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ROTAX®
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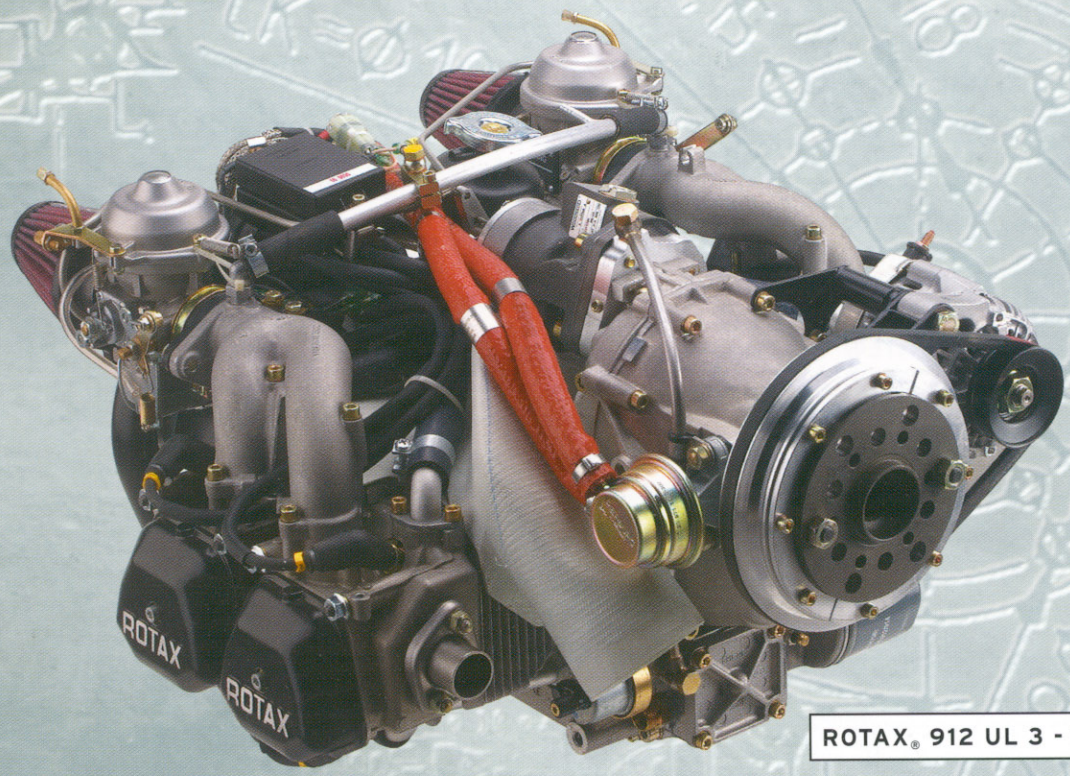
Maintenance Manual II

(Heavy Maintenance)

for

ROTAX® Engine Type 912 Series



ROTAX® 912 UL 3 - with options

⚠ WARNING

Before starting any maintenance work, please, read the Maintenance Manual completely as it contains important safety relevant information.

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

Edition: 0 of 2002 01 01

ROTAX® part no.: 899601

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fig. 003

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01	÷16	1 up to 125	02 01 01	english version not required			

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fig. 003

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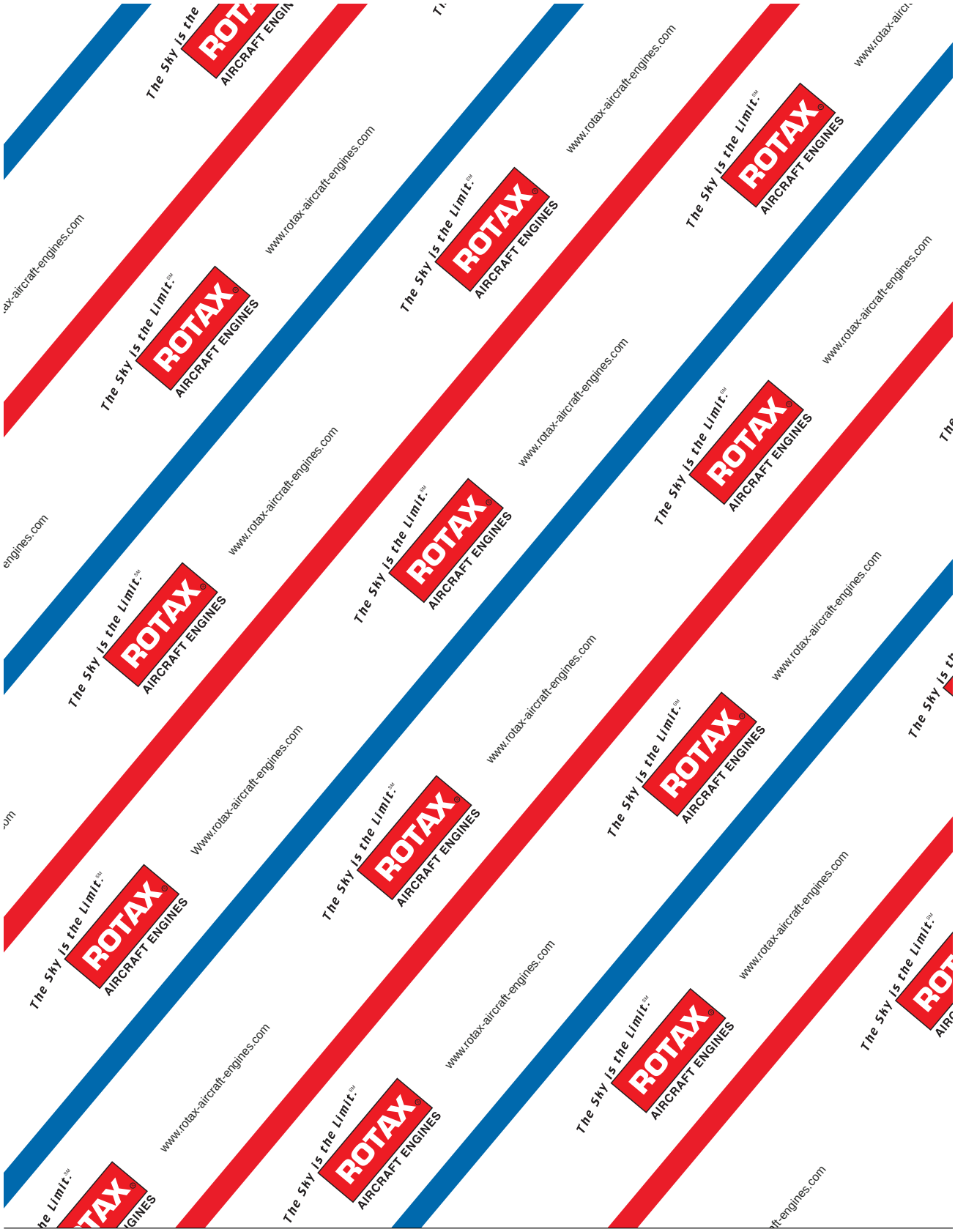
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5) Introduction

See Maintenance Manual type 912 (Line Maintenance) Chapter 00-00-00 para 4.

6) Safety

See Maintenance Manual type 912 (Line Maintenance) Chapter 00-00-00 para 5.

6.1) Repeating symbols

This Manual uses the following symbols to emphasize particular information:

▲ **WARNING:** **Identifies an instruction which, if not followed, may cause serious injury including the possibility of death.**

■ **CAUTION:** **Denotes an instruction which, if not followed, may severely damage the engine or other component.**

◆ **NOTE:** **Indicates supplementary information which may be needed to fully complete or understand an instruction.**

7) Technical documentation

See Maintenance Manual type 912 (Line Maintenance) Chapter 00-00-00 para 5.3.

8) General

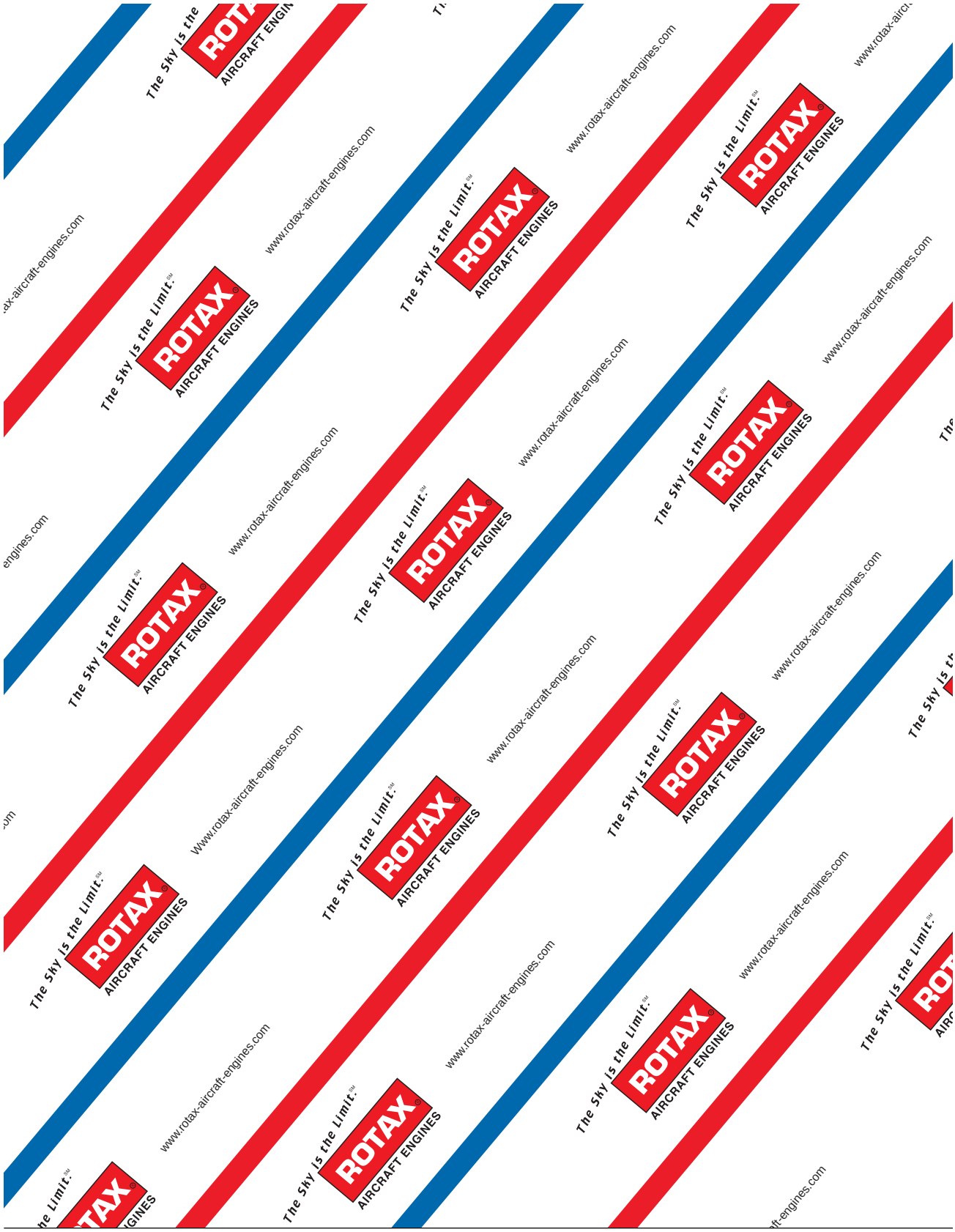
For further information see relevant Operator's Manual of the engine type 912.

9) Auxiliary equipment

For further information see relevant Operator's Manual of the engine type 912.

10) Description of design

For further information see relevant Operator's Manual of the engine type 912.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11) Maintenance

11.1) General note

See Maintenance Manual type 912 (Line Maintenance) Chapter 05-00-00 para 2.1.

In this chapter the maintenance of engine Type ROTAX® 912 is described. The Manual is subdivided into sections that contain the description and function of the various systems Some overlapping maintenance instructions are treated as generally valid information at the beginning of this section

The information given in the Maintenance Manual is based on data and experience which are considered to be applicable for a skilled mechanic under normal working conditions. The guidelines given in the Maintenance Manual are useful and necessary supplements to training. They, however, cannot substitute competent theoretical and practical personal instruction.

Maintenance of engines and systems requires special knowledge and special tools.See also para 11.2,11.3, 11.4, 11.5, 11.6 and 11.7.

11.2) Version

See Maintenance Manual type 912 (Line Maintenance) Chapter 05-00-00 para 2.2.

We particularly emphasize that parts and accessories not supplied as genuine ROTAX® parts are not verified for suitability by ROTAX® and thus are not authorized for use. Installation and/or use of such products may possibly change or negatively influence the operational characteristics of the engine. For damages resulting from use of non-genuine parts and accessories ROTAX® refuses any liability.

Non-authorized modifications as well as the use of components and auxiliary components not corresponding to the installation instructions exclude any liability by the engine manufacturer.

Besides our instructions in the documentation supplied, also respect the generally valid safety and accident preventive directives and legal regulations.

11.3) Procedure notes

See Maintenance Manual type 912 (Line Maintenance) Chapter 05-00-00 para 2.3.

11.4) Auxiliary tools

– Screwdriver ground to shape ❶ for piston pin circlip removal (see fig. 5)

– 2 pressure gauges, adapter for dial gauge in spark plug thread for leakage test

– valve spring pliers

– step punch for valve guide

– adjustable reamer 6,5 ÷ 7,5 mm

– valve seat rework set, valve lapping paste

– gearbox support plate

– fixing device for overload clutch

– fitting tool for “Heli-coil” inserts

– auxiliary screws for crankcase joining, 2 hex. screws M8x110, DIN 931 - 8.8 (part no. 941 171) or equivalent

– stud extraction tool

– scraper, lapping fleece, grinding wheel, cover sheet, adhesive tape

– cleaning agent, approved cleaners, funnel, graphite marker

– magnetic particle tester DEUTROFLUX®, series UHW, or equivalent. These testers are suitable for complete combined magnetic particle crack inspection of all ferromagnetic materials. For this purpose an A.C. field circulation can be combined with a shifted phase A.C. circulation. Both magnetizing methods are independent from each other and can be applied separately.

To achieve the direction changes of the magnetic field vector necessary for indication of cracks in any direction, the alternating currents serving as current supply for the different methods of magnetizing are dephased by 120° to each other:

a) current circulation for longitudinal cracks

b) field circulation for transverse cracks

c) auxiliary circulation for axial and radial crack indication on parts with bores right through by using an electric auxiliary conductor (copper bar).

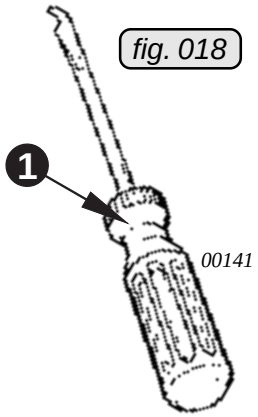

fig. 018

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11.5) Measuring tools

Vernier callipers, dial gauge, micrometer, internal micrometer,

feeler gauge,

spring scale up to 50 kp (500 N).

Stroboscope: BOSCH® 0 684 100 308 or equivalent.

Supply voltage 8 ÷ 15 V. Flash triggering by inductive pick-up. Flashing frequency 4500 r.p.m.

Multimeter: FLUKE® series 70, series 80 or equivalent.

Electronic, 3 1/2 digits indication.

Current range 10 A.

Direct voltage range 200 V minimum.

Resistance range 200 Ω ÷ 2 MΩ

Accoustic continuity tester.

Oscilloscope: TEKTRONIX® 2225 or equivalent

(optional) 2 channels

Analogous

Sensitivity 5 mV to 5V/div

Frequency limit 50 MHz

▲ WARNING: Using these instruments, observe the manufacturer's specifications.

11.6) Special tools and devices

See fig. 6.

The following tools and devices are also indicated in the spare parts list.

Fig.No.	Part-No.	Description, application	quantity
1	276 282	spark plug wrenchSW 16	1
2	276 280	spark plug wrench SW 18	1
3	977 420	handle bolt 8x130-10 for spark plug wrench	1
4	240 880	threaded pin DIN 915-M8x50 for crankshaft locking	1
5	876 510	insertion jig for oil seal (12x30x7), water pump shaft	1
6	877 258	insertion jig for face seal	1
■ CAUTION:		The new insert jig can be used only in conjunction with rotary seal part no. 850.945.	
7	877 270	insertion jig for oil seal 32x52x7, crankshaft, magneto side	1
8	877 276	insertion jig for oil seal 22x32x7, vacuum pump	1
9	276 332	insertion jig for pressing out needle sleeve 22x28x12 and ball bearing 15x32x8, vacuum pump	1
10	877 650	handle for insertion jigs	1
11	876 518	insertion jig for oil seal 40x55x7, gearbox cover	1
12	877 320	insertion ring for ball bearing 35-72-17, propeller shaft, use together with insertion jig 876 518	1
13	877 680	insertion jig with sleeve for oil seal 6x11x3/4,5 of rev. counter housing	1
14	877 410	protection piece for crankshaft, magneto side	1
15 - 16	877 375	extractor ass'y for magneto flywheel	1
16	841 875	hex. screw M16x120 DIN 931 for extractor	1
17	877 360	insertion sleeve for oil seal 32x52x7, crankshaft, magneto side	1

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Fig.No.	Part-No.	Description, application	quantity
18	877 295	impeller spanner for water pump impeller	1
19 ÷ 20	877 730	float level gauge ass'y to check the float bracket	1
20	240 381	hex. screw M6x12 DIN933-8.8 for float level gauge	1
21	877 710	dial gauge adapter ass'y	1
22	877 700	spring scale for valve spring close force	1
23	877 802	circlip installation tool for installation of piston pin circlip	1
24	876 950	precision dial gauge	1
25 ÷ 26	877 091	piston pin extraction tool ass'y for removal and installation of piston pin	1
26	877 155	extracting nut M6 ass'y for piston pin extraction tool	1
27	876 978	piston ring spanner for piston 79,5 mm dia.	1
28	876 967	piston ring spanner for piston 84 mm dia.	1
29	877 385	valve spring clamp ass'y for removal and installation of valve springs	1
30	877 380	valve spring mounting device for removal and installation of valve springs	1
31	877 790	adapter ring for valve spring clamp ass'y	1
32	242 660	distance nut spanner M8x33 fixture for vacuum pump drive sleeve	1
33	876 470	ring spanner 10/13 a/f	1
34	877 260	cylinder aligning tool for aligning the cylinders	1
35	877 262	cylinder aligning tool for aligning the cylinders	1
36	877 300	aligning plate for plain bearing position	1
37	877 315	measuring plate to check plain bearing protrusion	1
38 ÷ 39	877 230	trestle ass'y for chucking the engine	1
38	876 762	trestle support ass'y	1

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Fig.No.	Part-No.	Description, application	quantity
39	877 240	trestle support ass'y	1
40	877 670	cutting tool for oil filter	1
41	877 620	oil filter wrench 80-110 for oil filter removal	1
42	877 390	pin-face wrench A90 DIN 3116 for overload clutch	1
43	877 450	socket S 46x20 L DIN 3121 for hex. nut, crankshaft, magneto side	1
44	877 465	reduction socket 3/4x1 1" to 3/4", for socket wrench 46 a/f	1
45	877 440	socket S 41x20 L DIN 3124	1
46	877 460	reduction socket A 20x12,5 3/4" to 1/2", for socket wrench 41 a/f	1
47	877 660	puller ass'y. for gearbox	1
48	876 885	mounting yoke	1
49 ÷ 52	877 615	puller ass'y for prop shaft, roller bearing 25x52x15 and oil seal 30x52x7	1
50	877 580	pull-in spindle M24x1,5	1
51	276 155	handle 12x250	1
52	842 585	hex. nut M24x1,5 length 19	1
53	941 180	stud M10x45/20 for roller bearing 25x52x15 and oil seal 30x52x7	1
54	877 605	protection piece for propeller shaft configuration 2	1
55	877 600	protection piece for propeller shaft configuration 3 and 4	1
56	877 592	protection piece for roller bearing 25x52x15 and oil seal 30x52x7, configuration 4	1
57	877 590	protection piece for roller bearing 25x52x15 and oil inlet flange, configuration 3	1
58	877 560	puller plate for roller bearing 25x52x15, oil seal 30x52x7	1
59	242 091	hex. nut M10 for roller bearing 25x52x15, oil seal 30x52x7	1
60 ÷ 63	876 489	puller cap ass'y for ball bearing 15x32x8 and needle bearing 22x28x12	1
61	941 730	hex. screw M6x80 DIN 933	1

