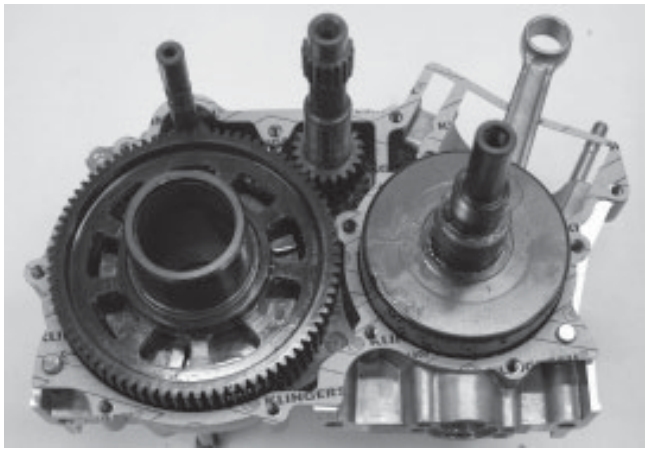


Fig. 69

Overview of crank and gearbox housing components

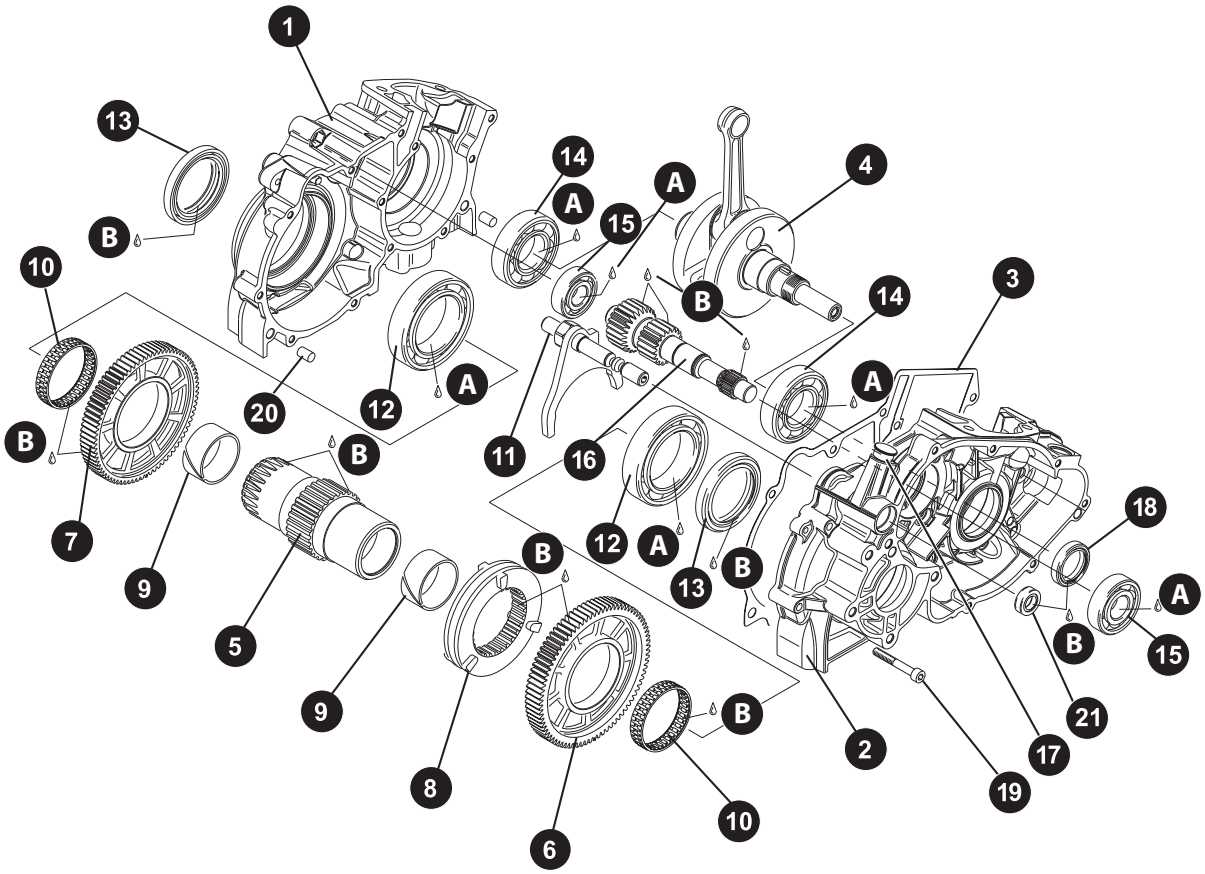


Fig. 70

Pos.	ROTAX Part No.	Description	Use
1	684 231	Housing, complete	Crank and gearbox housing, ignition side
2	684 231	Housing, complete	Crank and gearbox housing, ignition side
3	630 520	Sealing	Sealing, housing
4	685 010	Crankshaft, complete	Crankshaft, Replacement on repair
5	620 163	Hollow shaft	Replacement on repair
6	635 700	Idler 1st gear	
7	635 710	Idler 2nd gear	
8	257 360	Gear shift sleeve	
9	233 120	Bearing sleeve	Support of idler wheels on needle cage
10	632 360	Needle cage	
11	257 405	Shift fork	
12	432 330	Roller ball bearing	Support of hollow shaft in housing
13	630 500	Shaft seal	Sealing, housing
14	832 533	Roller ball bearing	Support of crankshaft in housing
15	932 432	Roller ball bearing	Support of pinion shaft in housing
16	620 180	Pinion shaft	
17	257 422	Locking, sliding selector shsft	
18	930 695	Shaft seal	Seal, housing
19	241 821	Allen screw	Attachment, housing halves
20	632 010	Cylindrical roller	Dowel pin, housing
21	250 455	Shaft seal	Seal, housing
A	297 434	Loctite AntiSeize 15378	Surface treatment, roller ball bearing
B	897 330	Lithium-base grease	Surface treatment, gear wheels, WDR, needle bearing

Table 5

◆ **Note:** Note the sequence for the idling gear wheels - first gear 1. Position gear (81Z) on the hollow shaft, then idling gear 2. Gear (77Z). If the sequence is incorrect it prevents further assembly of the gearbox and engine components.

◆ **Note:** When assembling the gear wheels, make sure that their flatter side faces the shifting claw. A reverse positioning does not allow engagement of the shifting claw in the gear wheels and so there is also no drive.

◆ **Note:** When using new housing halves insert new dowel pins in the ignition-side housing half; when using the old housing halves unscrew the set bolts.

⇨ Insert a new housing gasket ROTAX No. 630 520.

⇨ Position the drive-side housing half on the shafts.

⇨ Using a plastic hammer, complete the assembly of the drive-side housing half. Avoid striking the sealing surfaces.

⇨ Fix both hosing halves on the trestle mounting plate.

◆ **Note:** Use Special tool “Trestle mounting plate, complete“ ROTAX No. 876 762 and 676 052.

⇨ Tighten the 12 screws from the inside towards the outside in crosswise sequence to a torque value of 10 Nm.

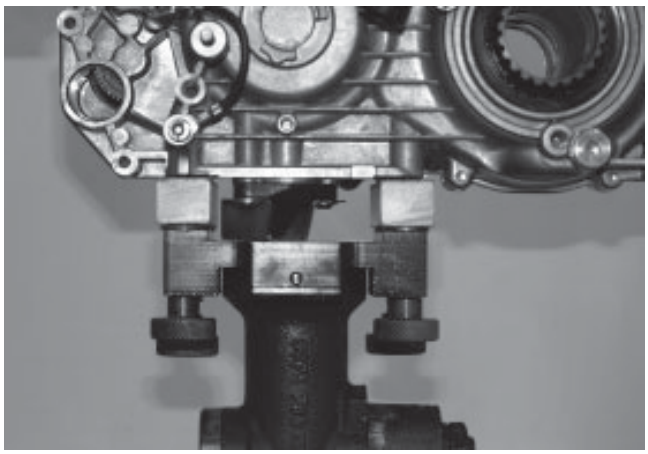


Fig. 71

⇨ Cut off the overlapping housing gasket in the area of the cylinder base seal and smooth with a grinding stone.

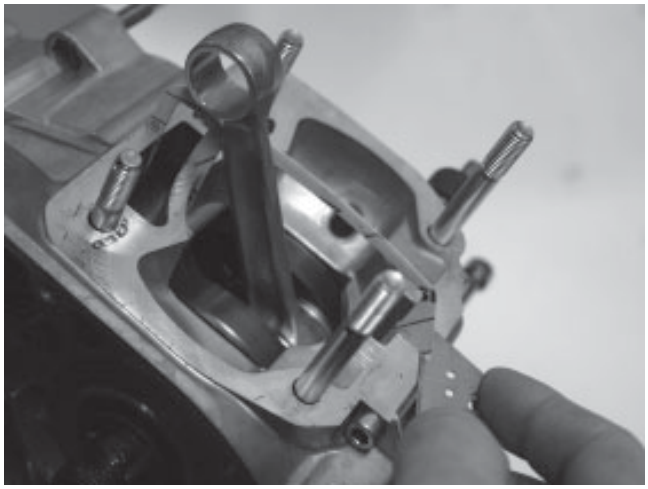


Fig. 72

Installation of the water pump shaft

⇨ Secure the impeller of the water pump (Item 4) by means of a dowel pin (Item 7).

⇨ Screw in the water pump shaft (Item 6, Fig. 74) with rotation to the left and secure with Loctite 221 (Violet).

◆ **Note:** The water pump drive thread is a left hand thread.

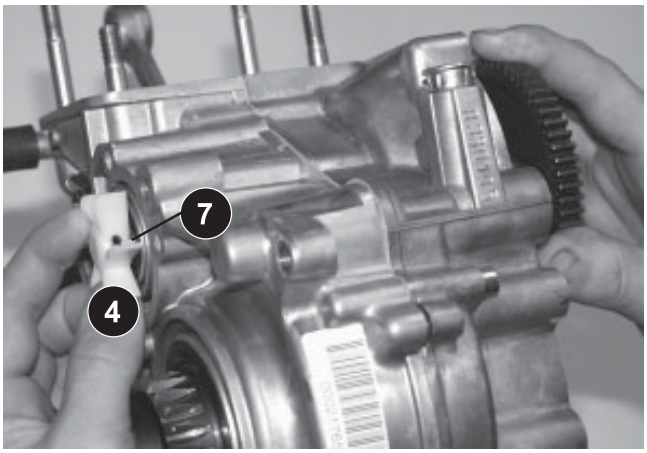


Fig. 73

⇨ Screw the water pump flange (Item 1) to the housing (Item 7) with the shaped sealing ring (Item 2) by means of the 4 Taptite screws (Item 8).

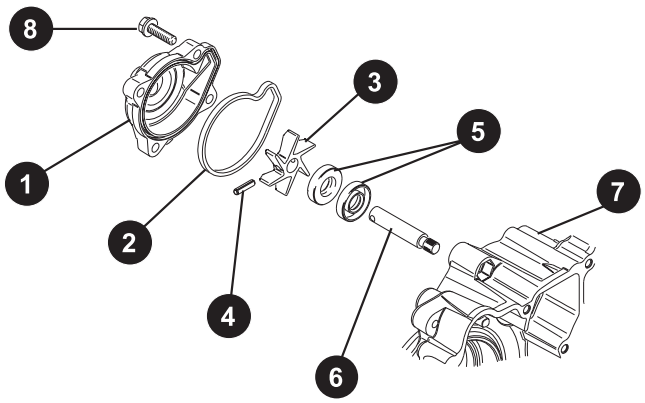


Fig. 74

◆ **Note:** Use only the special Taptite screws specified by ROTAX to secure the water pump flange. These are self-tapping. Other types of screws can destroy the threads in the housing. Lack of sealing would then quickly follow.

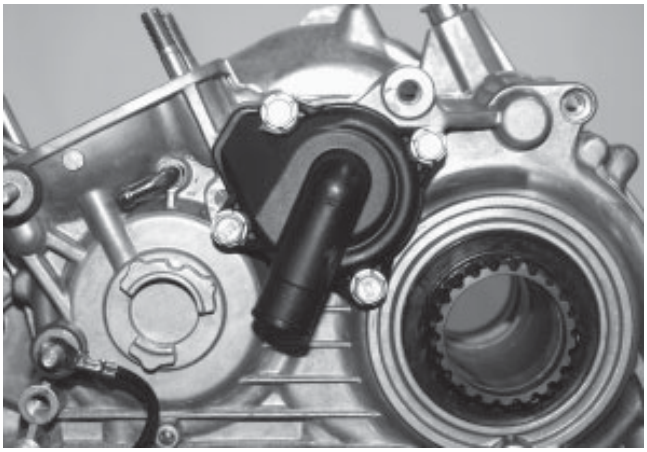


Fig. 75

Installation of the clutch, primary and balance drive

Overview of clutch components

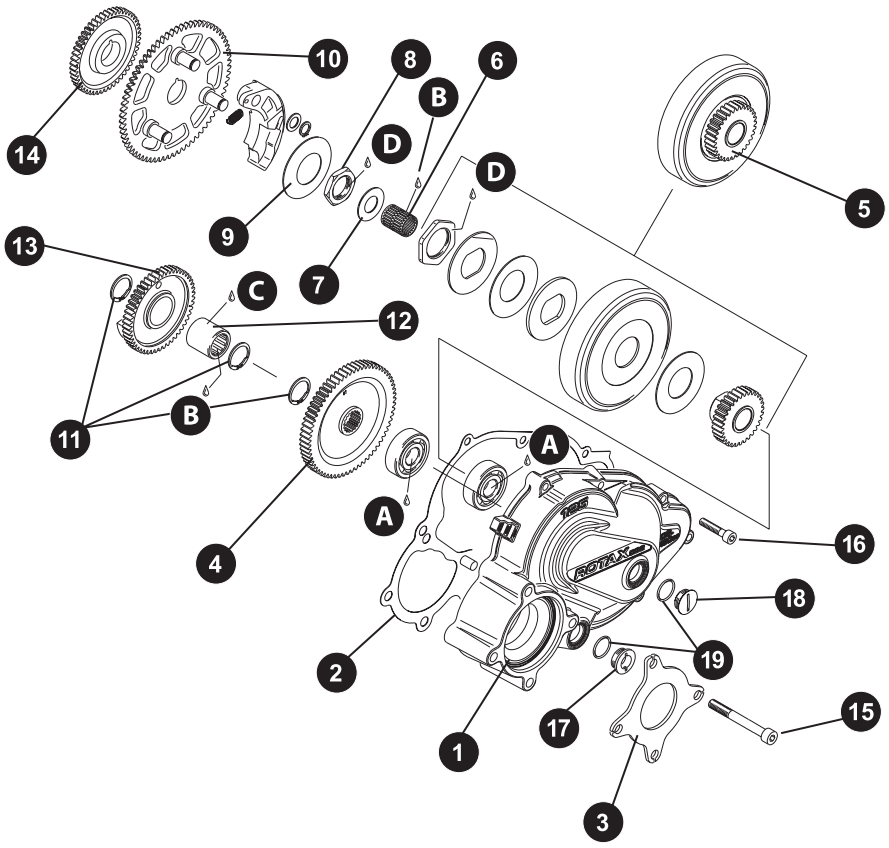


Fig. 76

Item	ROTAX Part No..	Description	Remarks
1	610 641	Clutch cover	
2	630 510	Sealing, housing	Sealing, housing
3	251 335	Bracket	Detent, hollow shaft
4		Secondary gear wheel	Option of various ratios
5		Clutch drum with drive gear	Option of various ratios
6	632 410	Needle cage	
7	927 057	Thrust washer	
8	242 874	Hexagon nut	Starter crown wheel attachment
9	239 320	Disc spring	Starter crown wheel attachment
10	635 776	starter toothed ring, complete	70 teeth
11	945 660	Retaining ring	
12	632 030	Needle sleeve	
13	635 741	Balance gear wheel	50 teeth
14	635 730	Balance drive gear wheel	50 teeth
15	841 991	Allen screw	M8x70
16	840 880	Allen screw	M6x30
17	240 820	Oil level screw	
18	241 800	Plug screw	
19	250 890	O-ring	
A	297 434	Loctite AntiSeize 15378	
B	897 330	Lithium-base grease	
C	899 788	Loctite 648 green	Screw locking
D	899 785	Loctite 221 violet	Screw locking

Table 6

⇨ Insert the starter drive (Item 1) with thrust washer (Item 2) into the housing (Item 3).