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Fig.No.	Part-No.	Description, application	quantity
62	827 305	washer 6,2/18/2	1
63	242 211	hex. nut M6 DIN 934	1
64	877 597	protection piece for needle bearing 22x28x12, vacuum pump	1
65	877 595	protection piece for ball bearing 15x32x8, vacuum pump	1
66	874 230	fuel pressure gauge	1
67	877 690	check lever to check the valve spring close force	1
68	877 377	extractor ass'y	1
69	877 570	Tapping drill M18x1 To clean the thread at exhange of coolant bend	1
70	877 245	trestle support ass'y	1

REPARATURWERKZEUGE FÜR MOTOR

REPAIR TOOLS FOR ENGINE

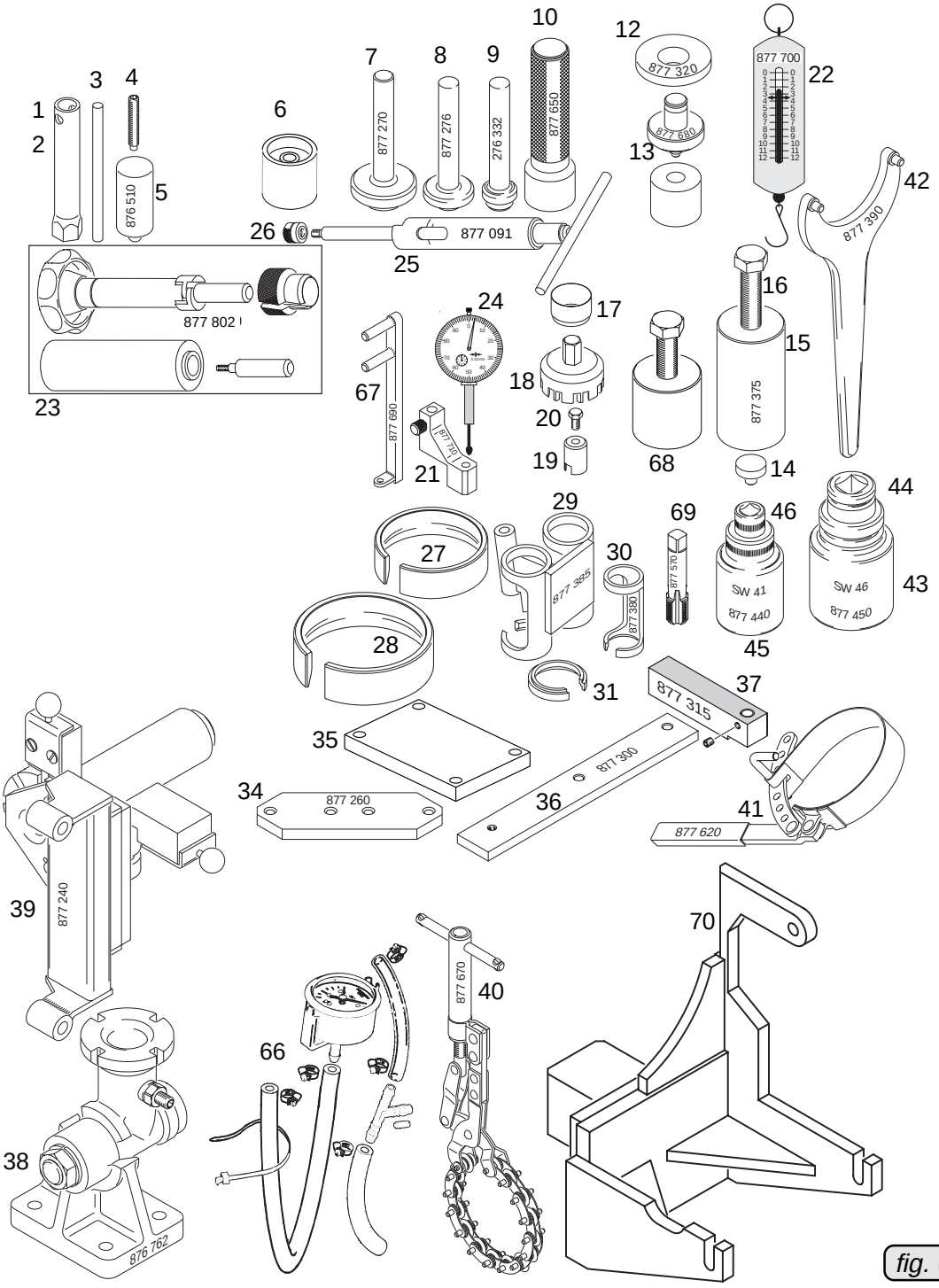

fig. 019/1

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REPARATURWERKZEUGE FÜR GETRIEBE

REPAIR TOOLS FOR GEARBOX

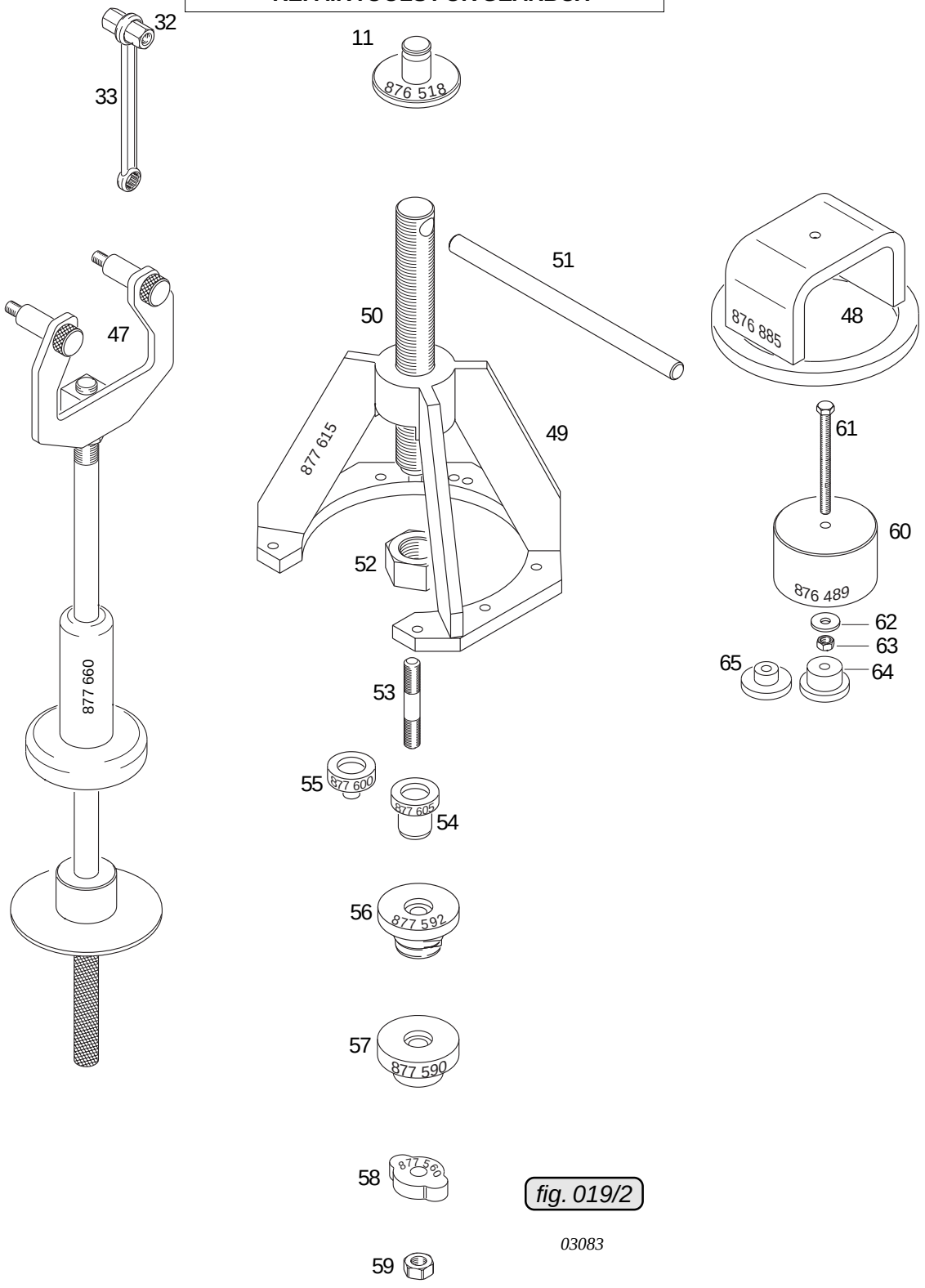

fig. 019/2

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11.7) Consumable materials

See fig. 020.

■ CAUTION: Use only the specified or **technically equivalent** materials for all maintenance work.

The materials specified have been tested and are suitable for all operating conditions indicated by the manufacturer.

Fig.	part no.	description, application	Qty.
1	899 785	LOCTITE® 221 violet, medium-duty screw securing agent	10 cm^3
2	897 651	LOCTITE® 243 blue	10 cm^3
3	899 788	LOCTITE® 648 green, heavy-duty screw securing agent	5 g
4	899 784	LOCTITE® 574 orange, sealing compound	50 cm^3
5	297 434	LOCTITE® Anti-Seize,to prevent fretting corrosion	50 ml
6	897 511	LOCTITE® 380 black, Adhesive medium-duty	20 ml
7	897 186	SILICONE HEAT CONDUCTIVITY PASTE	150 g
8	899 789	LOCTITE® 603, heavy-duty screw securing agent	10 cm^3
9	897 330	Lithiumgrease**,** to avoid leakage current	250 g
10	897 166	MOLYKOTE® 44 medium	100 g
11	297 386	SILASTIC 732 RTV multi purpose, one component sealing compound on silicon base	100 g
12	297 710	PU-Adhesive	310 ml
13	297 433	MOLYKOTE® G-N, Lubricant	100 g
14	897 870	K&N® Filter oil 99 - 1131, Bag	15,8 ml
15	996 943	gasket set, for complete engine	1
16	996 947	gasket set, for complete carburetor	1

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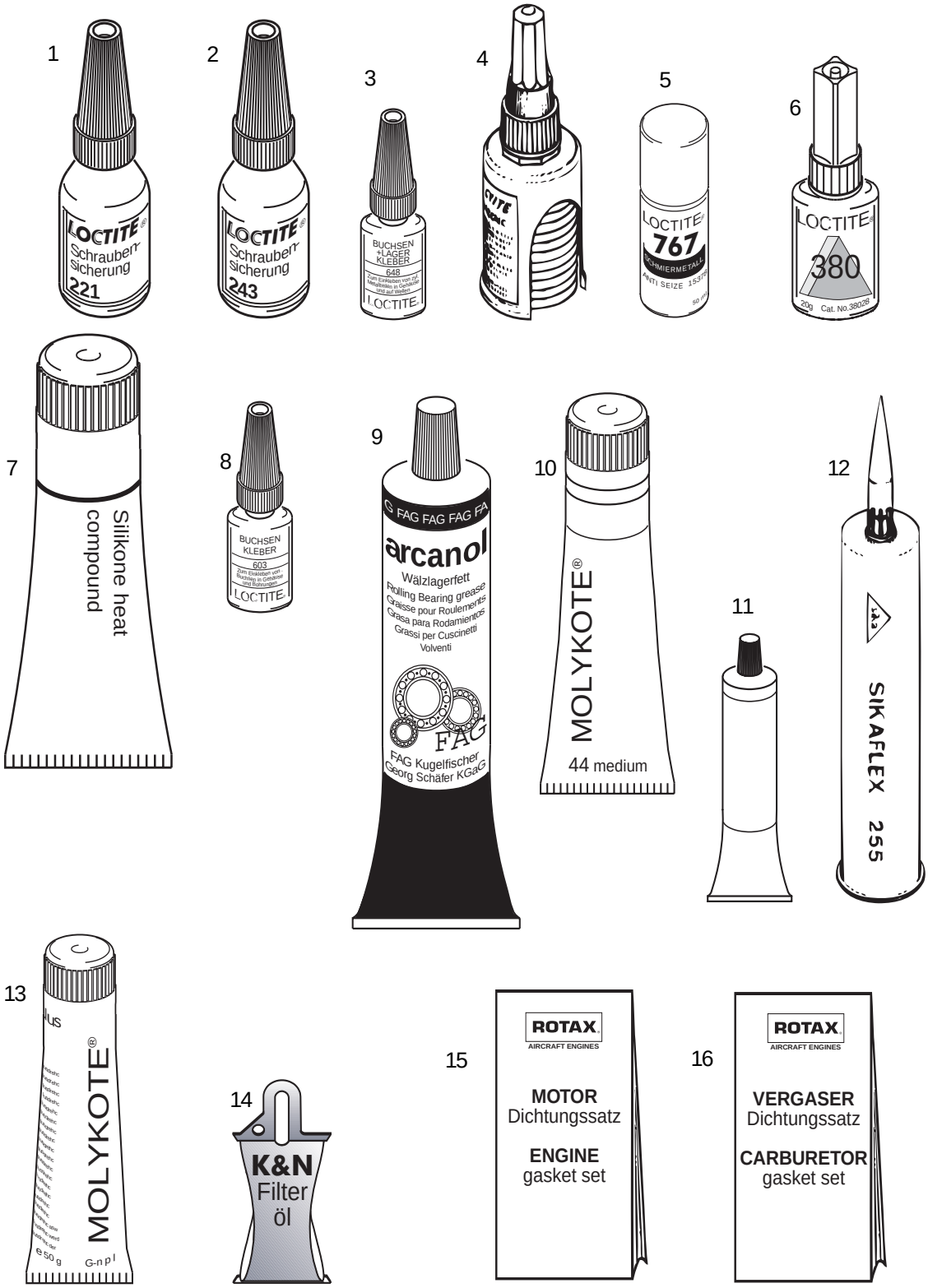
fig.020



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11.7.1) Motor oil

See relevant Operator's Manual of the engine type 912.

In principle motor oil is used for lubrication of components during reassembly. except where something different is specified. Use only oils specified in the "Chart of Lubricants" in order to avoid chemical reaction.

11.7.2) Lithium grease

Is used on all electrical connections, to avoid current loss. After assembly is complete, apply Lithium grease to the connection as anti-corrosive.

11.7.3) Multi-purpose grease LZ

Generally usable, neutrally coloured multi-purpose grease, water resistant and higly adherent.Usable for temperatures from -35°C to +120°C (-31°F to 248° F).

11.7.4) Corrosion inhibiting oil Mobil® Arma 524

Corrosion inhibiting oil, unsoluble in water, hydrocarbon basis with additives. The pour point is below -18° C (-3° F).

▲ WARNING: When handling chemicals, respect the generally valid safety directives.

11.7.5) SILASTIC 743 RTV

Is used for vibration damping of the exhaust system springs. The material fills the complete inside of the springs.

11.7.6) LOCTITE® ANTISEIZE 15378

High-temperature lubricating and anti-corrosion agent. LOCTITE® ANTISEIZE is always applied on both components mated and warrants for maintenance-free bearing seats due to the hermetically sealed sliding surface.

11.7.7) LOCTITE® "574 orange"

Is a sealing material used as an alternative to conventional solid gaskets where a high friction factor and exactly defined distance between parts is required. LOCTITE® sealing compound is a solvent-free liquid gasket applied to the sealing surfaces. After assembly it cures under hermetical conditions with metal contact.

Its surface sealing properties are guaranteed for temperature range between - 55°C and + 200°C (- 67°F to + 390°F).

11.7.8) LOCTITE® "380 black"

Adhesive suitable for materials of different properties. Suitable for medium duty connections. Its cure time depending on the materials is max.12 hours and it resists temperatures from -55° C (- 67°F) up to +150° C (300° F).

11.7.9) LOCTITE® "648 green"

Heavy duty adhesive or screw securing agent. Its cure time depending on the materials and temperatures is max. 12 hours and it resists temperatures from -55° C (- 67°F) up to +175° C (347° F). To separate parts secured by this agent, it may be necessary to heat the parts to approx. 250° C (480° F).

11.7.10) LOCTITE® "221 violet"

Medium duty adhesive or screw securing agent suitable for materials of different properties. In case of strain the stress is distributed evenly over the whole surface of connection. The adhesive connection creates hermetic sealing for gas and liquids. This sealing property protects the parts from corrosion.

LOCTITE® 221 is suitable for screws and nuts up to M12 threads and for low duty connections.

11.7.11) LOCTITE® "243 blue"

Medium duty adhesive or screw securing agent suitable for materials of different properties. Its cure time depending on the materials and temperatures and it resists temperatures from -55° C (- 67°F) up to +150° C (300° F).

11.7.12) LOCTITE® "603 green"

Heavy duty adhesive or screw securing agent, similar to LOCTITE® 648, especially for applications where the mating surfaces can not be made absolutely free of grease.

11.7.13) MICRONORM shot blasting abrasive

This abrasive is suitable for local and gradual very fine treatment of steel parts with rust film (propeller shaft). The MICRONORM shot blasting abrasive does not contain any noxious matter, is approved by the competent authorities and warrants for optimum cleaning. The granulates used are of sizes 40 to 60 µ. The surface roughness to be achieved is 0,5 - 1 µ representing a microfinish of the parts.

11.7.14) Lapping fleece SR 4600 A - very fine grading

Is sold by the meter and used for manual removal of smaller rust spots or oxidation, especially for optimum ground connections. It is most appropriate to remove LOCTITE® from surfaces or threads to make them metallic clean. Before re-applying LOCTITE®, clean surfaces with nitro-thinner or degreasing agent (Castrol ZA 30 or ÖMV - SOFT SOL).

11.7.15) Cleaning agents

▲ WARNING: Use only approved cleaning agents (e.g. fuel, kerosine, varsol, etc.) for cleaning metal parts.

Do not use cold cleaner on lye basis or degreasing agents. Do not clean coolant- and oil hoses with aggressive solutions. Clean off remains of sealing compound with sealant remover.

Soak combustion chamber, piston and cylinder head with cleaning agent and remove combustion residues with a bronze brush. Very good experience was made with CASTROL® "Clenvex 2000" as cold cleaning agent on basis of laboratory fuel and kerosine. It is a solvent - cold cleaner, free of halogen, on base of selected fuel fractions with densities, and it is biologically disposable.

Never use caustic or corrosive cleaning agents.

▲ WARNING: Proceed with great caution when using solvents. Inhaling of vapours is hazardous to health.

11.7.16) Valve lapping paste

This paste produced by various manufacturers is a fine granulate lapping paste for valve seats and valves. The paste is usually available in 3 different granulate sizes.

▲ WARNING: Use valve lapping paste as per manufacturer's directives.

11.7.17) MOLYKOTE® 44 medium

Is a long time lubricant for shaft-sealing-rings.

11.7.18) Grease MOLYKOTE® GN

Is used on highly loaded bearing positions as initial lubrication and at press fits for prevention of fretting corrosion. MOLYKOTE® GN is applied to both components mated.To application is pointed in case.