◆ **Note:** Make sure that the correct sequence is followed - it is no longer possible to install the starter drive after inserting the clutch drum with the drive gear.

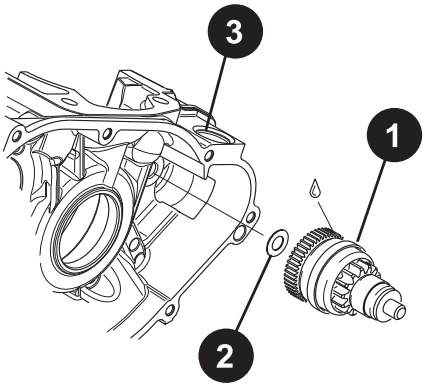


Fig. 77

⇨ Position the balance drive gear wheel on the crankshaft and locate the cutout in the gear wheel on the Woodruff key, see Fig. 78.

◆ **Note:** Make sure that the installation position is correct - the balance gear wheel and the balance drive gear wheel are asymmetric. Incorrect installation of a gear wheel therefore leads to damage to the engine.

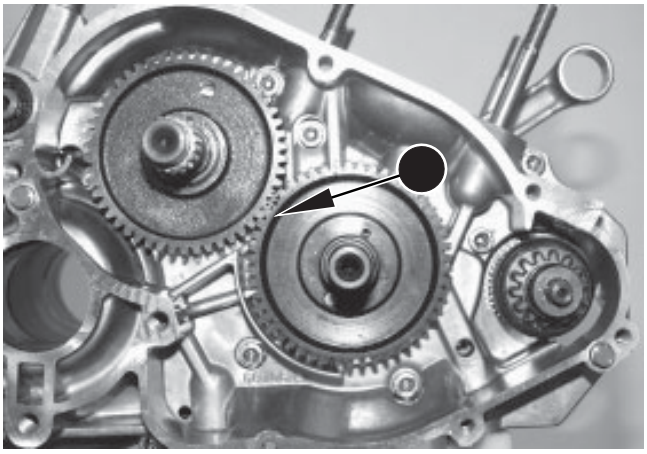


Fig. 78

⇨ Install the shaft circlip on the first groove in the pinion shaft, using suitable pliers.

⇨ Lubricate the inside of the needle sleeve with lithium-base grease.

⇨ place the needle sleeve on the pinion shaft and coat the surface with Loctite 648.

⇨ Fit the balance wheel on the needle sleeve, making sure that the mark on the balance shaft drive wheel lies between the marks on the balance gear wheel.

Fig. 79

⇨ Fix the balance wheel with the second shaft circlip using pliers.

■ **Attention:** Check the installed position - the marks on the installed balance gear wheels must be as shown in Fig. 79. Any other positioning of the gear wheels is not permissible, because this would lead to damage to the engine due to vibration of the crankshaft.

◆ **Note:** The shaft circlips should be installed with the chamfer facing the pressure side of the shaft.

⇨ Complete the starter crown wheel, see from page 36, and position it on the crankshaft.

✔ Inspect the disc spring for wear.

⇨ Install the disc spring.

◆ **Note:** Take care over the installed position - the disc spring must be able to transfer the pressure from the fixing nut to the component.

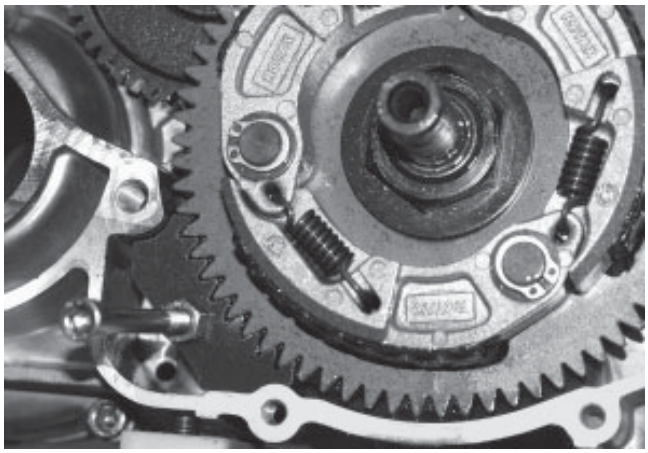


Fig. 80

⇨ Tighten the nut SW30 to the prescribed tightening torque of 120 Nm using the special tool.

◆ **Note:** Use the special tool “Locating/ locking device, complete“ ROTAX No. 676 200/202

⇨ Fit the thrust washer (Item 1), see Fig. 81.

✔ Inspect the thrust washers and needle bearing for wear - replace if required.

✔ Inspect the drive gear for material erosion and scouring in the area of the bearing. Check for deformation and wear of the toothed components.

⇨ Coat the needle sleeve (Item 2) with lithium-base grease and fit it on the crankshaft.

⇨ Fit the shaft circlip in the third groove on the pinion shaft using suitable pliers.

⇨ Position the clutch with the drive gear, complete, on the needle sleeve.

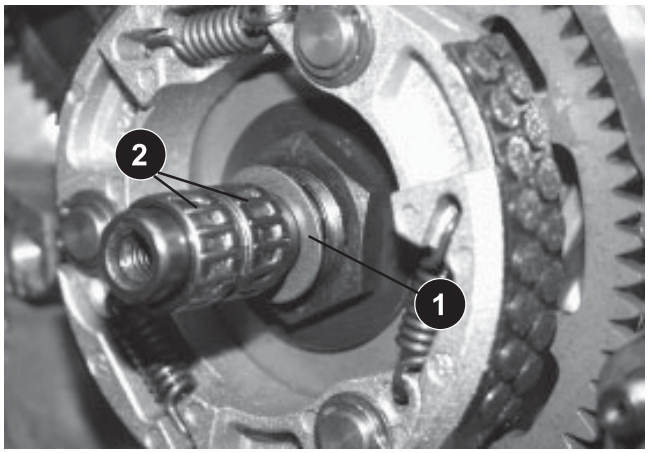


Fig. 81

⇨ Engage the secondary gear wheel in the teeth of the pinion shaft.

⇨ Fit new gearbox housing cover gasket.

⇨ Screw in the oil drain screw (Item 1) with a new sealing ring (Item 2).

⇨ Tighten the 6 screws in the clutch cover and the 4 screws in the hollow shaft bracket to the prescribed torque of 10 Nm.

⇨ Screw in the oil level screw/screw plug with a new sealing ring.

⇨ Fill the assembly with the specified quantity of oil (150 ccm) through the oil filler.

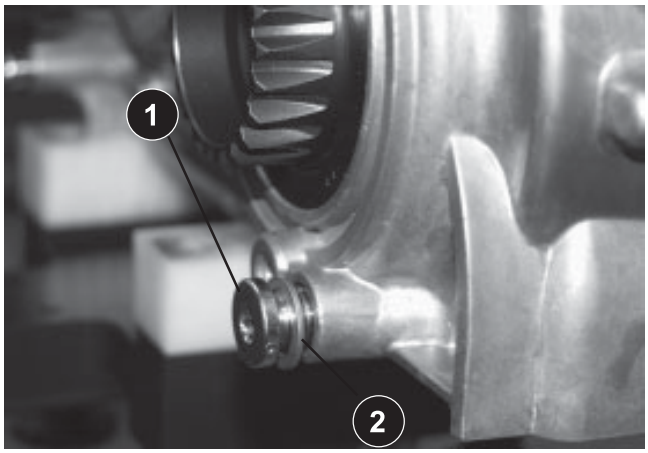


Fig. 82

Installation of the piston and piston pin

◆ **Note:** Cover the crankcase with a clean cloth to prevent small parts from inadvertently falling into the crank and gearbox housing and causing damage.

⇨ Coat the piston pin retainer with lithium-base grease,

⇨ Insert the piston pin retainer into the upper connecting rod eye,

⇨ Mount the piston and piston pin on the conrod.

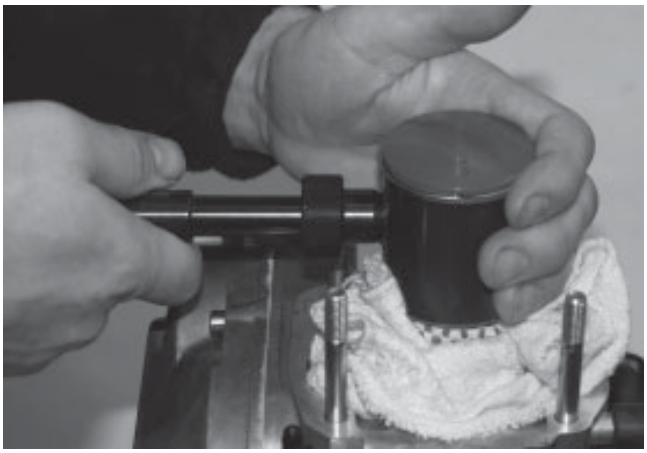


Fig. 83

■ **Attention:** Mount the piston with the locking pin of the piston ring facing the intake port.

■ **Attention:** The piston pin is fixed in the piston with two retaining rings.

■ **Attention:** Always fit new retaining rings.

⇨ Lay the new piston pin retainer ring flat on a level surface.

⇨ Position the piston pin retainer ring mounting sleeve over it.

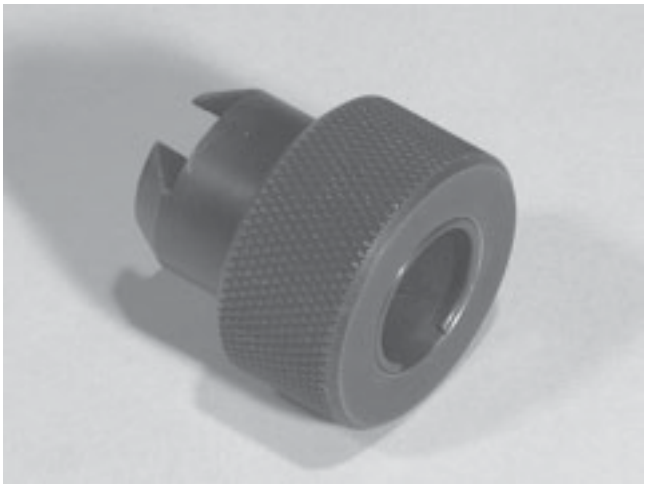


Fig. 84

◆ **Note:** Use the special tool “Installation tool, complete“ ROTAX No. 676 035.

⇨ Using the conical side of the installation tool, push the piston pin retainer ring deeper into the mounting sleeve.

Fig. 85

⇨ Rotate the installation tool and push the mounting sleeve further until the piston pinretaining ring engages in the groove in the mounting sleeve.

⇨ Push the Installation tool with the opening of the piston pin retainer ring downwards onto the piston.

⇨ Support the piston with one hand, see Fig. 83, and push the piston pin retainer ring into the piston.

◆ **Note:** The installation tool centers itself in the piston.

✔ Inspect the piston pin retainer rings for correct seating in the piston grooves.

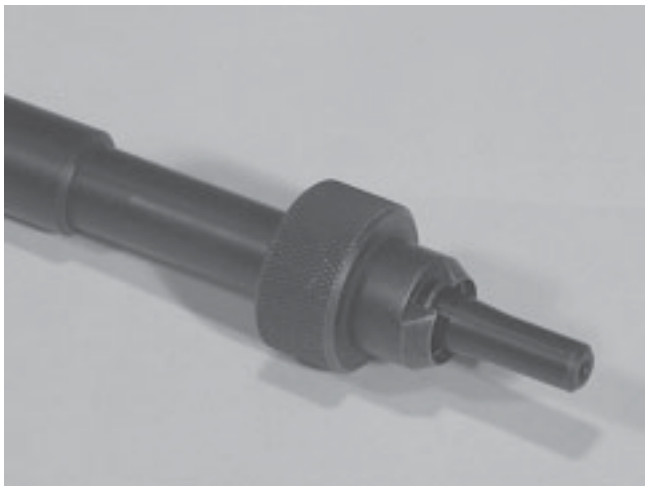


Fig. 86

Installation of the cylinder

◆ **Note:** Coat the stud bolts on the longer threaded end with Loctite 221 securing medium.

◆ **Note:** Screw the longer threaded portion of the stud bolts into the crank and gearbox housing and torque tighten to 5 Nm.

⇨ Fit new cylinder base gasket.

⇨ Lubricate the cylinder wall and piston with engine oil.

⇨ Using two fingers, push the piston ring into the piston.

⇨ Position the cylinder over the piston.

⇨ Secure the cylinder with the 4 flanged nuts to the crank and gearbox housing, with crosswise tightening to the prescribed tightening torque of 24 Nm.

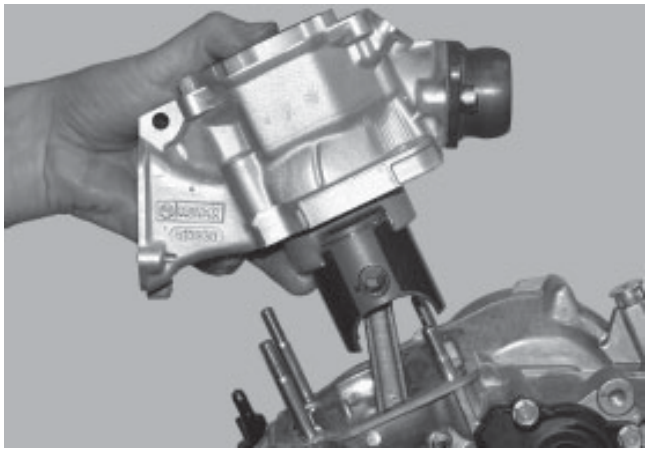


Fig. 87

◆ **Warning:** Use exclusively the piston/cylinder pairings in accordance with the table on page 34. All other combinations may lead to engine damage.

Installation of the combustion chamber insert and cylinder head cover

⇨ Insert the new o-ring (7) in the groove.

⇨ Secure the combustion chamber insert (Item 6) to the cylinder (Item 2) by crosswise tightening the five screws (Item 8) with spring washers (Item 9), taking care not to crush the o-ring (Item 7), see Fig. 88. The prescribed tightening torque is 30 Nm.

⇨ Install the thermostat (Item 13) with disc (Item 14), spring (Item 15) and bracket (Item 16) and tighten the 2 recessed head screws (Item 17), see Fig. 88.

⇨ Insert the shaped gasket (Item 3) and o-ring (Item 10) in the cylinder head cover (Item 1).

⇨ Secure the cylinder head cover on the cylinder (Item 2) with the 4 screws (Item.5) to the prescribed tightening torque of 10 Nm.

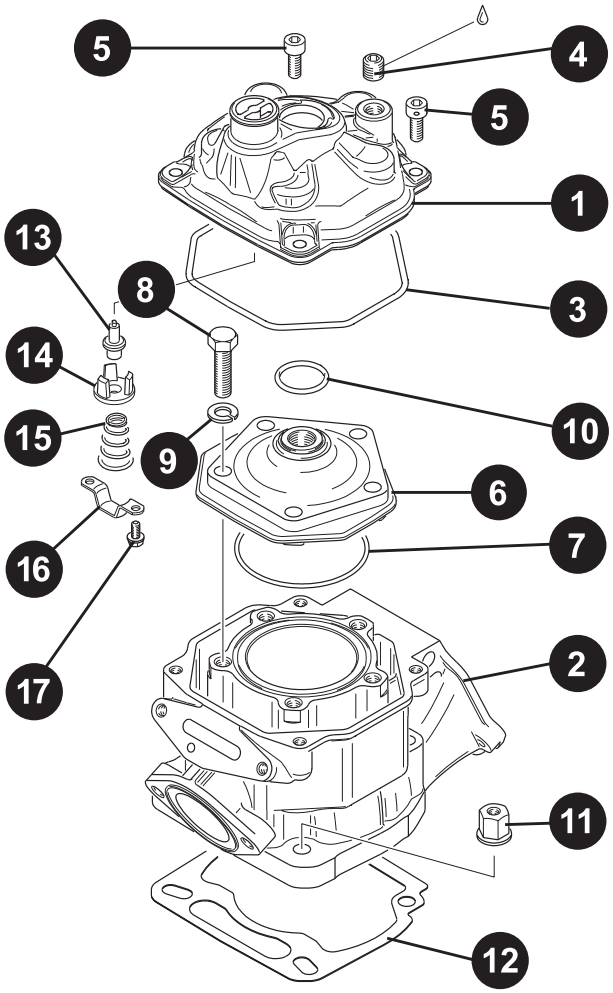


Fig. 88

◆ **Note:** Take care when installing the combustion chamber-insert (Item 6) - the casting “made in Austria“ lettering should be on the same side as the exhaust port.