11.7.19) K&N® Filteroil 99 - 1131

To optimize filtration and to protect against moisture.

11.8) Securing elements

See fig. 021.

■ CAUTION: Self-locking nuts, cotter pins, tab washers and safety wires must be replaced with new parts each time they have been removed.

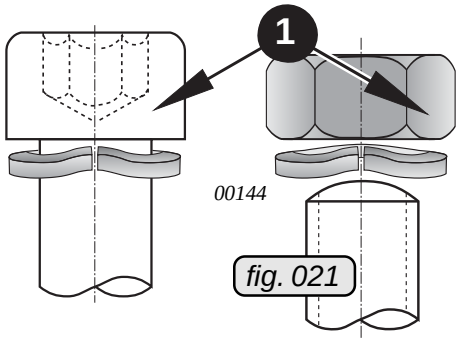

fig. 021

Respect without fail all additional information regarding securing and sealing means and lubrication of fixation elements. Adhere to specified tightening torques.

◆ NOTE: Fit the lock washers with the bent up ends ❶ facing the screw head or nut.

11.8.1) Safety wiring

See fig. 022 and 023.

Safety wiring serves to secure screws or nuts to prevent unintended loosening. The screws or nuts are secured by a 0,8 mm (.0315 in.) safety wire twisted 3 to 4 turns per 10 mm (.4 in.). The wire must by no means be overstretched.

▲ WARNING: As a principle, all external engine components and accessories must be wire-secured for safety reasons.

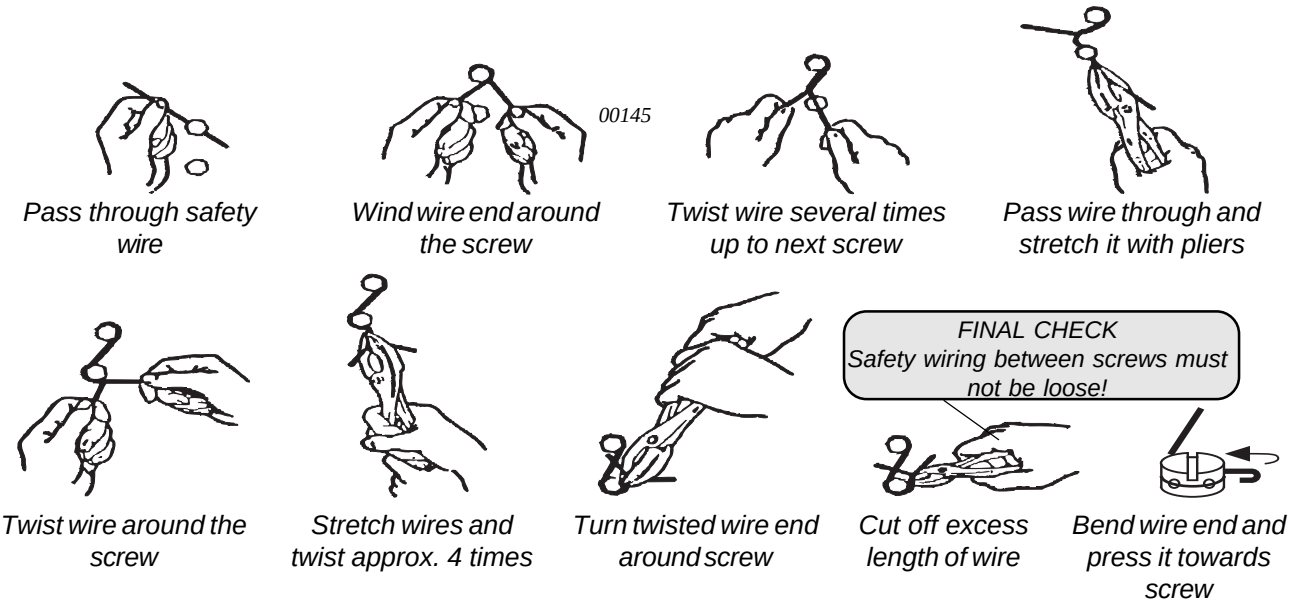

fig. 022

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11.8.2) Nut securing

When using a self-locking nut, take care that the polyamide insert ring on nuts according to DIN 985 as well as the securing element on nuts according to DIN 980 is positioned towards outside.

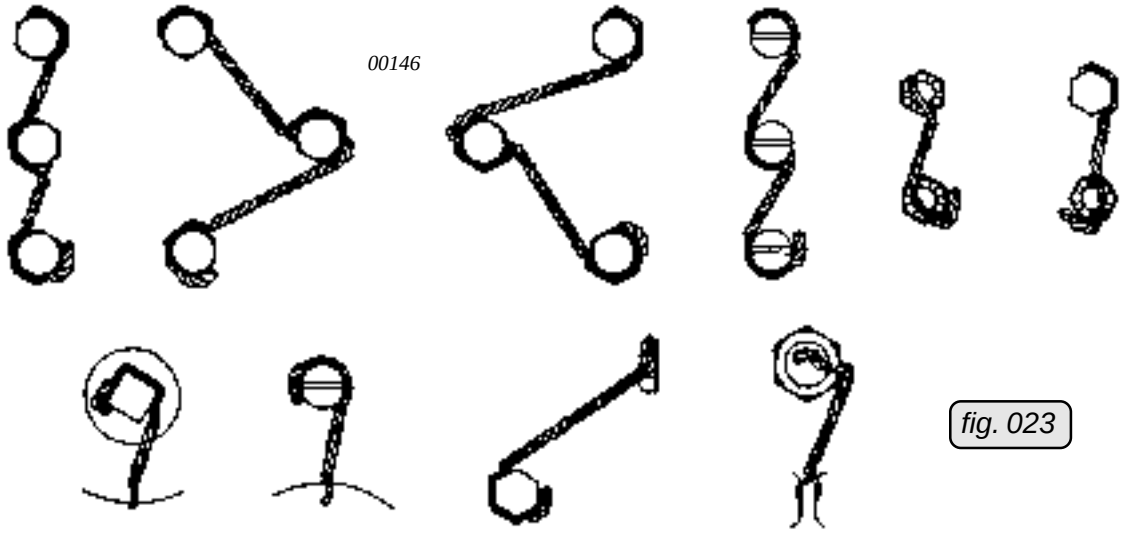

fig. 023

Various typical applications of safety wiring

11.9) Tightening torques

Adhere to the tightening torques specified. See also indications in Illustrated Parts Catalog (IPC).

M4 ..... 4Nm (35 in lb)

M5 ..... 6Nm (55 in lb)

M6 ..... 10Nm (90 in lb)

M8 ..... 24Nm (212 in lb)

M10 ..... 35Nm (310 in lb)

hex. nut	housing of sprag clutch	M 34x1,5	120 Nm (1062 in lb)
stud	cylinder and cylinder head	M 8	3 Nm (27 in lb)
hex. cap nut	cylinder head	M 8	22 Nm (195 in lb)
hex. nut	cylinder head	M 8	22 Nm (195 in lb)
allen screw	valve cover	M 6	12 Nm (106 in lb)
temperature sensor	cylinder head	M 10	10 Nm (88 in lb)
locknut	exhaust stack	M 8	12 Nm (106 in lb)
impeller	water pump	M 8	15 Nm (133 in lb)
allen screw	stator assy and trigger coil	M 5	6 Nm (53 in lb)
hex.hd. screw	flywheel	M 16x1,5	120 Nm (1062 in lb)
sparking plugs	cold engine	M 12x1,25	20 Nm (177 in lb)
hex.hd. screw	gearbox bearing fixation	M 7	15 Nm (133 in lb)
hex. nut	drive gear (crankshaft)	M 30x1,5 LH	200 Nm (1770 in lb)
allen screw	gear cover	M 8	25 Nm (221 in lb)
hex. nut	fuel pump	M 8	22 Nm (195 in lb)
plug screw	oil drain	M 16x1,5	35 Nm (310 in lb)
banjo bolt	oil drain	M 16x1,5	35 Nm (310 in lb)
plug screw	pressure relief valve	M 12x1	25 Nm (221 in lb)
oil filter nipple	oil pump	M 18x1,5	60 Nm (530 in lb)
oil pressure sensor	oil pump	1/8-27 NPTF	15 Nm (133 in lb)
hex.hd. screw	oil tank	M 12	25 Nm (221 in lb)
hex.hd. screw	carburetor flange	M 8	15 Nm (133 in lb)
clamp	carburetor	up to 7 mm (0,275 in.)	
clamp	air filter	hand tight	
oil filter	oil pump	first hand tight to stop and after trial run retighten by hand	
banjo bolt	oil line, pressure side	M 10x1	20 Nm (177 in lb)

d01381

11.10) Treatment of corrosion and surface damages

At longer standstill it may occur that a rust film forms on various metal parts. With considerable corrosion or heavily corroded screws, nuts, shims, bearings, bushes etc., an exchange is inevitable.

Propeller shaft

The flange of the propeller shaft is likely to get a rust film. A special treatment is only possible with propeller shaft removed. After covering all bearing seats with plastic adhesive or a plastic tube, the propeller flange can be treated with MICRONORM® shot blasting abrasive with incorporated anticorrosive.

At heavy rust damage, when the material is affected, renewal of the propeller shaft is necessary.

Electric system

Formation of a rust film on the permanent magnets in the magneto flywheel and on the metal cores of the pick-ups is harmless. Replace fixation screws and lock washers at heavy oxidation or rust formation. Before reassembly clean all contact surfaces of the screws removed and apply lithium grease. Take care that no foreign material falls into the magneto flywheel. Clean cable shoes and apply lithium grease to the contact surfaces to assure lasting contact.

At exchange of a pick-up apply PU-adhesive to the cable inlet to avoid vibration breakage at these points.

Check contact between plugs and/or fasten connections by separation test, if necessary apply contact spray to increase conductivity.

11.11) Engine preservation and engine back to operation

Due to the special material of the cylinder wall, the ROTAX® aircraft engine needs no extra protection against corrosion. At extreme climatic conditions and for long out of service periods we recommend the following to protect the valve guides against corrosion :

— Let engine run until warm, then change oil.

— Remove the air intake filters and insert approx. 30 cm^3 (1 fl oz) of corrosion inhibiting oil (see para 11.7.4) or equivalent oil into the carburetor throat with the engine running at increased idle speed.

— Shut off engine.

— Drain carburetor float chambers.

— Apply motor oil to all joints on carburetors.

— Close all openings on the cold engine, like exhaust end pipe, venting tube and air intake against entry of dirt and humidity.

— Spray all steel external engine parts with corrosion inhibiting oil.

11.11.1) Preservation of a new engine

Storage and preservation directives of ROTAX® for the aircraft engine type 912 Series:

ROTAX® as the manufacturer of the engine warrants for perfect corrosion protection of aircraft engine 912 Series for min. 12 months from date of delivery by ROTAX®.

This warranty consent is subject to the following conditions:

— The engine must be stored in the original packing as supplied by ROTAX®.

— The protection covers must not be removed.

— The engine must be stored in a suitable place (closed area, clean and dry).

If the engine is stored longer than 12 months, the following inspections have to be carried out every 3 months:

— Remove 1 spark plug on each cylinder and turn crankshaft by hand 2 full turns

— Visually check for corrosion (e.g. on propeller shaft). If corrosion is detected, the engine has to be sent immediately to an authorized overhaul facility for inspection.

▲ WARNING: The engine is not allowed to be taken into operation.

◆ NOTE: The maximum possible storage period is limited to 24 months.

If exceeding this period, the engine has to be sent to an authorized overhaul facility for inspection.

11.11.2) Engine back to operation

— Remove all plugs and fasteners.

— Clean spark plugs with solvent and a plastic brush.

— If preservation including oil change took place not longer than a year ago, oil renewal will not be necessary. At longer shut down periods repeat preservation annually.

▲ WARNING: Work on the engine is only allowed to be carried out and approved by authorized persons. See para 11.3.

12) Periodic maintenance

For further information see relevant Maintenance Manual type 912 (Line Maintenance) .

13) Maintenance of the Systems

13.1) Fuel system

Besides the maintenance work prescribed, see Maintenance Manual type 912 (Line Maintenance) chapter 05-00-00 para 5, further maintenance procedures are described as follows.

13.1.1) Removal of carburetors and carburetor flange

See fig. 10 and 11.

Identify both carburetors to respective cylinders, e.g. carburetor for cyl. 1/3 and cyl. 2/4.

◆ NOTE: The standard attachment of the carburetors ❶ is by flexible flanges ❷ on the intake manifold ❸.

Verify positioning of clamp screw ❹ with position downward as delivered and 7 mm (.28 in.) gap between clamp lugs.

Remove tension spring ❺ of carb support with a suitable tool.

Slacken clamp screw ❹ and remove carburetor ❶ by slight turning and swivel action.

■ CAUTION: If the float chamber ❻ should not have been drained yet, proceed as follows:

Swing open spring clip U take off and empty float chamber while holding both floats in position. Refit float chamber and secure with spring clip.

Ensure proper disposal of fuel.

The carburetor flange assemblies ❷ can be taken off after removal of the hex. hd. screws M8x20 ❽ and washers ❾.

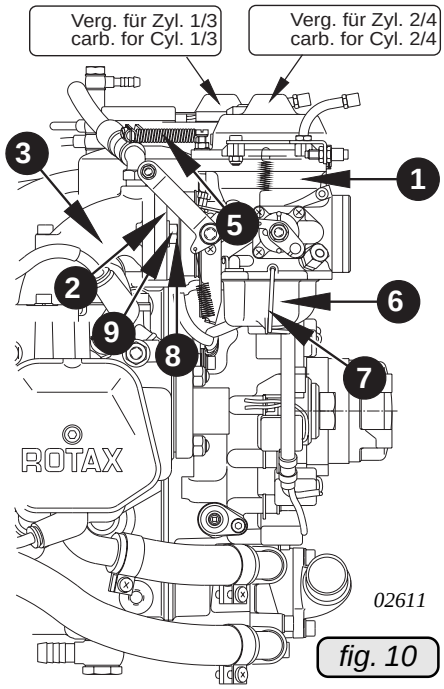

fig. 10

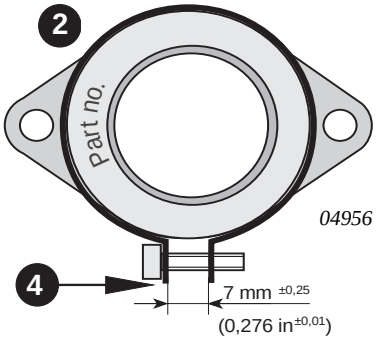

fig. 11

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13.1.2) BING constant depression carburetor: Check and maintenance

See fig. 037 and 038

■ CAUTION: 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.

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

Remove carburetor from the carburetor flange, after loosening the tube clamps and deposit them on a clean surface.

13.1.2.1) Leakage test of float needle valve

Unhook spring ❶ from choke lever ❷ and chamber top ❸. Connect vacuum pump ❹ to the fuel supply line ❺ and generate a depression of approx. 0,4 bar (5,8 psi). The depression must not change within approx. 5 seconds. Otherwise tilt spring clip ❻ backward, remove the float chamber ❼ and the pin ❽ with a punch and remove the float bracket ❾. Check the float needle ❿ and its seat for wear and if inlet is contaminated.

With this check the float needle seat is checked for tightness. If the depression is not maintained, pay particular attention during disassembly to the float needle with Viton tip and the carburetor housing.

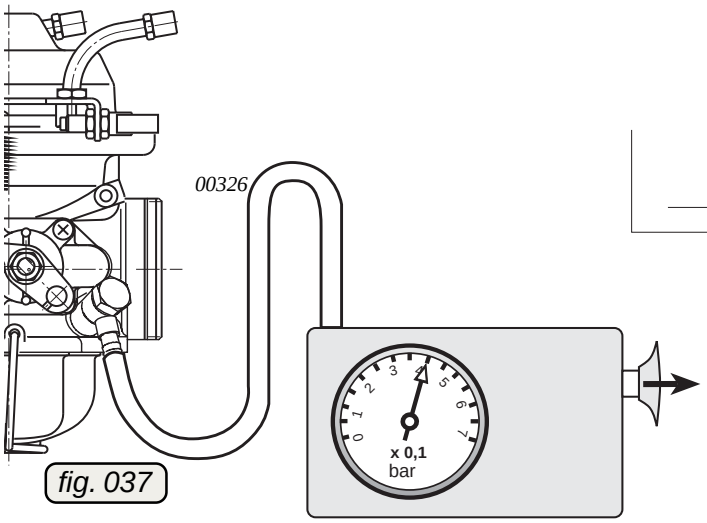


fig. 037

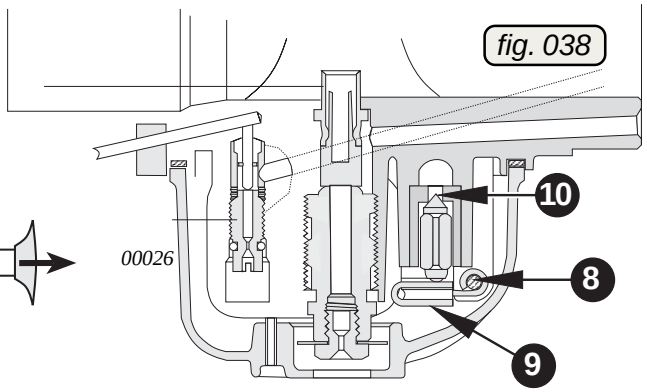


fig. 038

d01382

13.1.2.2) Diaphragm

See fig. 039.

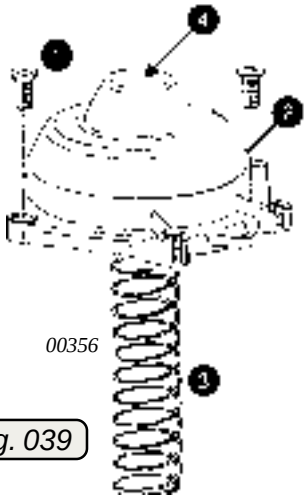


fig. 039

The diaphragm 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 ❶ M5x12, the chamber top ❷ and the spring ❸. Check tight fit of the cover ❹ on chamber top. Wash chamber top with cleaning agent and blow the inside venting bore with compressed air, then check.

Remove plunger from the carburetor housing and remove 4 Allen screws ❺ M4x12. The diaphragm ❻ is fixed by the retaining ring ❼ to the carburetor piston ❽. The position of the carburetor piston is controlled via the diaphragm. On the diaphragm ❻ there are 2 positioning noses**.** The nose ❾ fits exactly in the recess in the plunger, nose ❿ must engage in the recess in the carburetor housing.

Check diaphragm for cracks or brittleness, replace if necessary.

13.1.2.3) Jet needle

See fig. 040.

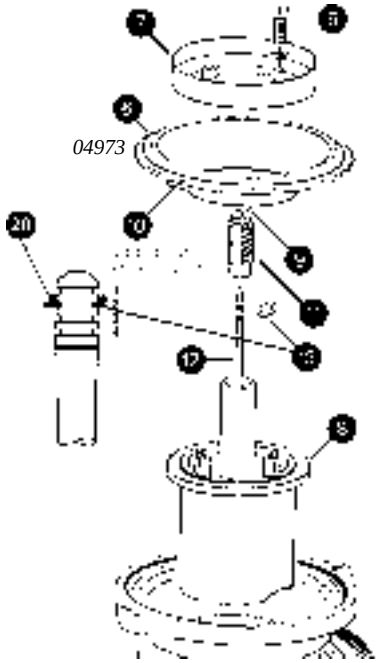


fig. 040

The jet needle controls the fuel consumption at part load. It may be regulated by choosing position of jet needle between 1 and 4. Standard the needle is set to position 2. Modifications are allowed only after consultation with the engine manufacturer.

Remove fixation screw ⓫ and check jet needle ⓬ with circlip ⓭ and O-ring ⓴ for wear.

◆NOTE: O-ring ⓴ is only used in 912 ULS/S.

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.

◆ NOTE: The jet needle fitted must move freely.

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

13.1.2.4) Jets

See fig. 041.

Remove float chamber. Remove main jet ⓮, mixing tube ⓯, needle jet ⓰, idle jet ⓱, start jet ⓲ and mixture screw ⓳. 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, see IPC.

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

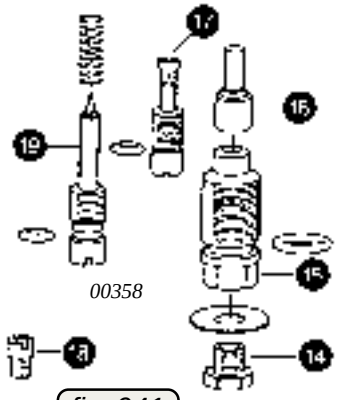
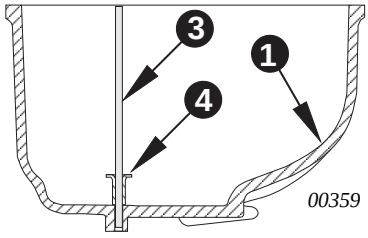


fig. 041

13.1.2.5) Float chamber

fig. 042

See fig. 042, 043, 044, and 045.



Remove and clean float chamber ❶. Check both floats ❷ for free movement on the guide pin ❸. 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 ❹ are in position.

◆ NOTE: Distance pieces ❹ were used to avoid the stucking of the floats.With the new floats ⓬ is no use for them.

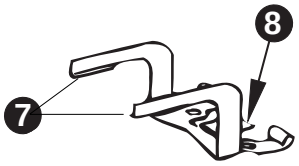


fig.043

A float stuck causes the carburetor to flood. Check wear of guide sleeves ❺ inserted in the float. Check the pins ❻ for float support ❼ for wear due to excessive vibration. At noticeable wear replace both floats and if necessary also the float suspension ❽.

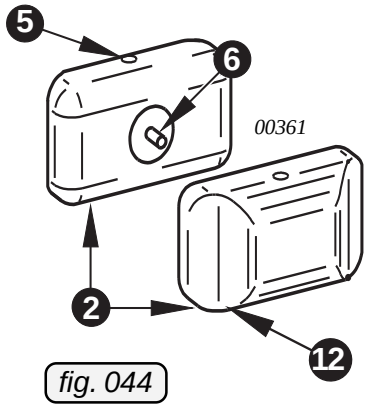


fig. 044

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13.1.2.6) Float suspension

See fig. 043, 044, and 045.

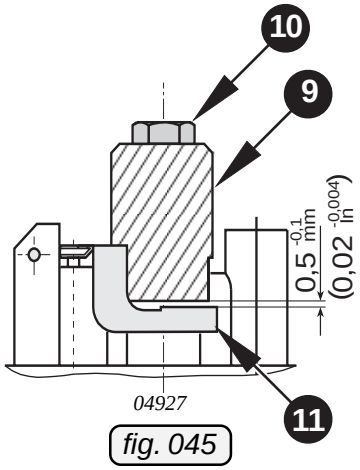


fig. 045

Check if float suspension brackets are parallel. To do so, remove main jet and attach gauge ❾, *part no. 877 730*, with a hex. screw ❿ to the mixing tube. When the needle valve is closed, both brackets ⓫ of the float suspension must be of equal distance of 0,4 ÷ 0,5 mm (.016 ÷ .02 in.). At noticeable imperfection the float suspension can be bent for correction or be renewed. After the check remove the gauge and refit main jet.

13.1.2.7) Check of float needle valve

See fig. 046.

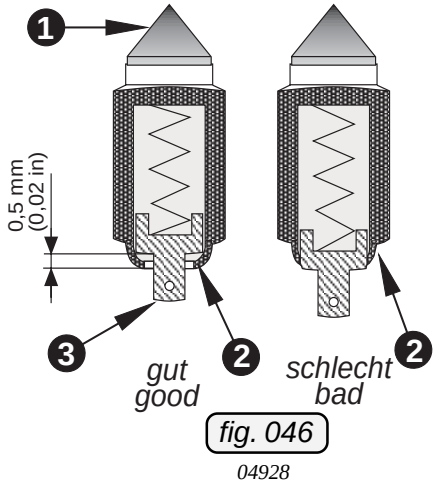


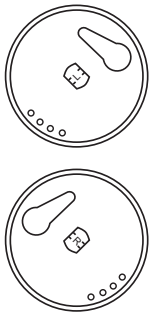
fig. 046

Remove float chamber. Remove barring pin of the float suspension and float needle. Check the fuel supply for free flow. Inspect Viton tip ❶. At visible wear of the beaded edge ❷ at the sprung pin ❸ the valve has to be renewed. If the distance becomes less than 0,5 mm (.02 in.) the float level will be affected, leading even to interruption of the fuel flow. Engage float needle clip into float bracket, place it in position and fix float bracket with pin. Fit float chamber and fix it with spring clip.

◆ NOTE: Various float needle valves,see IPC. Higher springrate for the engine type 912 ULS/S which have a black colored spring pin ❸.

13.1.2.8) Starting carburetor (choke)

See fig. 047, 048 and 048/1.



04704

fig. 048/1

Remove 4 countersunk screws M4x14 and remove the complete choke housing.

◆ NOTE: The choke shaft is marked with L- and R-. The shaft marked with L- is assigned for the carburetor of the cylindes 2/4 and shaft marked R- is for carburetor of cylinders 1/3. Fig. 048/1 shows the positions of the marks on the choke shaft.

Remove hex. nut and complete fuel choke valve from the housing. Clean all parts and check.

◆ NOTE: The choke shaft ❶ has a mark ❷. This mark has to point towards cable engagement ❸ or to bore ❹.

Clean all parts and blow all bores and ducts with compressed air. Check all parts and replace imperfect ones.

Reassembly of the carburetor with new O-rings and gaskets in reversed sequence.

Apply the 4 countersunk screws M4x14 with Loctite 221.

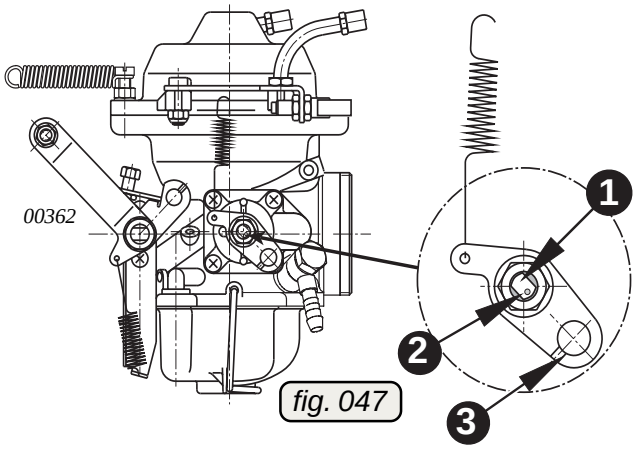
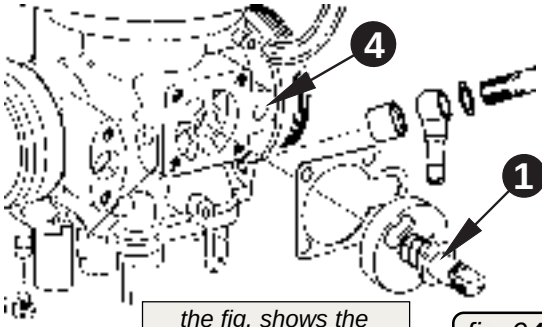


fig. 047

00363



the fig. shows the carburetor for cyl. 2/4

fig. 048

d01382

13.1.3) Check of the fuel system

The most common reason for engine failure is a shortcoming in the fuel system. Many problems can be prevented by regular checks. Contamination and water by condensation can lead to erratic engine run or misfiring.

— Check float chamber for dirt and water.

— With bad contamination or formation of water, drain the complete system inclusive tank, filter and fuel lines, clean and rinse it well.

13.1.3.1) General notes on fuels

Use clean fuel of a registered brand only. Do not store fuel for longer periods. For storage use only clean, non-translucent, safety approved fuel containers. If possible avoid the use of plastic containers. When refuelling from containers, use a fine mesh screen.

▲ WARNING: Handling of fuel in well ventilated places only. Never mix fuel in closed rooms. Gasoline is highly inflammable and under certain conditions explosive. Do not smoke, no naked flame or sparks. Do not fill tank brimful, allow for expansion of fuel. Never refuel while engine is running.

13.1.3.2) Fuel pressure

See fig. 050.

Fuel pressure at fuel pump is limited to max. 0,4 bar (5,8 psi), and is normally between 0,15 ÷ 0,3 bar (2,2 psi ÷ 4,4 psi). By utilizing the fuel pressure tester, *part no. 874 230*, the pressure as well as the operation of the fuel system can be checked.

Installation of fuel pressure test kit

Connect pressure gauge ❶ with hose ❷ instead of fuel return line on the four-fold banjo screw ❸. Attach the pressure gauge where it can be easily observed by the operator of the ground test run.

■ ATTENTION: Make sure there is no danger that the gauge and hose get drawn into the propeller air stream. If necessary, secure with cable ties.

If during the test run the nominal fuel pressure values are not met, stop engine and start with the trouble shooting procedure.

▲ WARNING: Do not start the aircraft before an obvious fault has been found and eliminated!

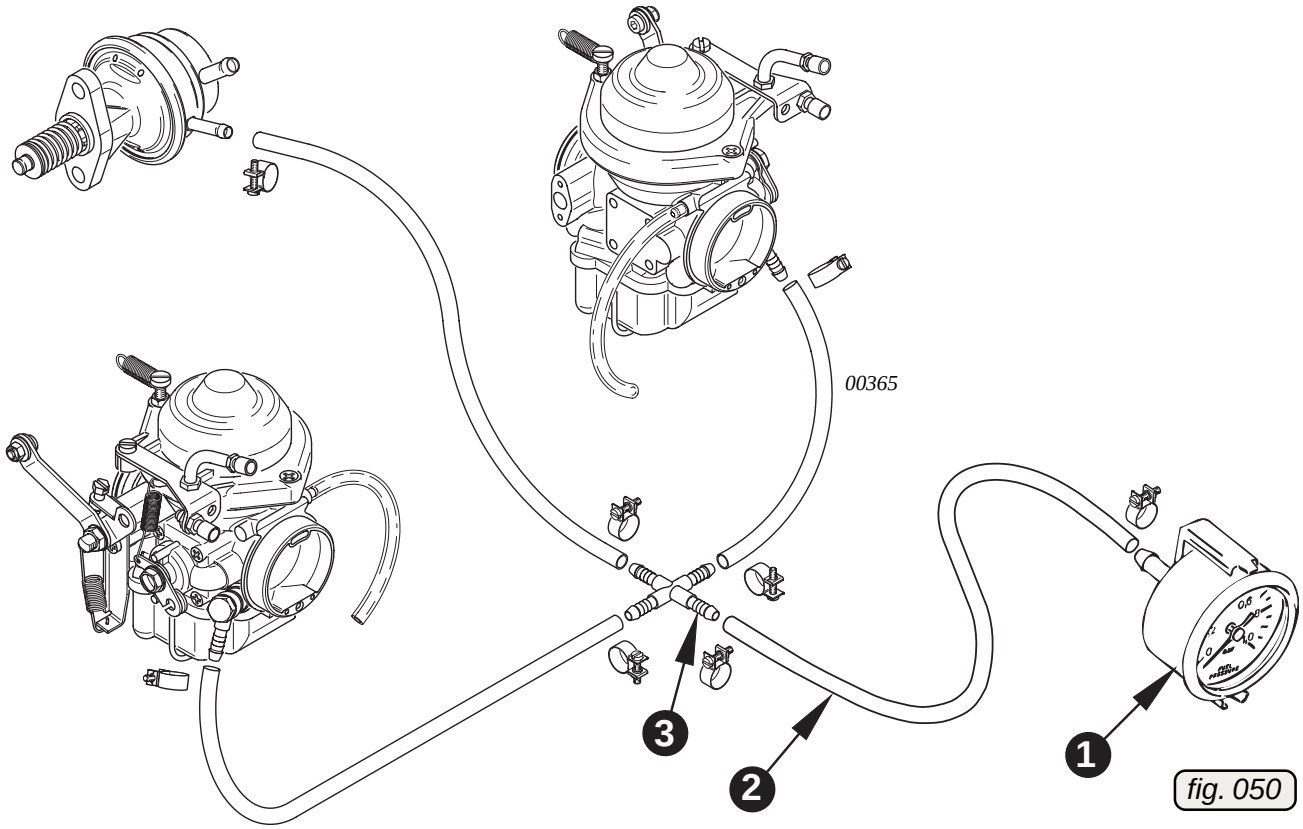


fig. 050

d01382

■ **CAUTION:**

— Water and dirt in the fuel may cause engine failure and performance drop.

— Leaks in the fuel system may cause performance drop and bad idling of the engine

— Unsuitable routing of fuel tubes may cause engine failure.

— After maintenance work the fuel system has to be checked for leaks.

— Always use clean and non-translucent, safety approved fuel containers. At refuelling use filter funnel. Do not smoke, do not allow open flames or sparks in the vicinity.

— Never refuel with engine running.

— Do not refill tank brimfull, allow for expansion of the fuel.

— Remove split fuel immediately, dispose of it respecting environmental regulations.

— Gasoline is highly inflammable and under certain conditions explosive. Handling of fuel in well ventilated places only.

— Faultless function of the carburetors cannot be warranted if the fuel pressure is below 0,15 bar (2,2 psi) or over 0,4 bar (5,8 psi). If the required fuel pressure is not achieved, use of an electric backing pump is necessary.

— Between fuel tank and fuel pump a suitable fuel filter of mesh size 0,1 mm (.004 in) has to be placed. Do not use a paper filter.

— Choose fuel lines respecting the national directives for aviation. A minimum diameter of 5 mm (.2 in.) should be respected.

— The tank must be provided with a fuel cock (with filter) to cut off fuel supply at any time.

— The float needle valve cannot retain the fuel pressure over a longer period or during transport of the aircraft.

— If problems with fuel supply are encountered and cannot be resolved, contact a ROTAX® authorized Distributor or Service Center.

13.1.4) Carburetor flange

See fig. 051 and 052.

The fixation of carburetor on engine 912 is designed to allow secure fastening on intake manifold by carburetor flange ass'y 267 787and use of the genuine ROTAX air filter 825 551**.**

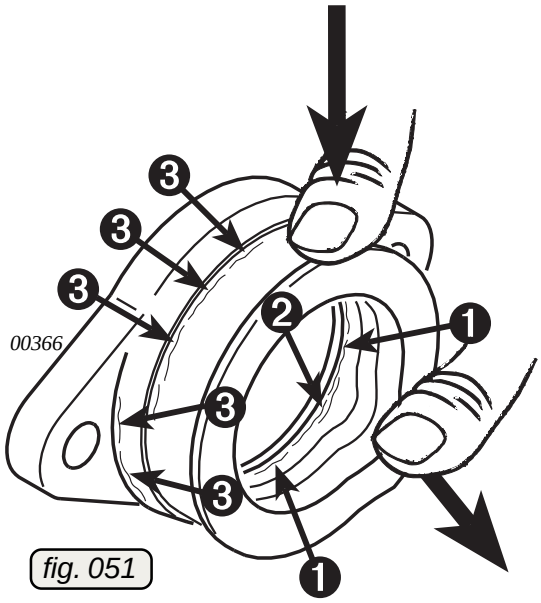


fig. 051

An additional carburetor suspension by a tension spring has been introduced standard since design year 1996. See para 14.12 and Service Bulletin SB 912-010, current issue.

This kind of fixation warrants for safety in case of hard landing, air turbulences, excessive vibration etc., protecting the carburetor at a large extent from vibration.

The carburetor flange is subject, apart from chemical strain due to fuel and UV radiation also to stress by vibration. Excessive tightening of the clamp may also damage it.

Compress carburetor socket in the area of the carburetor connection to allow easier detection of existing cracks ❶ and ❸. Also check the area of the inner diameter ❷. If cracks are suspected, tighten the new carburetor socket up to the prescribed gap of 7 mm (.275 in.).

At replacement of the carburetor socket take care of the following:

— As on engine of type 912 Series and type 914 Series the old carburetor sockets won't be longer available, a new socket will be used.

— On the affected engines old carburetor sockets of the carburetor 1/3 and 2/4 can be replaced separetly and therefor a mixed arrengement is feasible.

As this carburetor socket is without Al-spacer, the carburetor socket must be fitted according to Service Instruction SI 912-004 and Service Bulletin SB 912-010.

■ CAUTION: To assure safety of the fixation, it is recommended to apply a safety wiring of suitable dimension, as per usual standard in aviation.

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Every modification on the intake unit (e.g. additional air box, carburetor preheating device etc.) should be fitted only after careful judgement of consequences by the additional weight charged on the carburetor flange. In many cases an additional suspension will be required.

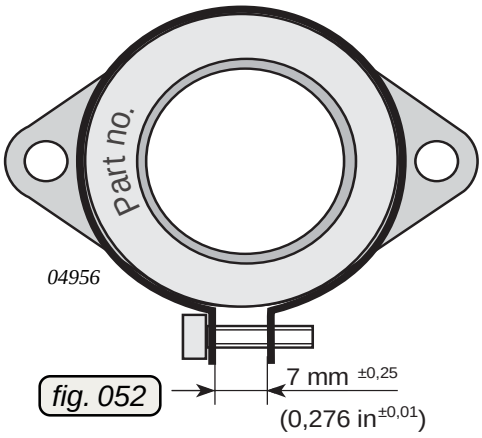

fig. 052

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.

To avoid cutting through of carburetorflange, fit the hose clamp with the screw showing downward and tighten the screw only to an extent that a gap of **7 mm** (.275 in.) between the lugs remains.

13.1.5) Fuel pump

See fig. 053.

Check if pump flange ❶ is perfectly plane. If the pump plunger ❷ shows scuffing marks, replace the pump and check the eccentric on the propeller gearbox. Check the connections ❸ for fuel lines.

Replace pump if its performance drops due to leaking valves or a leaking diaphragm. A leaking diaphragm can be detected if fuel exits at the venting holes ❹.

The sucked in fuel is filtered by a screen of 0,17 mm (.007 in.) mesh size. The fuel pump cannot be dismantled. Check for contamination is only possible by endoscope on suction side ❺. At overhaul the fuel pump must be renewed. The carburetor flange ❻ is marked with a continuous 6-digit number.

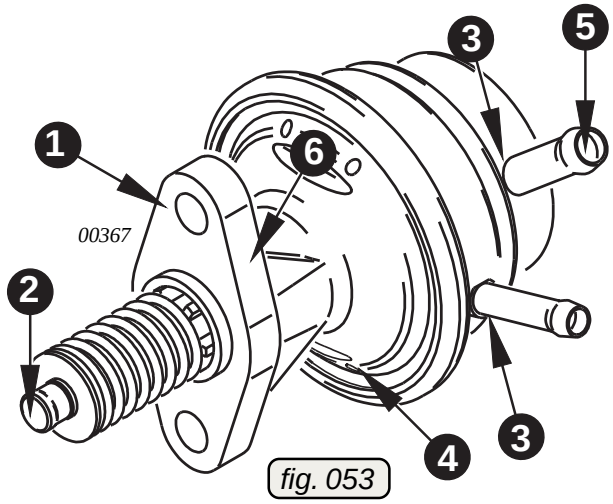

fig. 053

d01382

13.1.6) Fuel tubes

See fig. 054.