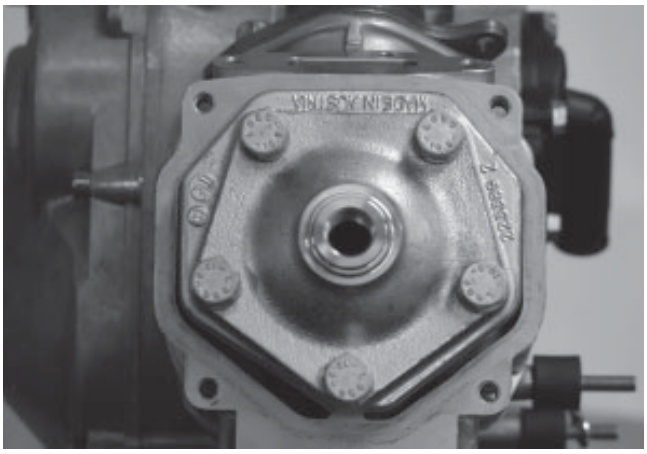


Fig. 89

◆ **Note:** On each of the components cylinder head, exhaust outlet and carburetor socket a screw with a hole in the top is used for the purpose of attaching sealing wire - ROTAX part no. 641 361.

◆ **Note:** Note the installed position of the thermostat, see Fig. 90.

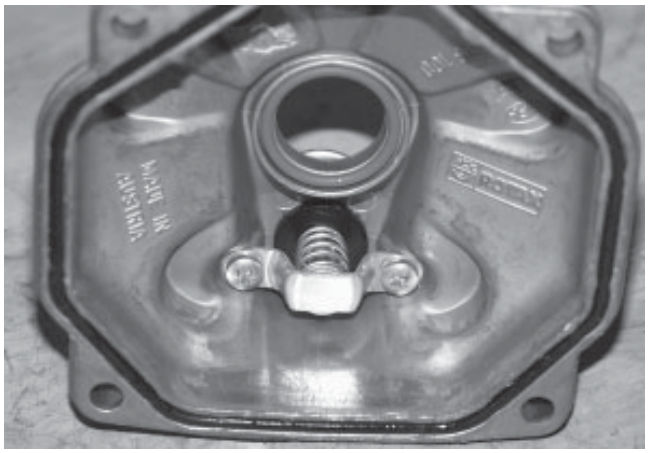


Fig. 90

Installation of the spark plug

✔ Check the electrode gap of the spark plug with a feeler gauge and adjust if required to s = 0.4 mm to 0.6 mm.

■ **Attention:** The ground electrode can be bent only by a minimal amount.

⇨ Tighten the spark plug by hand and with approx. 180° rotation, depending on the engine temperature and contact pressure of the spark plug that is fitted.

◆ **Note:** The following spark plugs are approved by BRP-ROTAX:

Denso IW 24 - 31, a Denso IW 27 spark plug is installed as standard.

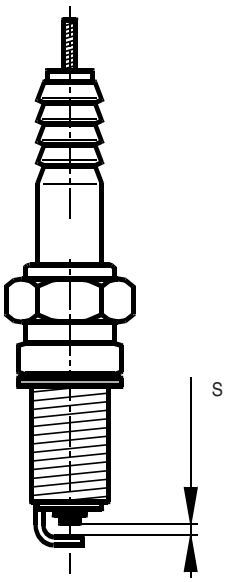


Fig. 91

Installation of the outlet slider

◆ **Note:** The item numbers in this section relate to Fig. 93.

⇨ Secure the outlet slider (Item 15) and stud bolt (Item 13) with Loctite 648, and tighten to a torque of 2-3 Nm.

⇨ Wipe away the surplus Loctite.

⇨ Fit the o-ring (Item 14).

⇨ Insert the outlet slider in the cutout in the cylinder as shown in Fig. 92.

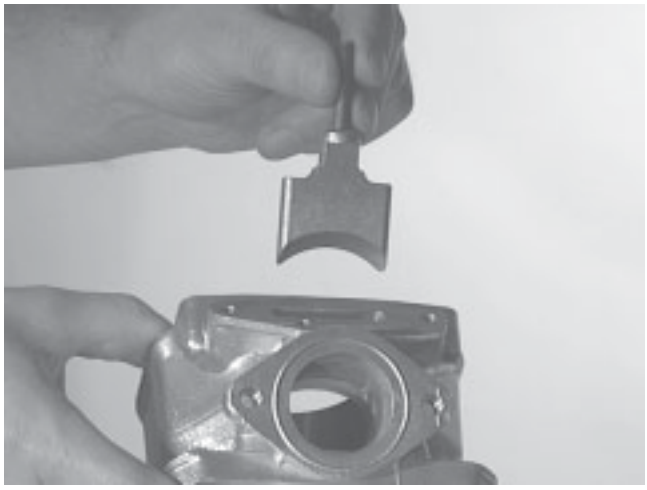
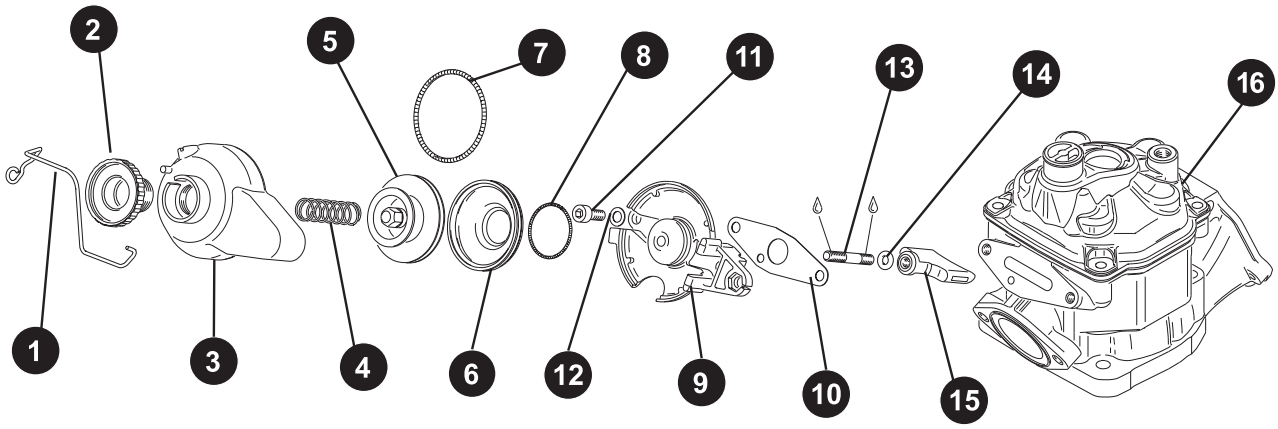


Fig. 92

⇨ Position the outlet slider gasket (Item 10), making sure that the impulse bore on the cylinder is not covered.

⇨ Insert the slider guide component (Item 9) with the cutout facing the exhaust port. Screw the two screws (Item 11) with spring washers (Item 12) into the cylinder (Item 16) and tighten to 10 Nm.

✔ Check the slider for freedom of movement.



◆ **Note:** Make sure that the components are in their correct respective positions. *Fig. 93*

◆ **Note:** If the slider does not move freely or is jammed, uninstall and refit the slider guide component.

⇨ Degrease the slider guide component (Item 9), slider bellows (Item 6) and slider piston (Item 5).

⇨ Pull the small tubular spring (Item 8) over the slider bellows.

⇨ Fit the slider bellows over the slider guide component (Item 9). The bead of the slider bellows must engage in the groove in the slider guide component.

✔ When fitting the slider housing, make sure that there is freedom of movement.

⇨ Coat the slider piston (Item 5) with a small amount of Loctite and secure it on the slider guide component with a torque of 3-4 Nm.

⇨ Tension the large tubular spring (Item 7) with a suitable tool.

⇨ Fit the coil spring (Item 4).

⇨ Install the cover (Item 3) and adjuster screw (Item 2).

⇨ Secure the spring clip (Item 1) on the cylinder, see Figs 93 and 94.

⇨ Fasten the spring clip over the cover and adjuster screw and into the groove in the slider housing.

◆ **Note:** Screw in the adjuster screw (Item 2) in the slider cover (Item 3), until it is approx. 5 cm in front of it - this corresponds to the standard setting.

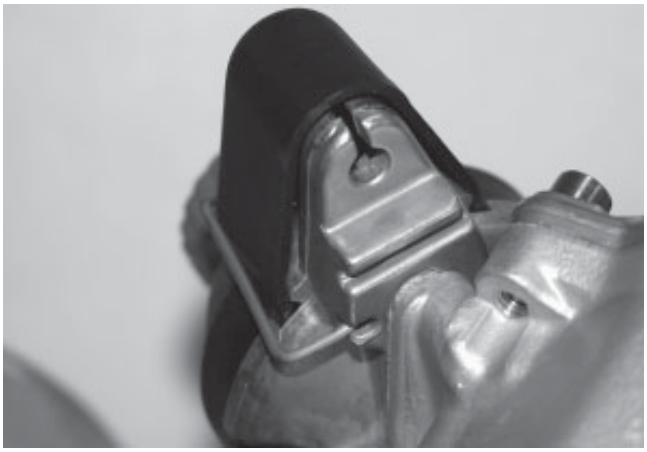


Fig. 94

Installation of the exhaust gas port

⇨ Secure the exhaust gas port, with a new gasket, to the cylinder, tightening the two screws to the prescribed torque of 20 Nm.

✔ Check the connection between the cylinder and the exhaust gas port for correct sealing.

✔ Check for tightness and correct seating of the exhaust gas port on the cylinder.

✔ Inspect the ball of the exhaust gas port for material wear.

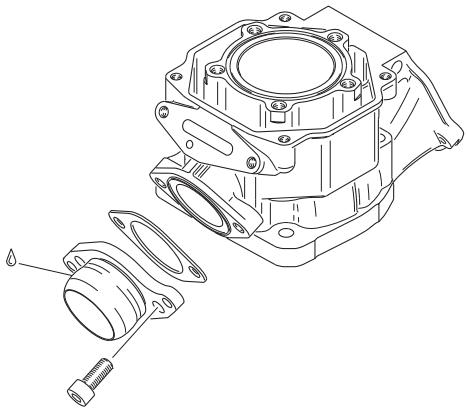


Fig. 95

◆ **Note:** Air leaking in to the exhaust gas port impairs the function and performance of the engine.

Installation of the valve fitting and carburetor socket

⇨ Attach the reed valve and valve detent to the valve fitting using recessed head screws, use Loctite 221 for screw locking.

⇨ Carry out the assemble of the components in the reverse of the sequence for disassembly, as described on page 18.

◆ **Note:** The reed valve mounted on the valve fitting must be fixed in precisely the correct installation position. Incorrect positioning of this valve leads to eccentric running of the engine due to incomplete combustion. The reed valve is bent, not flat. It must be fixed with the concave facing the valve fitting. If the valve fitting with the correctly fitted reed valve is held up to the light, it must not be possible to see through it.

◆ **Note:** The valve fitting can only be replaced as a complete item, dismantling is only carried out for cleaning purposes and in the event of damage to a component or for inspection.

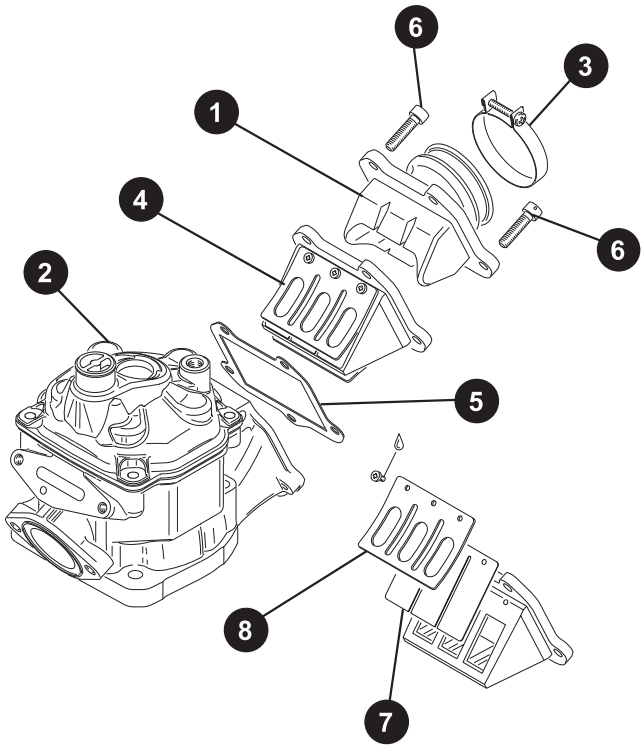


Fig. 96

⇨ Position the gasket on the cylinder.

⇨ Fit the valve fitting and carburetor socket to the cylinder, tightening the 5 screws to a prescribed tightening torque of 6 Nm.

Installation of the overload clutch

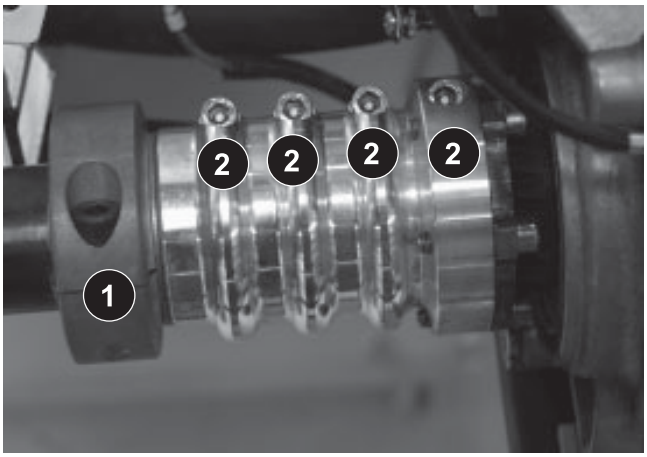


Fig. 97

⇨ Slide the wheel-side clamping ring (Item 1) onto the rear axle.

⇨ Slide the thrust washer onto the rear axle.

⇨ Slide the overload clutch with the 4 plastic bearings onto the hollow shaft,

⇨ Tighten all 4 Allen screws (Item 2) on the hollow shaft equally with the prescribed torque of 10 Nm.

◆ **Note:** The pre-assembly is described on page 41. Pay particular attention to the information in the user and installation manual.

Installation of the carburetor

▲ W**arning:** Gasoline can also spill out during the installation of the carburetor.

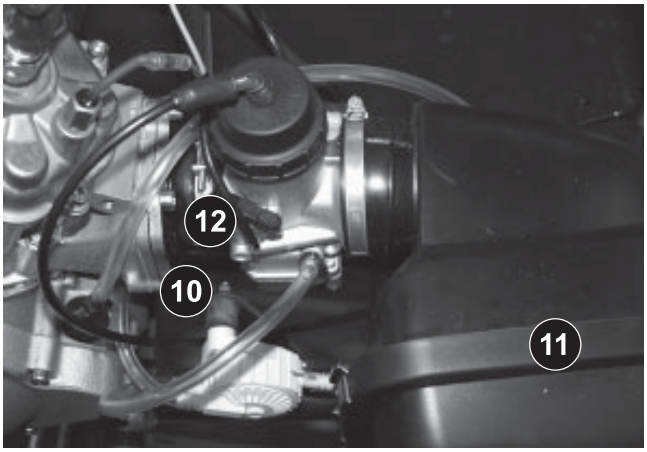


Fig. 98

⇨ Position the carburetor on the carburetor socket (Item 10).

⇨ Pull the screw hose clamp (Item 12) over the carburetor socket and secure it.

⇨ If required, attach the intake silencer to the carburetor using a screw hose clamp.

⇨ After installation of the engine (Item 11) secure the intake silencer on the Kart frame, as described on page 57.