Check fuel tubes ❶ between fuel pump ❷, fuel manifold and carburetor for leaks — see also para 13.1.2. Check connections on fuel pump and on carburetors. Check fuel manifold and check for leaks. Renew damaged fuel tubes. Route the tubes to avoid scuffing during operation.

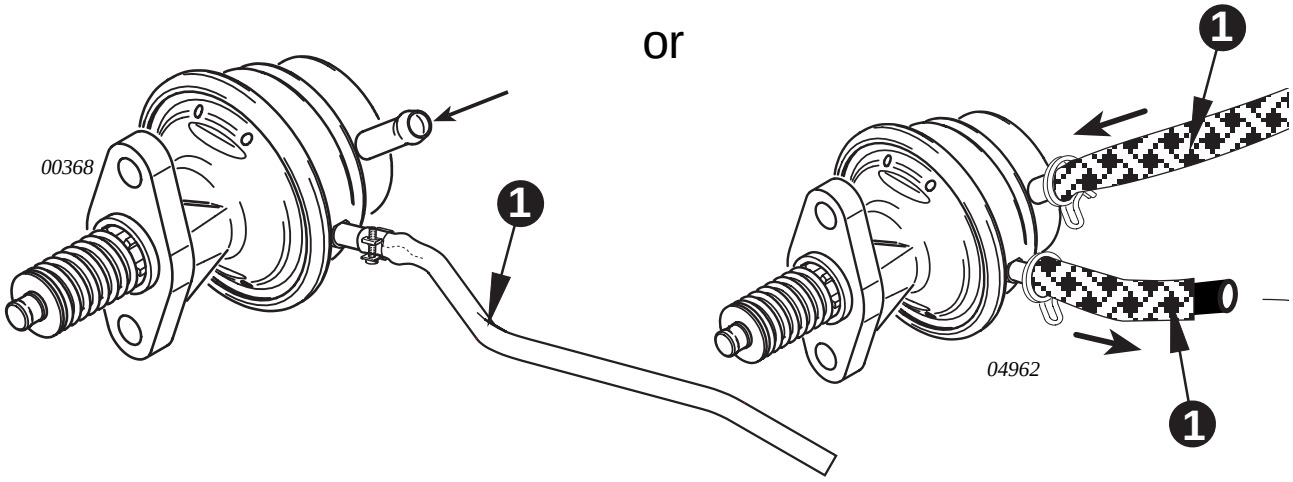

fig. 054

d01382

13.1.7) Carburetor flange, carburetor

See fig. 220 and 221.

Fit carburetor flange ❶ with 2 hex. screws ❷ M8x25 secured with LOCTITE 221 and washers ❸, tighten to 14 Nm (125 in.lb).

■ CAUTION: The screw ❹ of the hose clamp must face downward.

Put the carburetor into the carb flange socket, free of oil and grease. Align carbs and secure with hose clamp.

■ CAUTION: Tighten the hose clamp only to an extent that a gap of 7 mm (.275 in.) remains between the lugs. See fig. 220.

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

Verify the 5-6 mm (0,2-0,24 in) distance on the cheese head screw as this distance is required to maintain flexibility of the tension spring.

◆ NOTE: Since design year 1995 an additional carburetor suspension by a tension spring has been introduced,see Service Bulletin SB-912-10.

Use suitable tool to engagne spring ❽ on bracket ❻.

■ CAUTION: To warrant efficiency of the carburetor support, ㉟ distance of 40 mm (1,69 in) has to be maintained between cheese head screw ❼ and support bracket ❻.

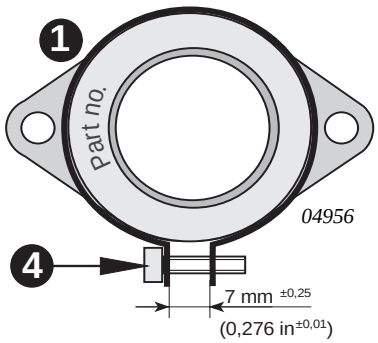

fig. 220

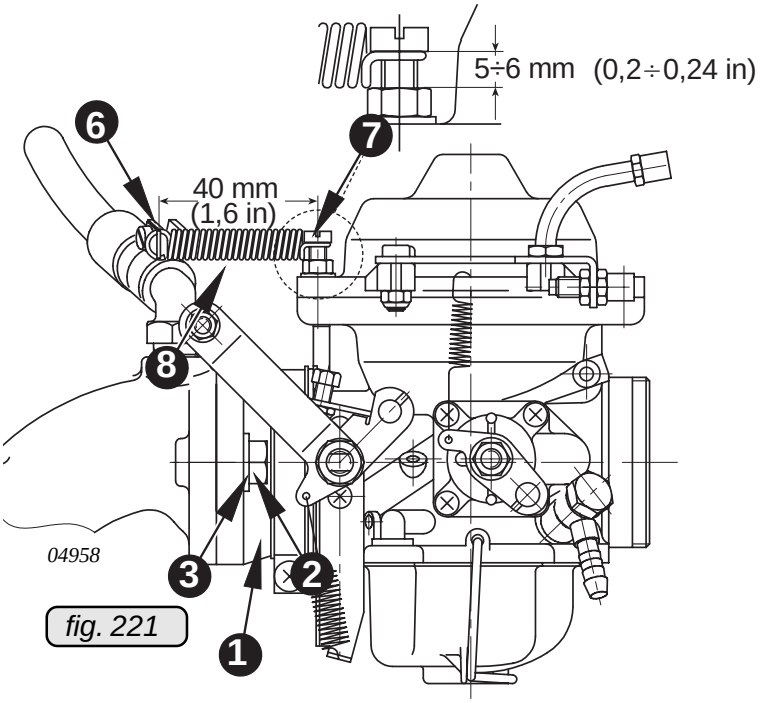

fig. 221

d01382

13.2) Lubricating system

Besides the maintenance work prescribed in para 12 and description of the oil circuit in the engine in para 10 further work for maintenance is described as follows:

13.2.1) Oil pump removal

See fig. 055.

Remove oil filter ❶ with strap spanner, partno.*877620*. Remove 4 Allen screws ❷ M6x50 with lock washers and the oil pump ass'y with 3 O-rings ❸.

00072

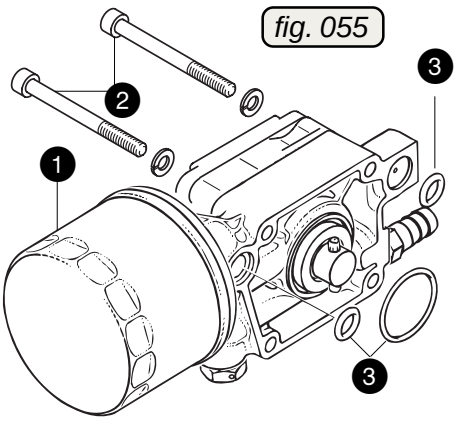

fig. 055

13.2.2) Oil pump checking

See fig. 056, 057, 058, 059, 060 and 061.

Remove oil pump cover and check inside ❶ with a straightedge ❷ for wear. The gap between pump cover ❸, revolving piston ❹ and rotor ❺, see dimension ② in para 15.

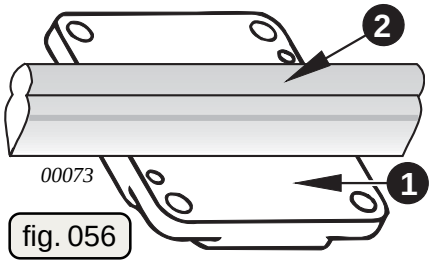

fig. 056

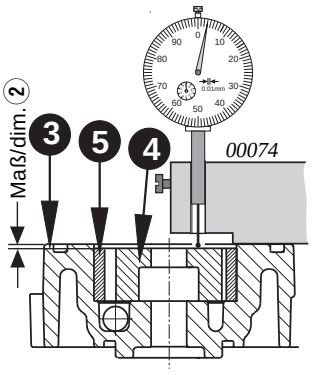

fig. 057

Withdraw revolving piston and rotor, driving pin and pump shaft. At noticeable furrows on mating faces of rotor inside ❻ and revolving piston outside ❼ renew both components. A bigger gap greatly reduces pump capacity. Check sealing faces of oil pump housing and pump cover, plane on an even plate if necessary. Check pump shaft on the bearing seats ❽. As a spare part, the pump shaft ❾ is supplied with driving pin pressed in.

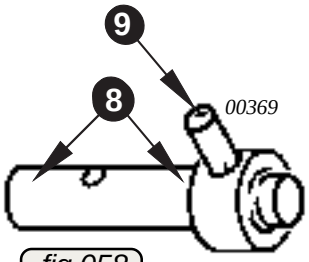

fig.058

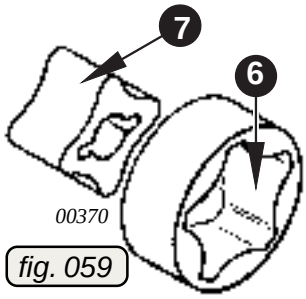

fig. 059

Remove plug screw ❿ from pressure release valve ⓫ with pressure spring ⓬, clean and check ball seat in pump housing. The shim ⓭ is only fitted if required to reach specified oil pressure.

Clean all parts and clear oil bores with compressed air.

On engine type 912 configuration 3 the oil pump housing is machined for an additional connection ⓮ for the pressure oil line for the propeller governor. On version 912 configuration 2 and 912 configuration 4 this connection is closed with a plug screw. ⓯ = oil pressure sensor.

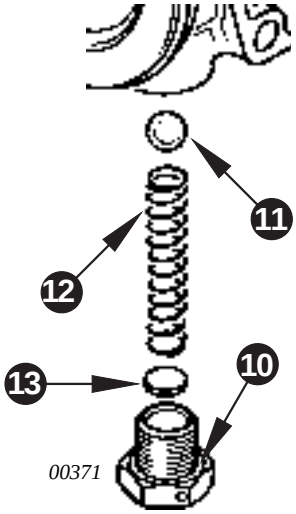

fig. 060

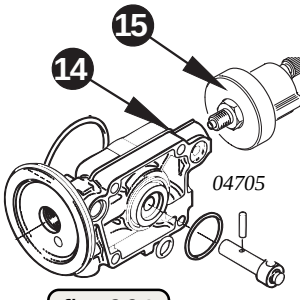

fig. 061

d01382

13.2.3) Oil pump reassembly

See fig. 062.

Lubricate bearing of pump shaft in oil pump housing with motor oil (see relevant Operator's Manual) and install pump shaft ❶. Insert pin ❷ 4x15,8 in the pump shaft ❶, install rotary piston assembly ❸ and turn pump shaft to check for ease of movement. Fit the 2 outer O-rings ❹ 11-2,7 and one O-ring ❺ 30-2,5 in the oil pump housing and fit it to the crankcase.

◆ NOTE: Turn oil pump shaft until the driving pin ❻ engages in the camshaft (Nut).

◆ NOTE: With design year 1995 rotary piston length was changed from 13 mm to 16 mm (0,53 to 0,65 in)!

Push both locating pins ❼ 4x15,8 into the pump housing, fit O-ring ❽ 57-3 and oil pump cover ❾ with Allen screws M6x50 and lock washers, tighten equally to 10 Nm (90 in.lb).

Fit ball ❿ 8,5 mm, spring ⓫ 39,5 mm (1,55 in.) long and plug screw ⓬ M12x1. Torque to 25 Nm (220 in.lb).

■ CAUTION: The adjustment shim ⓭ is not used for the time being and is only fitted if during test run the specified oil pressure is not reached.

◆ NOTE: Spring ⓫ 39,5 mm (1,55 in.) long, renew at wear.

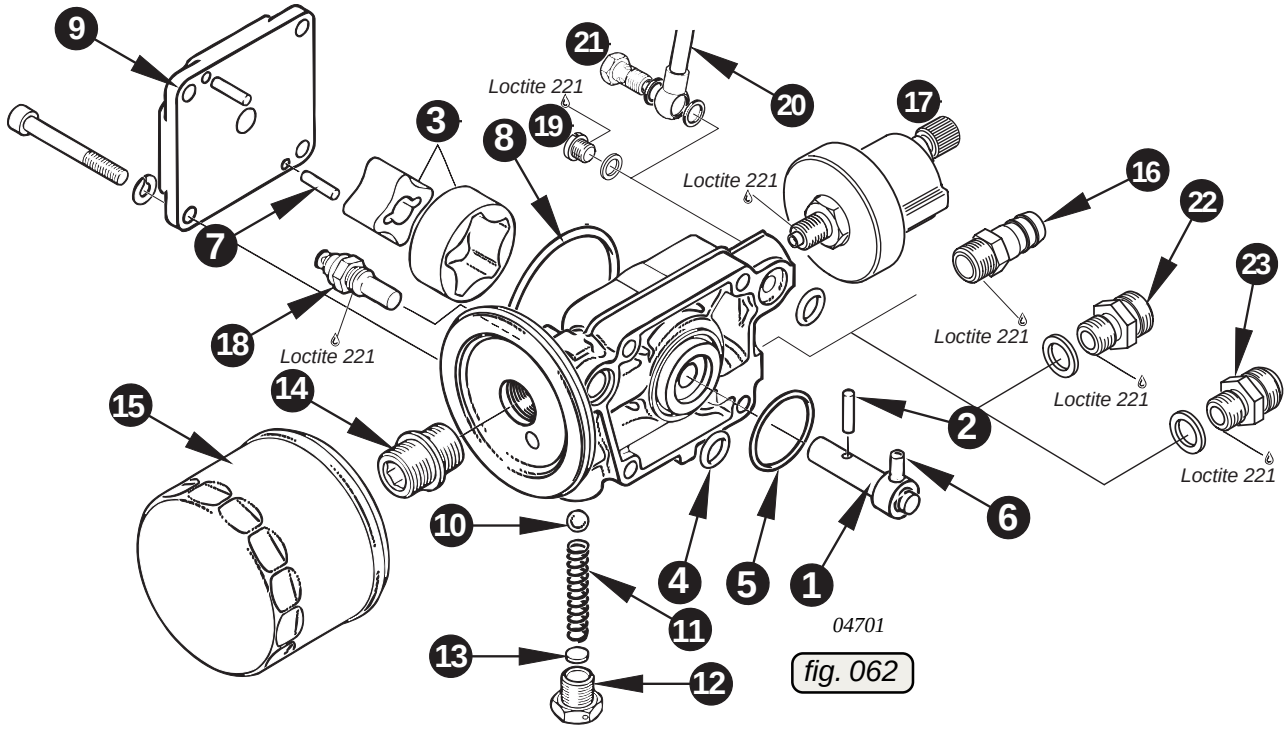

fig. 062

d01382

If the oil filter nipple ⓮ has been removed, re-tighten it to 60 Nm (530 in.lb). Slightly lubricate the rubber seal for oil filter ⓯. Screw oil filter on by hand until it stops at the oil filter housing. Then tighten by an extra 3/4 turn (270°).Secure with LOCTITE® 221 the following parts hose nipple ⓰ 14x1,5 (metric socket ㉒ or UNF socket ㉓), oil pressure sensor ⓱, oil temperature sensor ⓲ and the plug screw ⓳.

◆ NOTE: On version 912 configuration 3 instead of the threaded plug the pressure oil hose ⓴ for the hydraulic governor will be connected. Tightening torque of banjo bolt ⓳ is 17 Nm (150 in.lb).

13.2.4) Magnetic plug

Refer to Maintenance Manual 912 Series (Line Maintenance) chapter12-00-00, para 5.4.

13.2.5) Drain screw

See fig. 063.

On crankcase bottom side there is a plug screw ❶ and a banjo screw ❷ for oil return line.

Remove both screws, drain remaining oil and check. Refit the cleaned screws, tighten to 35 Nm (310 in.lb) and secure with safety wiring.

◆ NOTE: Location of screw ❶ and banjo bolt ❷ might be interchanged depending on installation.

▲ WARNING: After re-installation of the engine ensure no air is trapped in the lubrication system. For correct procedure, see Maintenance Manual type 912 (Line Maintenance) chapter 12-00-00, para 5.2.2.

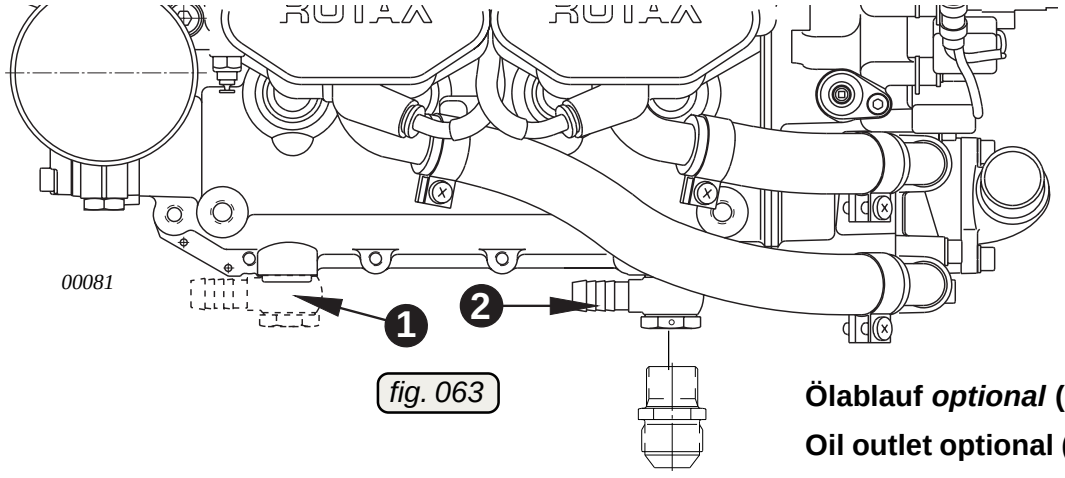

fig. 063

Ölablauf *optional* (UNF)

Oil outlet optional (UNF)

d01382

13.3) Cooling system

13.3.1) Water pump removal

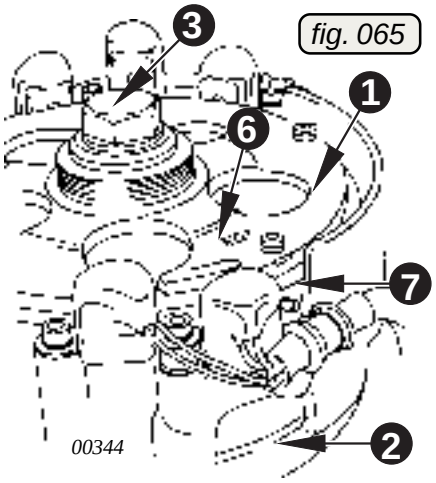

fig. 065

See fig. 065, 066 and 067.

The water pump is integrated in the ignition housing. For maintenance works the magneto hub ❶ and the magneto housing ❷ have to be removed. On some engine installations this requires removal or partial lifting of engine.

To remove the hex. screw ❸ M16x1,5 from the flywheel hub the crankshaft has to be looked, see Maintenance Manual 912 Series (Line Maintenance) Chapter 12-00-00 para 2.7.

13.3.2) Water pump housing disassembly and inspection

See fig. 068 and 069.

Remove the 2 Allen screws M6x20 ❶ of the water inlet elbow ❷ and remove water inlet elbow with O-ring.

◆ NOTE: Register the position of the inlet elbow ❷!

Remove the 4 hose clamps from water drain hoses and from water pump housing ❹. By removing 5 Allen screws M6 ❸ the water pump housing ❹ with gasket ❺ can be taken off.

■ CAUTION: The Allen screw M6x35 ❻ reaches into the water chamber, therefore it is of stainless steel and fitted with a sealing ring ❼ 6x10.