Installation of the ignition box

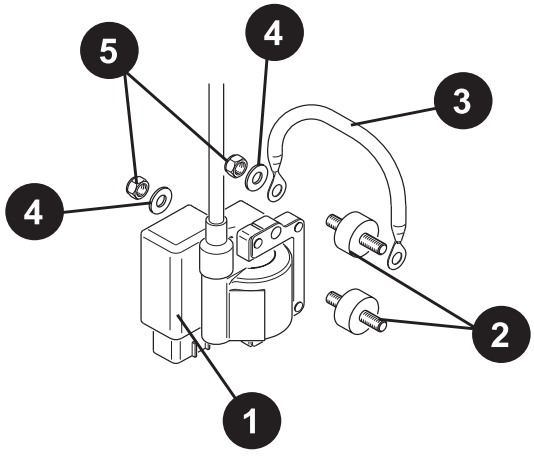


Fig. 99

⇨ Attach the ignition box (Item 1) and grounding cable (Item 3) to the crank and gearbox housing with the 2 rubber mountings (Item 2), washers (Item 4) and self-locking nuts.

⇨ Secure the grounding cable.

⇨ Attach the Hall probe and guard plate to the bottom side of the crank and gearbox housing with 2 self-tapping screws.

◆ **Note:** The ignition point is digitally controlled. The information required comes from a Hall probe on the crank and gearbox housing and the electronics integrated in the ignition box. Adjustment of the ignition unit is neither possible or necessary.

Installation of the engine on the chassis

▲ **Warning:** Before installing the engine on the chassis the installation instructions for the engine and the installation instructions of the chassis manufacturer must be read and understood.

▲ **Warning:** Before commissioning the engine the operating instructions for the engine and the operating instructions of the chassis manufacturer must be read and understood.

⇨ Remove the completed engine from the trestle mounting plate.

⇨ Secure the engine on the attachments provided on the Kart chassis. Refer to the installation and operating instructions.

Installation of the fuel pump

▲ **Warning:** Overflowing and spilt gasoline must be absorbed immediately with a binding agent and correctly disposed of. Do not work with open flames and sources of ignition. Fuel must not be allowed to come into contact with hot engine parts and components - risk of fire and explosion.

⇨ Connect the fuel supply hose (Item 6) and the hose to the carburetor (Item 7).

⇨ Connect the impulse pipe (Item 8).

⇨ Attach the fuel pump (Item 9).

◆ **Note:** The fuel pump used cannot be repaired and must be replaced in the event of malfunction by ROTAX new part No. 684 200.

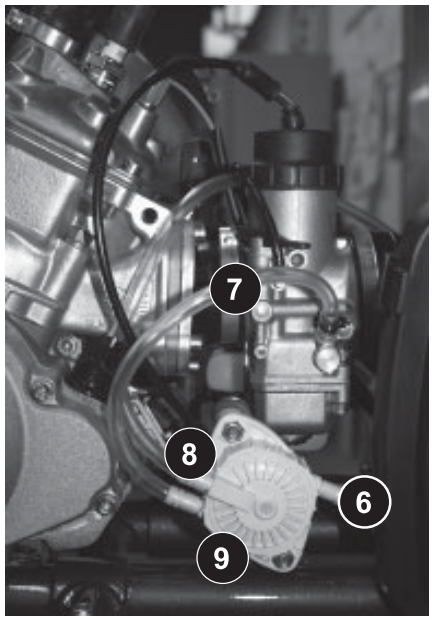


Fig. 100

◆ **Note:** The exact installation position should be obtained from the operating and installation instructions for the Kart.

◆ **Note:** On assembly, make sure that all pipes are correctly connected, see Fig. 100.

Installation of the intake silencer

✔ Inspect the silencer housing (Item 1) and silencer cover (Item 2) for cracks.

✔ Inspect the intake pipe (Item 3) and silencer connection (Item 4) for cracks and porosity.

✔ Inspect the silencer filter for brittleness.

◆ **Note:** A broken filter element must be replaced immediately.

⇨ Clean the silencer filter (Item 5).

◆ **Note:** Immerse the filter element in filter oil before assembly (Use Rotax No. 297 160) and then expel the surplus oil.

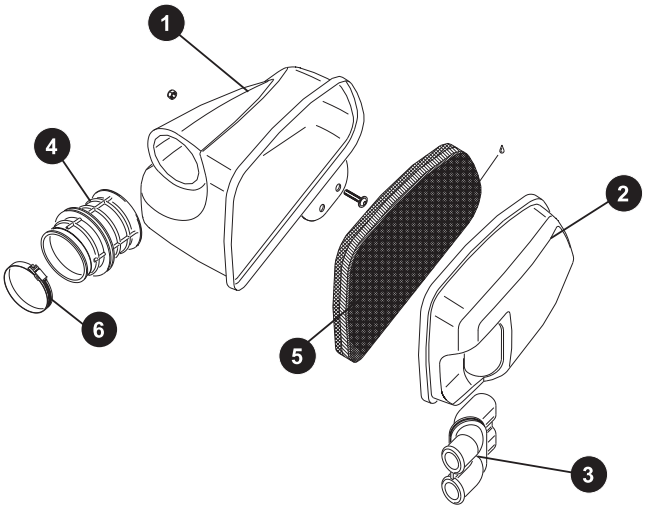


Fig. 101

⇨ Insert the silencer filter in the housing.

⇨ Fasten the cover on the housing.

⇨ Screw the complete intake silencer on the Kart chassis.

⇨ Mount the silencer connector on the carburetor with a clamp (Item 6) and tighten so that it is airtight.

Installation of the gear shift

⇨ Attach the rear bracket (Item 6) with the screw (Item 8) and washer (Item 7) to the crank and gearbox housing (Item 10).

⇨ Attach the support plate (Item 3, Fig. 26) on the crank and gearbox housing with the 4 M8x70 screws (Item.15, Fig. 26) and align it visually.

⇨ Insert the spring (Item 3) with thrust washer (Item 9).

⇨ Insert the switch contact (Item 5) between the rear bracket (Item 6) and front bracket (Item 14).

⇨ Fasten the retainer clip (Item 12).

⇨ Attach the front bracket with the screw (Item 11) and washer (Item 10).

⇨ Adjust the switch contact separation to between 1.0 and 1.5 mm using a feeler gauge.

⇨ Select gear N.

⇨ Attach the Bowden cables (Items 1+2) in the brackets (Items 6+14),

⇨ Fit the cable tie for fixing the Bowden cables.

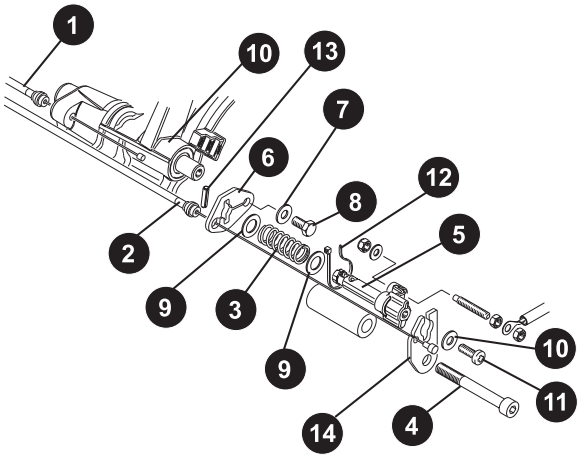


Fig. 102

Fig. 103

Installation of the exhaust system

✔ Inspect the exhaust system for cracks and breakages.

✔ Inspect the exhaust gas flange for deposits and deformation.

✔ Inspect the rivets of the exhaust inner pipe for tightness and seating.

◆ **Note:** If the exhaust system noise increases, then the silencer baffle mat (Item 2) should be replaced.

⇨ Drill out the rivets (Item 4) with a sheet drill - wear eye protection!

⇨ Wearing gloves, pull out the exhaust inner pipe and baffle from the exhaust system (Item 1).

✔ Inspect the baffle for wear.

■ **Attention:** A worn out baffle can lead to major engine damage.