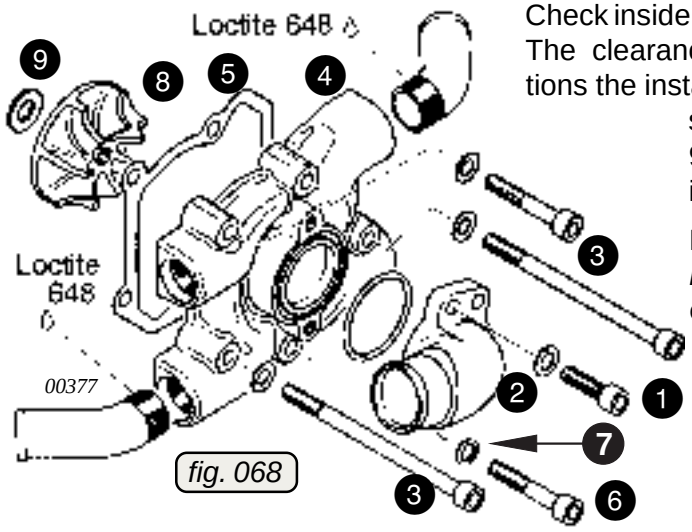

fig. 068

Check inside for traces of possible contact with impeller ❽. The clearance is not within manufacturers recommendations the installation has to be done again and new rotary seal and new oil seal must be installed, see SI-912-001. The shim ❾ fitted behind the impeller is of stainless steel.

Remove the impeller ❽ with special tool, *part no 877 295*, with crankshaft locked, turning **counter-clockwise**.

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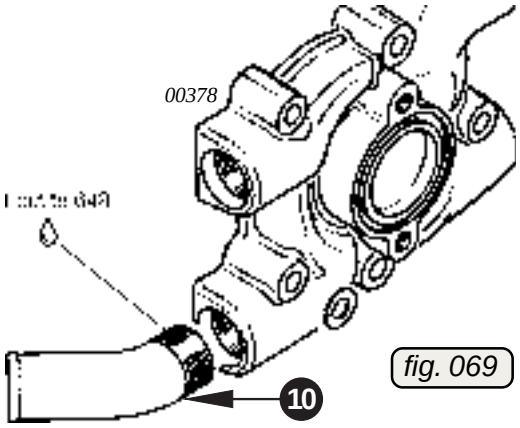

fig. 069

Verify the coolant elbows ❿ screwed into the water pump housing for leakage, cracks and tight fit. Replace as necessary. Mark the position of the coolant elbows. Warm up water pump housing to approx. 80° C (180° F) and remove the elbows. Carefully clean threads from LOCTITE® remains, apply LOCTITE® 648 on the new coolant elbows and fit it into position with at least 5 courses of thread engaged.

13.3.3) Magneto hub

See fig. 070.

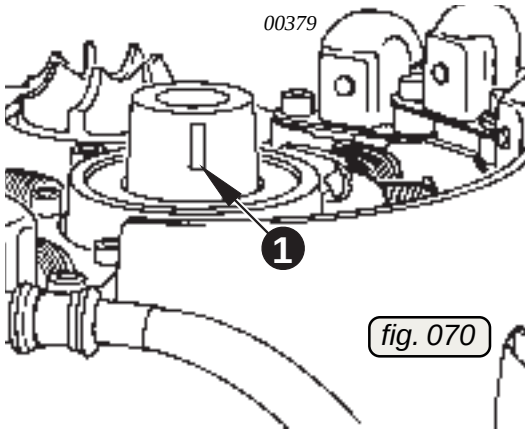

fig. 070

Remove hex. screw M16x1,5. Place protection mushroom *877 410* onto the crankshaft, screw puller *877 375* fully down and pull off flywheel hub with washer. Remove Woodruff key ❶ from crankshaft.

■ CAUTION: If Woodruff key is not removed, the oil seal and bearing bush will be damaged when removing the ignition housing!

13.3.4) Ignition housing disassembly and inspect

See fig. 071, 072, 073, 074 and 075.

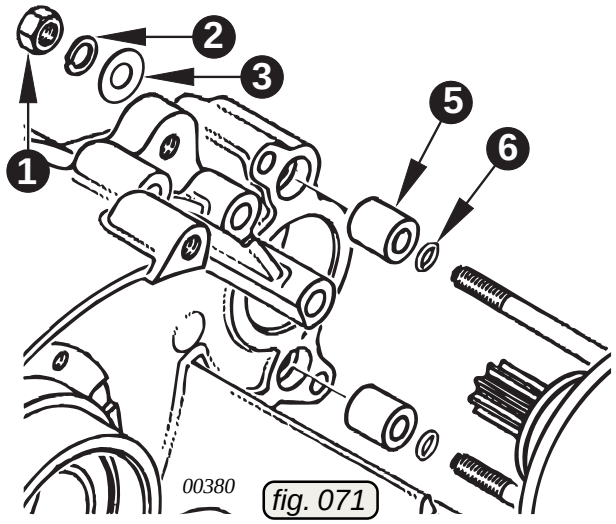

fig. 071

Open the plastic clamp and remove cable clamp from electronic module. Detach both 4-pole plugs of the 2 pick-up cables and both connections of charging cable. Detach both plug connectors of generator cable and control cable for the electronic rev. counter. See para 13.4.12.

Decide whether the stator may remain in the ignition housing. Otherwise remove the cable clamps and remove the stator.

Cover the groove for Woodruff key with a protective tape to avoid damage to the oil seal. See fig. 070.

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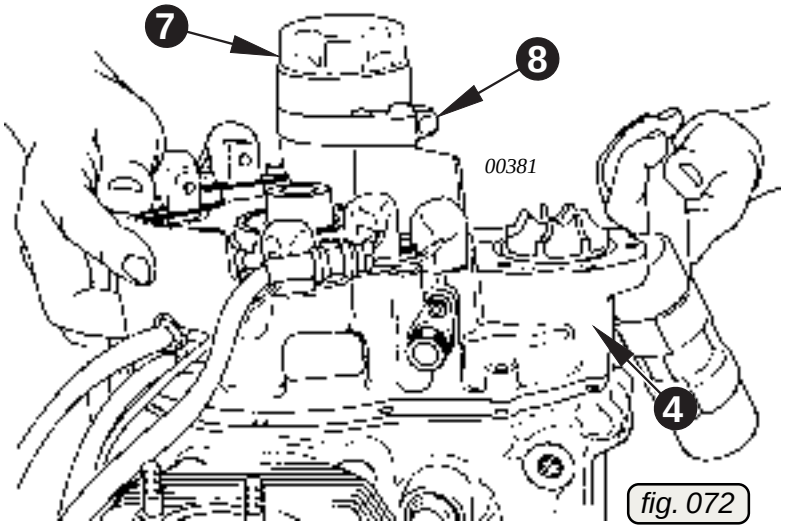


fig. 072

Remove 7 Allen screws M6 from ignition cover and 2 hex. nuts M5 ❶ with lock washers ❷ and washers ❸ from the bottom side of the ignition cover. By a smart blow with a mallet the ignition cover ❹ separates from the crankcase and can be taken off.

◆ NOTE: Remove the electric starter ❼, if neces sary, by removing the strap clamp ❽.

The electric starter is kept in position by 2 distance sleeves ❺ and O-rings ❻. When withdrawing the electric starter from the ignition housing, keep the bearing flange with starter housing and rotor support assembled. Otherwise the carbon brushes will jump off the rotor.

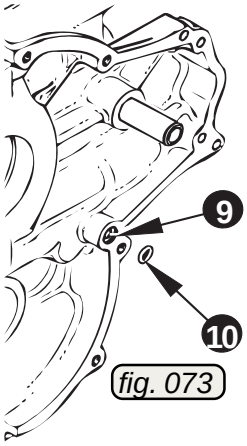


fig. 073

◆ NOTE: The crankshaft bearings in the ignition housing are lubricated via the oil duct ❾. Sealing of the oil duct at the joining face between crankcase and ignition housing is by an O-ring ❿ 5x2.

◆ NOTE: At the backside of the ignition housing a thrust washer of the intermediate starter gear may stick.

Visually check the sealing surfaces. Clean oil duct ⓫ with compressed air and check for free passage. Check dimension of bore ⓬ (dimension ③) of bearing bush for crankshaft support ⓭,(dimension ④) , see para 15.

00382

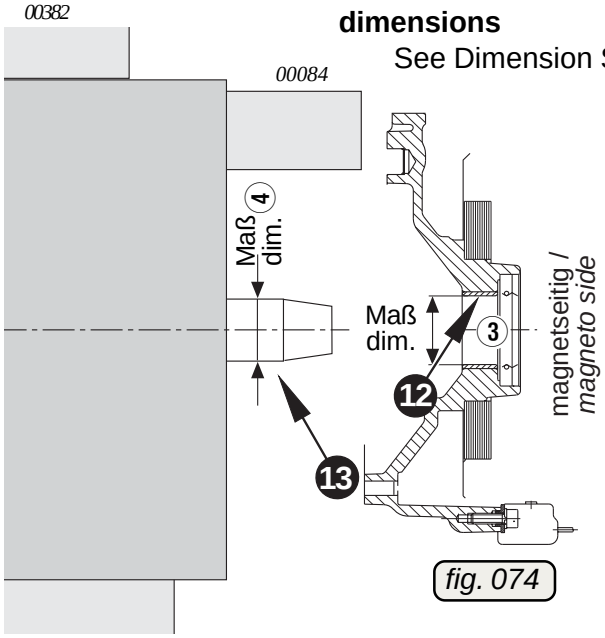


fig. 074

d01382

dimensions	new mm(in.)	wear limit mm(in.)
See Dimension Sheets in para 15.		

Renewal of the bearing bush ⓬ is not planned as after pressing in the bush, the internal bore and the lubricating bore ⓫ are machined. At wear of the bearing bush ⓬ the complete ignition cover with pressed-in and machined bush has to be replaced or to be sent for repair to the manufacturer.

Check oil seal ⓮ 32x52x7 for crankshaft, replace if necessary. Press in new oil seal with insertion jig, *part no. 877 270*. Check whether at the leakage bore ⓯ emergency of oil or water is visible.

Check rotary seal ⓰ for water pump sealing. At emergency of liquid, renew rotary seal and oil seal ⓱. See para 13.3.7.

Visually inspect location bore ⓲ for electric starter.

⓳ = Drive shaft for mechanical rev. counter.

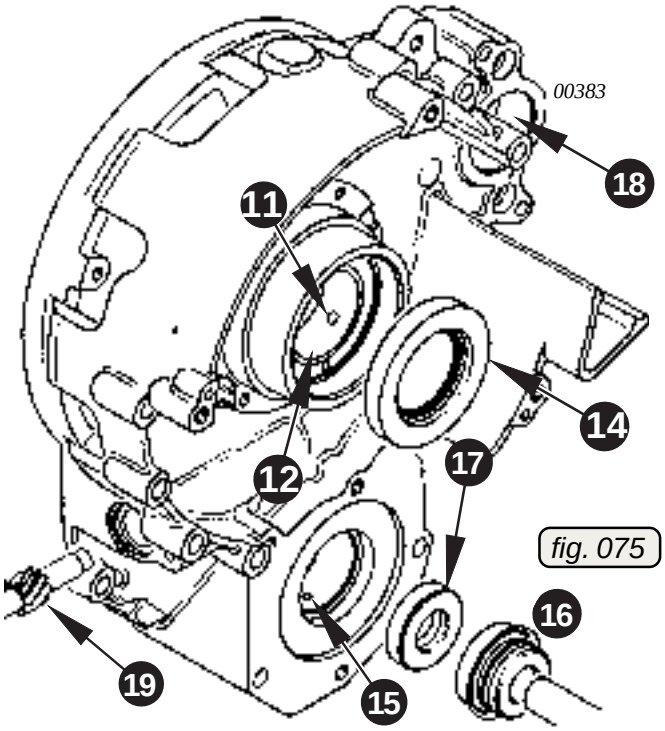


fig. 075

d01382

13.3.5) Water pump shaft disassembly

See fig. 076 and 077.

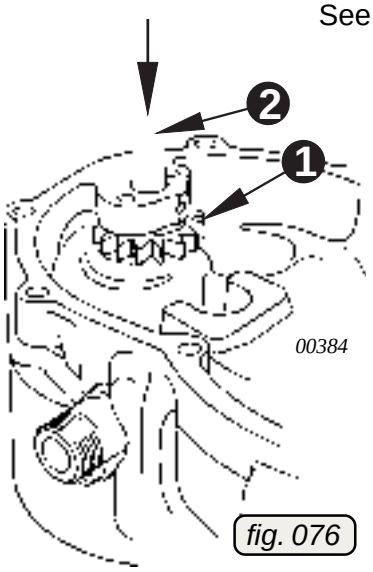


fig. 076

It is an advantage to loosen the impeller already when dismantling the engine (with crankshaft locked). Otherwise block water pump drive gear ❶ with suitable tool. Unscrew impeller using impeller wrench *877 295* to avoid damage to the impeller blades. Place ignition cover on a suitable plain surface and press water pump shaft out with a suitable punch ❷. Remove drive gear ❶.

◆ NOTE: With design year 1994 the transmission ratio on water pump drive was changed from 24:16 ❶ into 26:16 thus increasing the water pump speed.

Inspect water pump shaft ❸ for wear. Pay attention to possible corrosion at the thread end ❹. If engine is run without antifreeze, formation of corrosion is possible in this position.

If corroded, replace the water pump shaft.

◆ NOTE: The shaft has a conical end ❺.

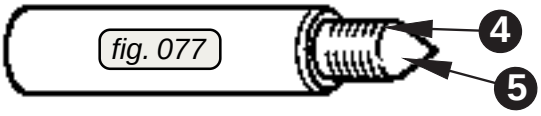


fig. 077

13.3.6) Rotary seal disassembly

See fig. 078.

Remove old oil seal and rotary seal utilizing 2 pins ❶ (approx. 5 mm dia. = 0,2 in.) and suitable punch ❷. Oil seal and rotary seal will be destroyed at removal and must be renewed.

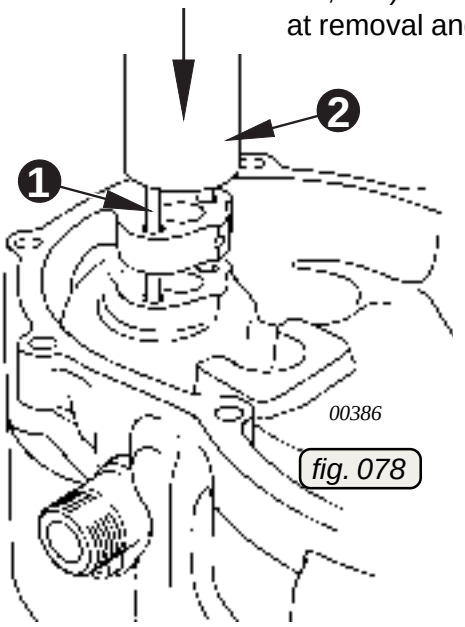


fig. 078

d01382

13.3.7) Rotary seal reassembly

See fig. 079, 080 and 081.

See SI-912-001.

Press new oil seal ❶ 12x30x7(sealing lip lubricated with motor oil) with sealing lip facing inwards, into ignition cover using punch ❷, *part no. 876 510*.

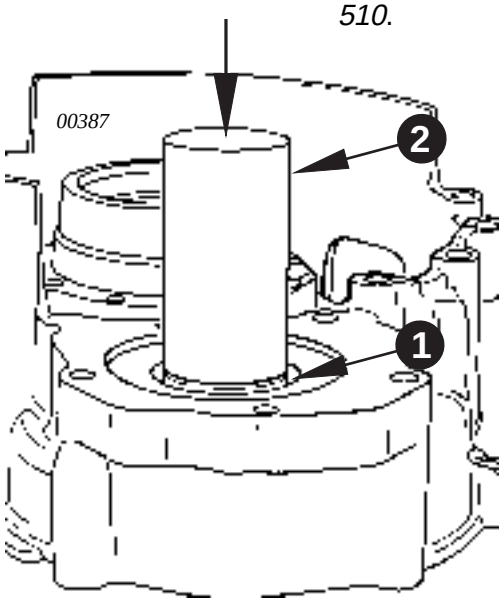


fig. 079

Carefully push rotary seal ❸ part no.. 850 945 on punch ❹ *part no. 877 258* , and press the water pump shaft ❺ carefully to positive stop of the insertion jig.

Place pump gear into gear cover. The larger collar of the gear should face towards inside, to the crankcase. Turn insertion jig ❹ and push water pump shaft ❺ with rotary seal ❸ already fitted into ignition cover. Turn pump drive gear into a position to align with pump shaft.

Now place the ignition cover under a hand press (20 kN / 4400 lb. capacity) on a plane face and press pump shaft into position until stop. Then turn ignition housing and press water pump shaft back using 10 mm (.4 in.) punch ❹ until level with sealing face. Turn water pump shaft for check.

◆ NOTE: The spring of the rotary seal presses the water pump shaft outwards towards the sealing face ❻, depending on axial clearance ❾. See fig. 082.

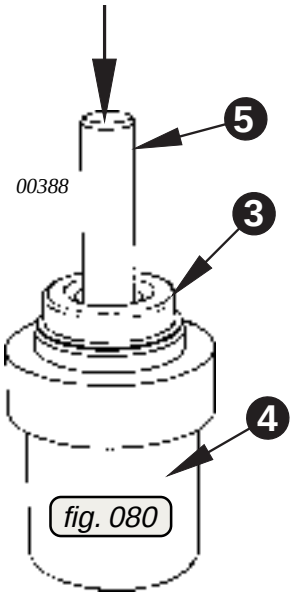


fig. 080

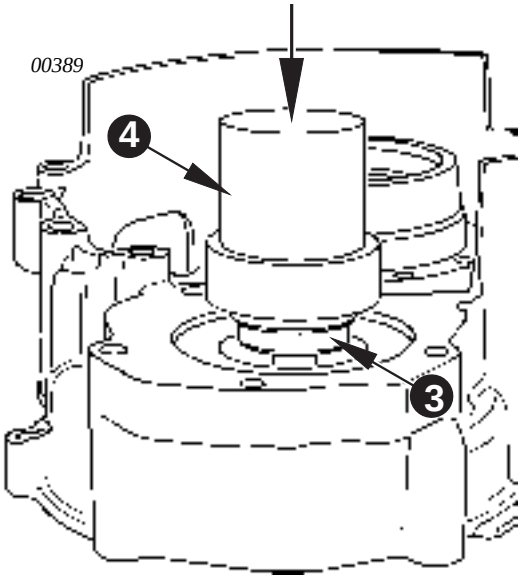


fig. 081

d01382

13.3.8) Crosssection of water pump

See fig. 082.

Check axial position of water pump shaft and pump gear. Large collar ❶ of the gear shows inward to the sealing face.

◆ NOTE: To warrant the correct gap ❸ (dimension ⑤ in para 15) between impeller ❹ and water pump housing ❺, ensure alignment of shoulder ❷ on water pump shaft with sealing face ❻ of ignition cover ❼. If need be, place ignition cover on a hardened and ground face plate with an 8 mm (0.3 in.) dia. clearance hole, and press shaft backwards accordingly, using a 10 mm (0.4 in.) dia. pin. Trial spin the pump shaft installed.

Place washer ❽ *TNr. 926 273* of stainless steel on the shaft. Fit impeller ❹ part no.*922 224* turning clockwise, tighten with special wrench, part no. *877 295*. Torque to 15 Nm (133 in.lb).

◆ NOTE: Check impeller ❹ for out-of-round. At noticeable out-of-round replace impeller or if necessary also the pump shaft.

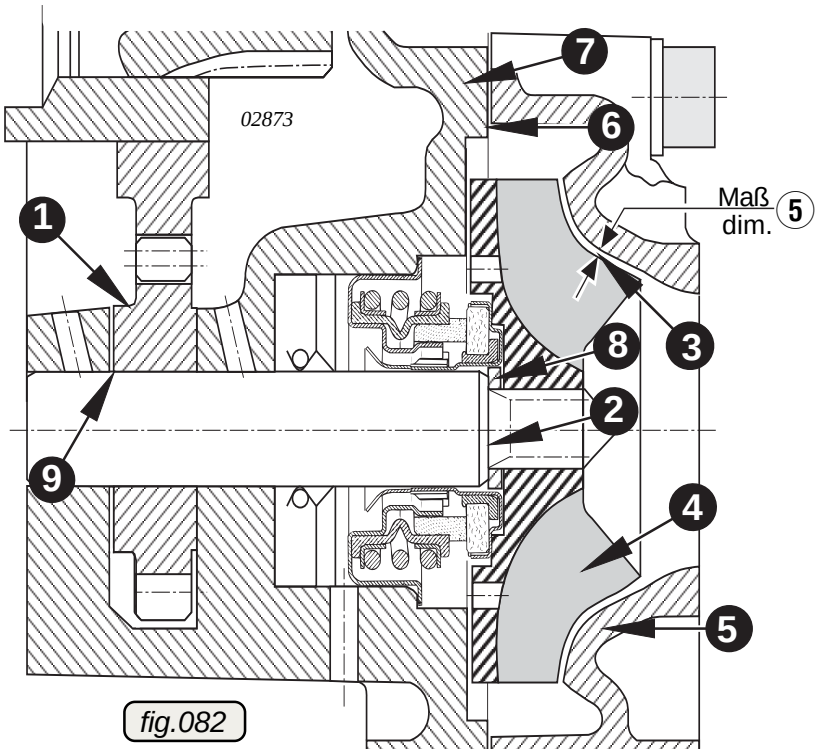


fig.082

13.3.9) Ignition housing reassembly

See fig. 083 and 084.

If the idle gear ❷ for electric starter has previously been removed, place thrust washer ❶ 12,5/21,5/1 onto the crankcase. Place idle gear into position and lubricate idle gear shaft ❸ with motor oil (see relevant Operator's Manual) and insert it. Place thrust washer ❹ 12,5/21,5/1 on top.

◆ NOTE: Commencing with model 95 the gear ratio was changed by using a differnt idle gear ❷ and consequently the distance between the axis of electric starter and idle gear shaft ❸.

Place O-ring 5x2 ❺ into crankcase and fit guide sleeve, *part no. 877 360*, for oil seal onto the crankshaft.

■ CAUTION: Without using the guide sleeve, *part no. 877 360,* the oil seal will be damaged by the keyway in crankshaft.

Apply LOCTITE® 574 sealing compound on the sealing face ❻ of pre-assembled ignition cover, apply multi-purpose grease LZ or equivalent grease onto oil seal ❼ see para 11.7.3, fit it and turn water pump to engage in the teeth. Tighten ignition cover with 7 Allen screws M6x30 ❽ and lock washers evenly to 10 Nm (90 in.lb.).

◆ NOTE: The Allen screw ❾ M6x30 reaches into the oil compartment and must be sealed with LOCTITE® 221.

❿ = drive shaft for mechanical rev. counter.

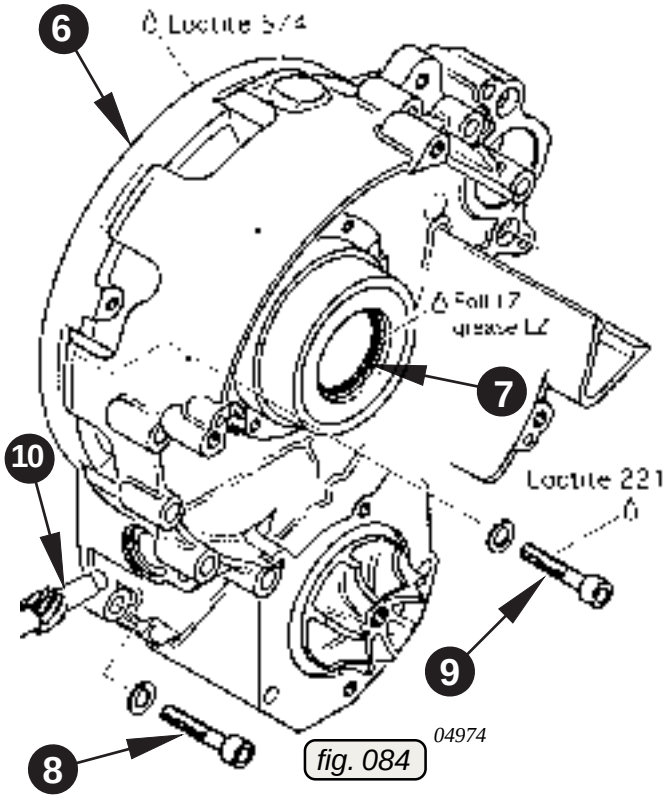


fig. 084

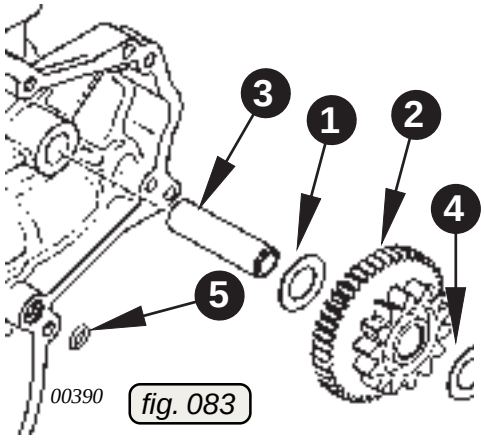


fig. 083

d01382

13.3.10) Water pump housing reassembly

See fig. 085

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

■ CAUTION: The Allen screw ❺ M6x35 at the lowest position reaches into the water chamber, therefore it is of stainless steel and fitted with a sealing ring ❻ 6x10. This gasket ring has to be fitted and mustn't be replaced by any other part.

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 para 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.

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

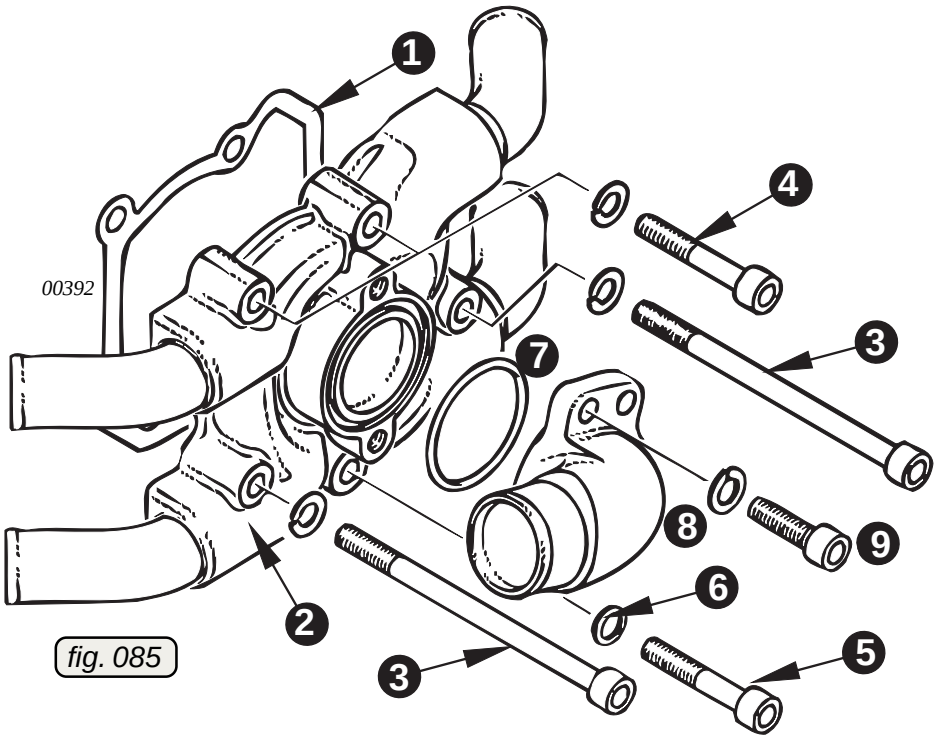


fig. 085

d01382

13.3.11) 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.

13.3.12) 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.

13.4) Ignition system

The DCDI ignition unit consists of 2 groups of components:

— the external ignition electric set (consisting of: 2 electronic modules, 4 double ignition coils with ignition cables, 8 resistance spark plug connectors and resistance spark plugs), and

— the components integrated in the ignition housing (consisting of: stator, magneto ring, magneto hub and trigger set).

In principle the ignition unit requires no maintenance. Before, however, dismantling the ignition unit it is useful to trace defects by trial and error method.

13.4.1) Checking of ignition unit, trouble shooting

Components can only be exchanged but not repaired. If there is no spark, systematically trace for possible cause.

▲ WARNING: For safety's sake, switch off ignition, if possible, and withdraw ignition key!

13.4.2) Spark plugs, ignition cables, spark plug connectors, cables

See fig. 091.

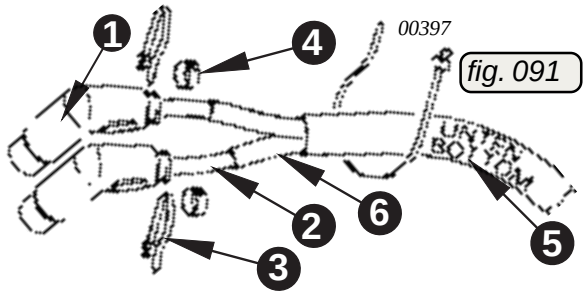
◆ NOTE: Engine is sensitive to a too large electrode gap. Especially at cold start problems check the gap and set to the minimum or renew spark plug.

— Visually check resistance spark plug connector ❶. Assure security of the spark plug connector. Minimum withdrawal force is 30 N(6,74 lbf). The spark plug connector is screw-fastened to the ignition cable ❷ and secured with a cable clamp ❸. At visible wear renew spark plug connector. It has a resistance value of 5 kΩ.

— Check for correct connection of the ignition cables ❷, as per Wiring Diagram (see para 13.4.8). The cable ends are furnished with coding sleeves ❹. The ignition cables for the bottom spark plugs are protected by glass fibre/silicone protection hose ❺. All ignition cables are covered by a protection hose ❻ — renew at visible wear.

— Check all cables and their plug connections for damage and correct connection as per Wiring Diagram (see para 13.4.8).

— Check all plug- and screwed connections for oxidation and tight fit.



00397

fig. 091

d01382

— Check short-circuit cables and ignition switch. If an ignition switch failure is suspected, the short-circuit cable can be withdrawn from the ignition switch.

▲ WARNING: Proceed with particular care because the ignition is not switched off.

— Assure sufficient ground connection between engine, battery and fuselage. Respect the wiring diagram of the aircraft manufacturer.

13.4.3) Electronic module, trigger set

See fig. 092 and 093.

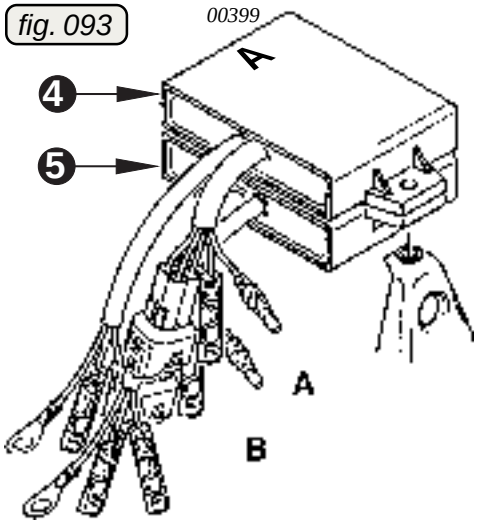
— If one ignition circuit failed, the two 4-pole plug connectors ❶ of the trigger cables may be interchanged. For this, connect the plug ❷ of the triggers A1/2 and A3/4 (coded with red and blue colour mark ❸ on the cable ends) to the electronic module ❺ of ignition circuit "B" (bottom module). ❹ = electronic module "A" (top module).

If the failure remains with the ignition circuit, either the electronic module or the charging coil on the stator is the cause. If renewal of the respective electronic module does not help, the charging coil is defective. Remove and renew the stator (see para 13.4.14).

If the failure passes on with the ignition circuit, the triggers are the cause. In both cases the disassembly work described below is necessary (see para 13.4.9 and 13.4.10).

◆ NOTE: The electronic modules are marked on the front side with part no. and serial number!

fig. 093



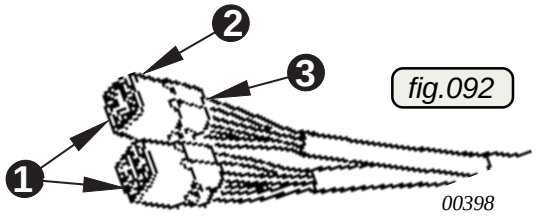


fig.092

d01382

13.4.4) Charging coil

See fig. 094.

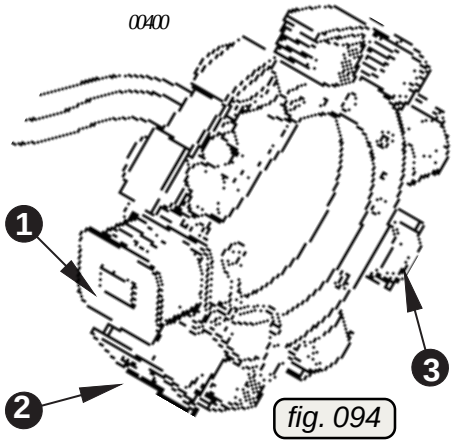


fig. 094

In case of failure of one ignition circuit, the 2 single-pole plugs of the red charging cables may be interchanged for failure tracing.

If the failure remains on the same circuit, the electronic module is the cause and the respective module has to be renewed (see para 13.4.12).

If the failure passes on with the ignition circuit, the charging coil ❶ for ignition circuit "**A**" or ❷ for circuit "**B**" is the cause. In this case the stator must be removed (see para 13.4.14).

Check charging cable for damage. Check resistance value with ohmmeter, see para 11.5 and 13.4.7. If required, renew the complete stator.

13.4.5) Double ignition coil

See fig. 095.

If the failure of a single spark plug or 2 spark plugs is noticed, check the connections and the resistance values of the respective double ignition coil, see para 11.5, 13.4.7, 13.4.8 and 13.4.11.

Assure the iron core ❶ is not loose. If required, renew the double ignition coil. In this case the disassembly work as described below is necessary, see para 13.4.9 and 13.4.10.

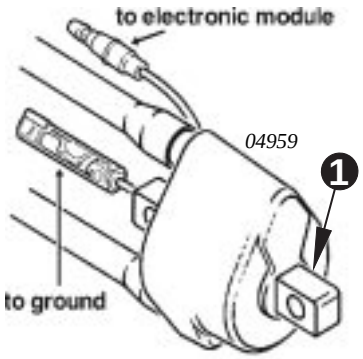


fig. 095

13.4.6) Generator coil

See fig. 094.

If the generator does not work, the reason may be a defective or squeezed yellow generator cable or a defective winding on the 8 generator coils ❸ (see fig. 094). Disconnect generator cables (yellow) and check resistance values, see para 13.4.7. There must be no connection between yellow cable and ground, and the indication on the ohmmeter must be ∞. If the value measured corresponds with the values indicated, the cause may be a defective rectifier-regulator.

Check of the complete ignition unit is only possible on an ignition test bench with an oscilloscope, see para 11.5. Especially if the failure occurs only occasionally this is necessary. In this case send the complete ignition unit to an authorized overhaul facility, see Maintenance Manual 912 Series (Line Maintenance) Chapter 05-00-00 para 2.2.

■ CAUTION: On all these works pay special attention that no foreign matter will enter the ignition.

13.4.7) Resistance values of the ignition unit

The values indicated below can be checked on the engine installed in the aircraft, after detaching connections:

Generator coil (on stator)	yellow – yellow	0,1 ÷ 0,8 Ω
Generator winding	yellow – grounding	∞
Charging coil (on stator)	red – ground	3,2 ÷ 4,5 Ω
Trigger coil	green/white – blue/yellow	15,0 ÷ 123,0 Ω
Trigger coil new* (with clamps)	white/yellow – blue/yellow	240,0 ÷ 250,0 Ω
Ignition coil, primary	connection contact – ground	0,1 ÷ 0,4 Ω
Ignition coil, secondary	high voltage – high voltage	6,1 ÷ 6,7 kΩ
Resistance spark plug connector		4,4 ÷ 6,0 kΩ

◆ NOTE: * Fitted in serial production, starting with design year 1995!

d01382

13.4.8) Wiring diagrams

13.4.8.1) Wiring diagram for ignition system("Single Plug")

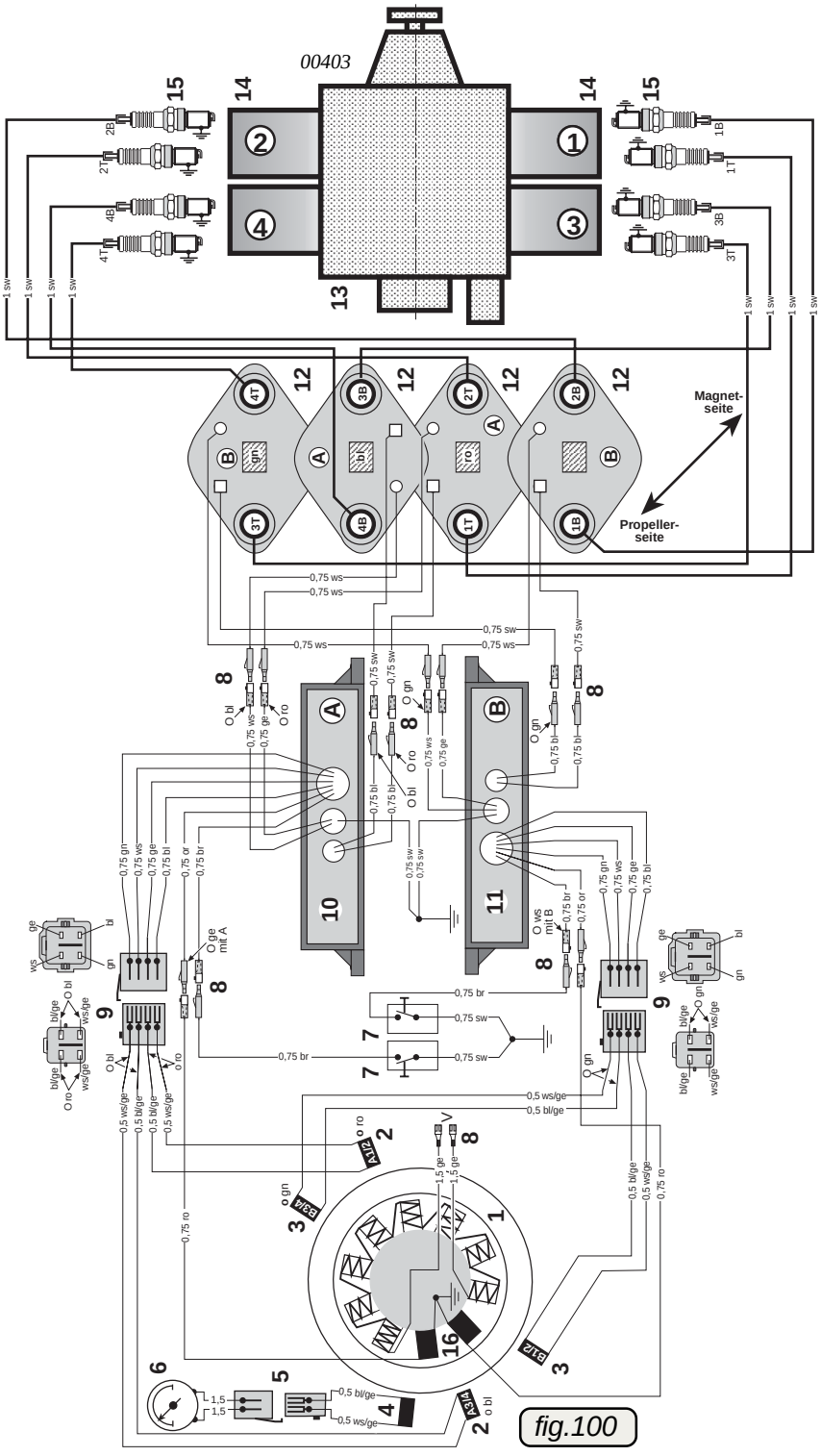
See fig. 100.