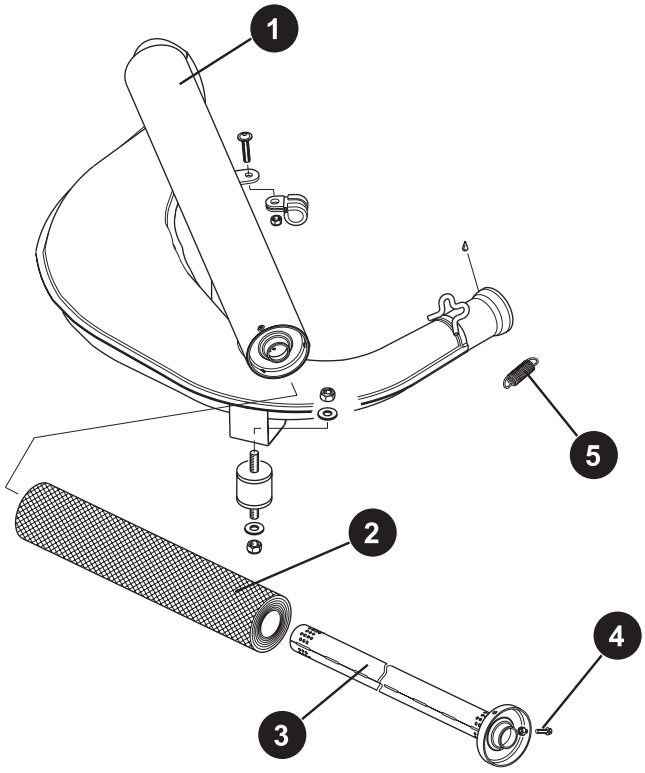


Fig. 104

⇨ Insert a new baffle ROTAX No. 297 980 tightly into the exhaust inner pipe (Item 3).

⇨ Insert the exhaust inner pipe and baffle into the exhaust system.

⇨ Secure the exhaust inner pipe in the exhaust system with new rivets, using suitable riveting tongs.

⇨ Install the exhaust system on the attachments (Items 5-10) on the Kart chassis and torque tighten the new self-locking nuts to the prescribed torque of 10 Nm.

⇨ Coat the exhaust gas ball with sealant.

⇨ Fit the springs (Item 5) to the exhaust gas flange of the engine with a suitable tool.

✔ Inspect the tightness of the exhaust pipe and seating on the exhaust gas ball.

Installation of the radiator

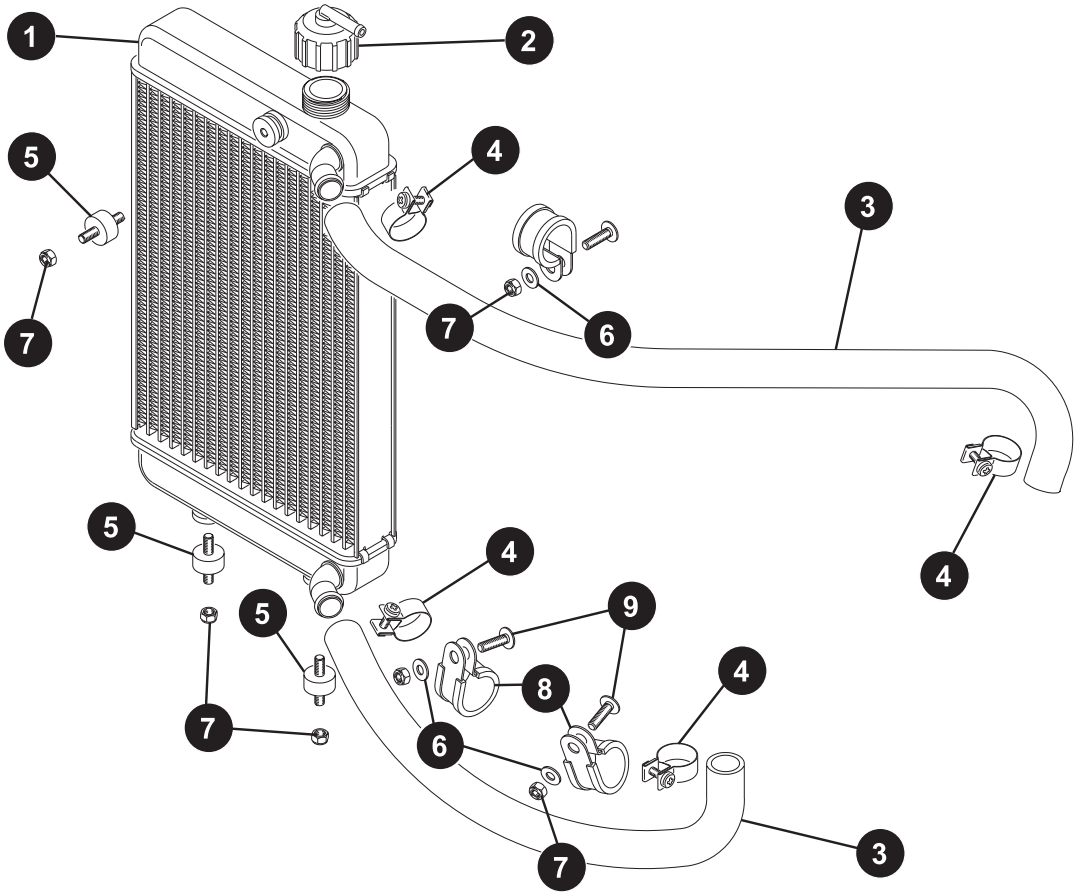


Fig. 105

⇨ Fix the radiator (Item 1), complete, to the 3 rubber mountings (Item 5) on the Kart chassis. The prescribed torque is 10 Nm.

⇨ Fit the radiator hoses (Item 3) on the support fittings on the radiator and align them with the engine support fittings. Secure with the screw hose clamps (Item 4) and tighten them to provide water tightness.

⇨ Fit the 3 cable clamps (Item 8) over the radiator hoses, as shown in Fig. 105 - two below, one above - align and secure them and attach them with the screws (Item 9) to the frame.

⇨ Use washers on the Kart frame. Tighten the nuts to the prescribed torque of 10 Nm.

◆ **Note:** Always use new self-locking hexagon nuts.

◆ **Note:** Note the installation position of the radiator.

Installation of the radiator hoses

⇨ First connect the radiator hose to the connection support on the cylinder head cover. Then tighten the clamp to provide water tightness with the recessed head screw, as shown in Fig. 106.

◆ **Note:** Install the profile hose untwisted.

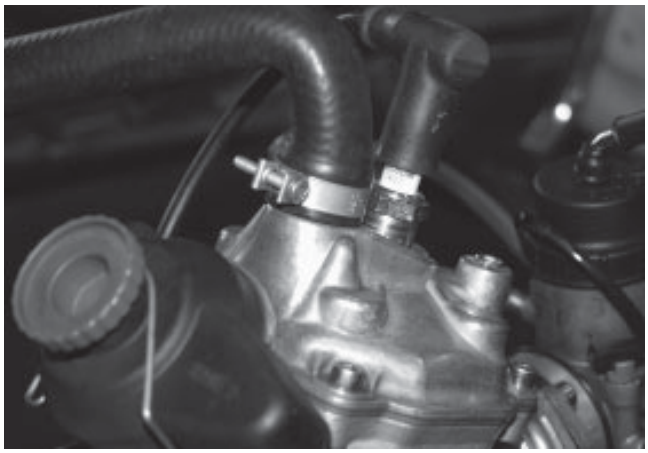


Fig. 106

⇨ Attach the radiator hose to the water pump using the hose clamp shown in Fig. 107 and tighten to provide water tightness.

⇨ Collect any overflowing coolant in a suitable vessel.

⇨ Using a funnel fill radiator with the prescribed quantity of coolant via the filler opening.

✔ Check the sealing of the cooling system with the engine running and warmed up.

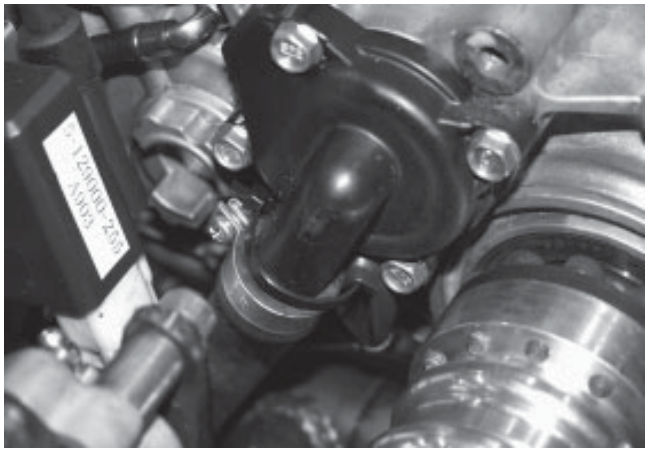


Fig. 107