T = top = oben
B = bottom = unten

❶	*ignition magneto-generator*
❷	*pick-up for ignition circuit A"*
❸	*pick-up for ignition circuit "B"*
❹	*pick-up for rev-counter*
❺	*plug receptacle 2-pole*
❻	*electronic tachometer*
❼	*shorting switch for ignition circuit "A" and "B"*
❽	*plug receptacle 1-pole*
❾	*plug receptacle 4-pole*
❿	*electronic module for circuit "A"*
⓫	*electronic module for circuit "B"*
⓬	*double ignition coil*
⓭	*engine*
⓮	*cylinder 1-4*
⓯	*spark plugs*
⓰	*charging coils*
⓱	*6-fach Stecker*
V	*consumer connection*
o	*colour code*

bl	*blue*
br	*brown*
ge	*yellow*
gn	*green*
ro	*red*
rs	*pink*
sw	*black*
ws	*white*
or	*orange*

ignition circuit A:	***1 and 2 TOP***
	3 and 4 BOT
ignition circuit B:	***1 and 2 BOT***
	3 and 4 TOP



◆ NOTE:

Fig. 100 shows the wiring diagram with 1-pol and 4-pol connector.

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13.4.8.2) Wiring diagram for ignition system ("Central plug")

See fig. 100/1.

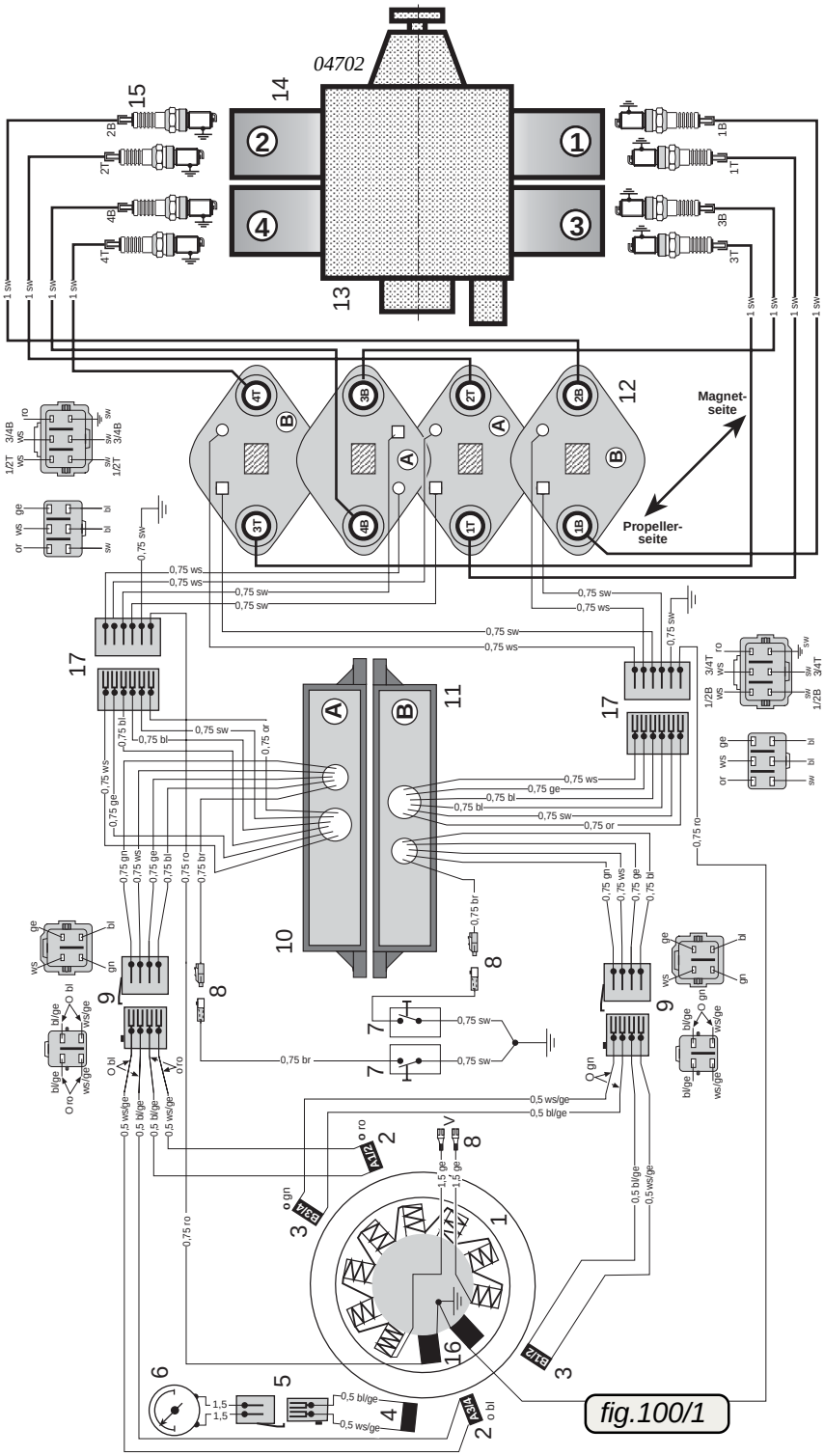

fig.100/1

◆ NOTE:

Fig. 100 shows the wiring diagram with 1-pol,4-pol and 6-pol connector.

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13.4.9) Ignition electric set disassembly

See fig. 102.

The ignition electric set, consisting of 2 electronic modules and 4 double ignition coils, is fitted to the engine on 3 rubber mounts. For removal, detach all 8 spark plug connectors ❶ from the spark plugs. Cut the cable straps for the 4 lower spark plug connectors and draw the ignition cables with protection hose through the cylinder heads. Take care not to lose the ignition cable marking sleeves.

◆ NOTE: On engines with hydraulic propeller governor it is necessary to remove also the spark plug connectors of the 2 upper spark plugs of cylinders 2 and 4 to allow easy removal of the ignition cables.

Cut off cable straps ❷ for ignition cable fixation and the plug connectors. Remove hose clamp ❸ and grounding cable ⓬ after removal of Allen screw M5x25 ❹ at the electronic module. Mark the two 4-pole plugs ❺ of the generator cables and the plug connection of the red trigger cable and remove them (see fig 100 and 100/1). Detach both fasteners ❻ of the ignition electric set (1 x M6 on bracket (ignition housing) and 1 x M8x50 ❼ on crankcase).

Unhook the tension spring of the carb support and remove the 4 Allen screws M6 ❼ each of the two intake manifolds ❽. Now the 2 intake manifolds ❽ with O-rings, compensating tube ❾, fuel line and ignition electric set can be removed, proceeding with great care. Plug all 4 intake apertures to avoid entry of foreign matter.

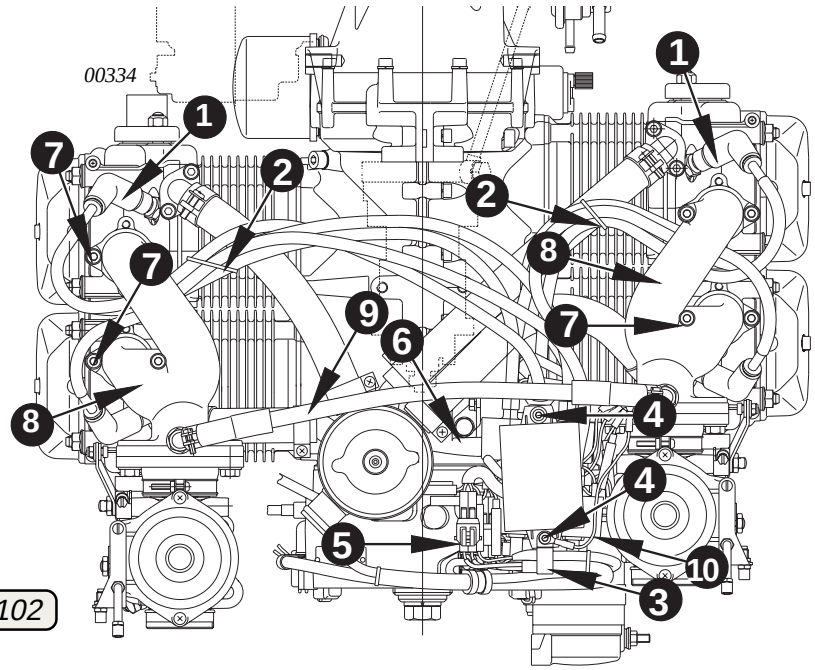


fig. 102

d01382

13.4.10) Ignition electric set disassembly

See fig. 103, 104

◆ NOTE: Before removal, mark all 8 ignition cables resp. check the correct application of the marking sleeves ❶-❷-❸-❹ of cylinders no. 1 to 4, to avoid mix-up at reassembly.

Cut the cable straps ㉕ of the lower spark plug connectors and pull ignition cables through the cylinder heads. If necessary, push off the 2 protection hoses ❺ for the lower ignition cables.

Remove Allen screw M5x25 ❻ for the electronic modules ❼ and tilt modules sideways from the engine. Remove hex. screw M6x16 ❽ and lock washer A6 from intake manifold and the ground cables ❾ from both electronic modules and ❿ from the 4 ignition coils㉖. Pay attention to the correct connection between electronic modules and ignition coils.

Double ignition coil renewal

At renewal of a double ignition coil, the following dismantling procedure is required:

Remove hex. nut M6 ⓫ and rubber mount ⓬ with bracket ⓭. Remove the Allen screw M6x16 ⓮ from rubber mount ⓯ with an Allen key. Remove both Allen screws ⓰ and ignition coil bracket ⓱ as well as the 3rd rubber mount ⓲ with bracket ⓳.

Remove both Allen screws M6x30 ⓴ from the distance nut M6 ㉑. After detaching the double grounding cables ❿, the double ignition coils㉒ and ㉓ can be replaced individually. The ignition cables are screwed in and therefore are renewable.

◆ NOTE: Except for the double ignition coil ㉓ for spark plug 3 top and 4 bottom, all are fitted in the same position, with boss ㉔ upwards.

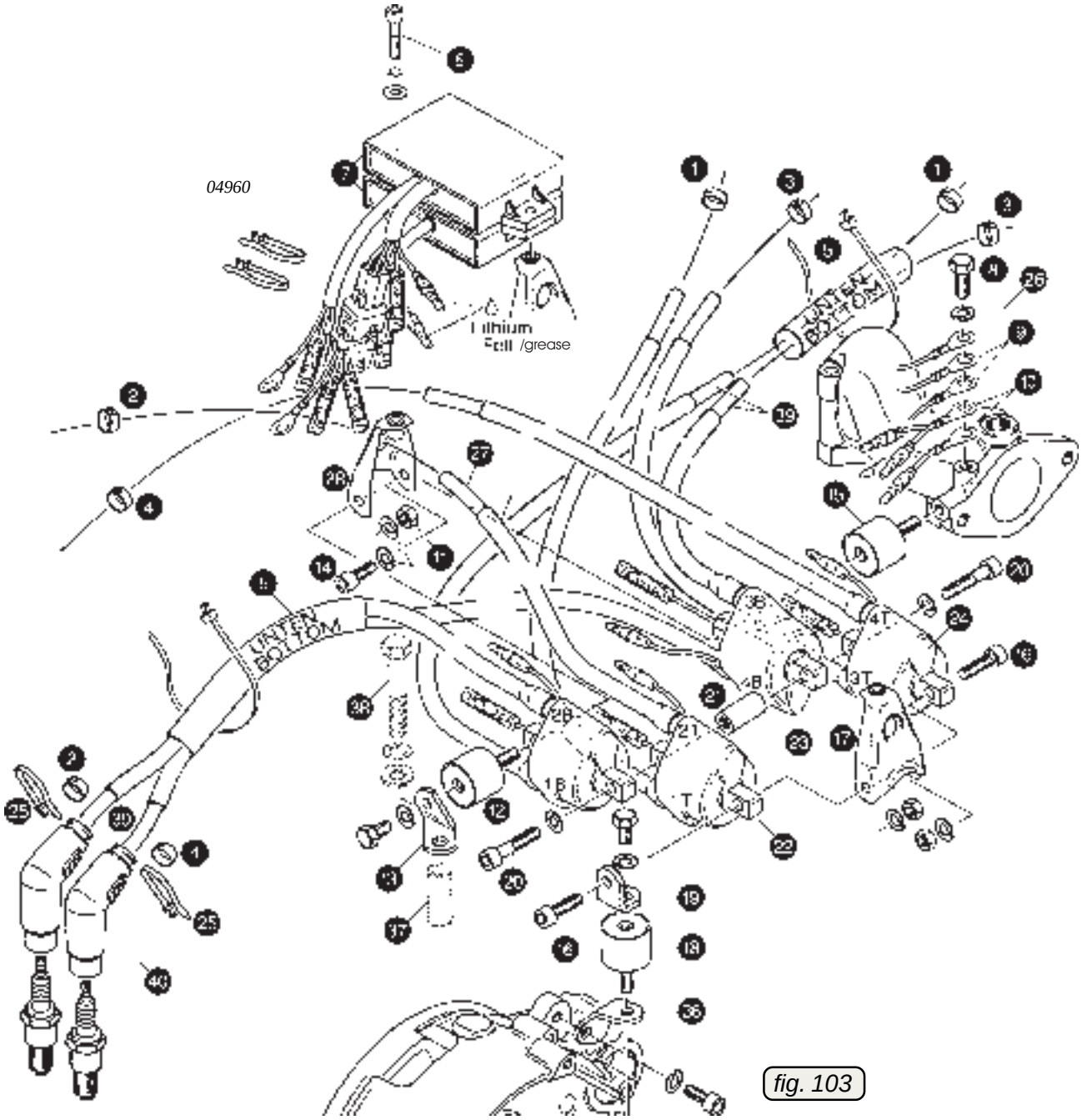


fig. 103

d01382

13.4.11) Ignition electric set reassembly

See fig. 103, 104.

Re-assembly of double ignition coils is in reversed sequence of removal.

Attach the double ignition coils offset and in the correct position as per illustration, with the two Allen screws M6x30 ⓴ and lock washers A6 with distance nut M6 ㉑. Pay attention to the double ignition coil ㉓ for spark plugs 3B and 4B. It must be fitted turned by 180°, compared with the 3 other double ignition coils (see fig. 104).

With the two Allen screws M6x20 ⑯, lock washer A6 and hex. nut M6 re-assemble, first only loosely tightening, the ignition coil bracket ⑰, ignition coil bracket ⑲, and the double ignition coils.

Insert ignition cable ㉗ into the ignition coil bracket ㉘, and fit the double ignition coils on rubber mounts ⑮ with the Allen screw ⑭ M6x16 and lock washer.

◆ NOTE: When replacing the rubber mounts ⑮, secure them with LOCTITE® 221 on the intake manifold.

Connect the white cables and the black grounding cables of the double ignition coils without fail as per wiring diagram. Route the grounding cables ❾ and ❿ towards outside. To achieve correct distance, fit the electronic modules ❼ on the ignition coil brackets with Allen screws ❻ M5x25.

Now all ignition coil fasteners can be tightened. Tighten ignition coil bracket ⓭ and rubber mounts ⓬ with hex. nut M6 and lock washer.

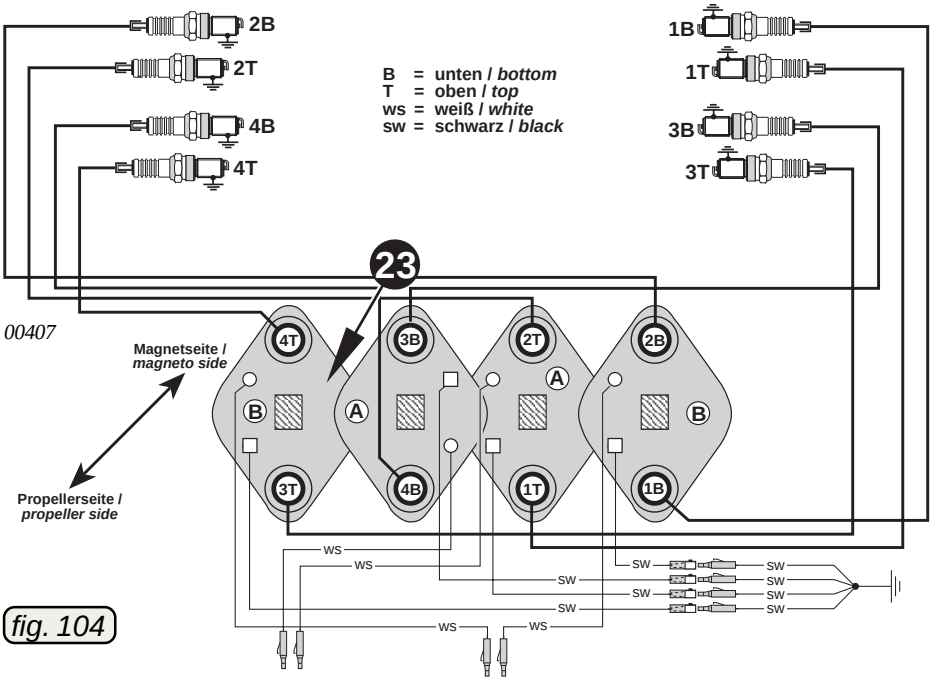


fig. 104

d01382

13.4.12) Ignition electric set installation

See fig. 103 and 105.

Place O-rings ㉝ 34x2 into the groove ㉞ of cylinder heads and remove the protections from the intake apertures. Fit both intake manifolds ㉟ with pre-assembled ignition electric set and tighten crosswise with 4 Allen screws to 10 Nm (90 in.lb). Insert rubber buffer ⑱ into bracket ㊱ of ignition housing and tighten with hex. nut and lock washer.

Place distance sleeve ㊲ into position and fix ignition electric set with hex. screw ㊳ M8, washer and lock washer on crankcase. Now tighten all screws and nuts of the ignition electric set.

Fit grounding cables ⑨, ⑩ and ㉖ on boss ㊶ of intake manifold with hex. screw ⑧ M6x16 and lock washer. Attach both 4-pole plug connectors (electronic module to trigger set) and secure with cable strap.

◆ NOTE: The trigger cable of ignition circuit **A** (top module) is marked at the end of the isolating hose with the colours blue and red. Those of ignition circuit **B** (bottom module) are marked with colours green and colourless (neutral).

Connect the two red cables coming from the charging coils with the two pink cables of the SMD electronic modules. Route the whole cable assembly into the cable clamp and fit electronic module with Allen screw ⑥ M5x25 on the ignition coil bracket ⑰.

■ CAUTION: The cable shielding must be fully inserted into the cable clamp to assure optimum mass connection.

Fit two each ignition cables ㊴ for the lower spark plugs into the glassfibre/silicone protection hose ❺ and route them between cylinder heads. Screw spark plug connector ㊵ onto the ignition cables, secure with cable straps ㉕ and plug them to the spark plugs according to the wiring diagram, see para 13.4.11.

Fasten ignition cables for cylinder 1 - 3 and 2 - 4 with new cable strap on coolant hose, see para 13.4.9.

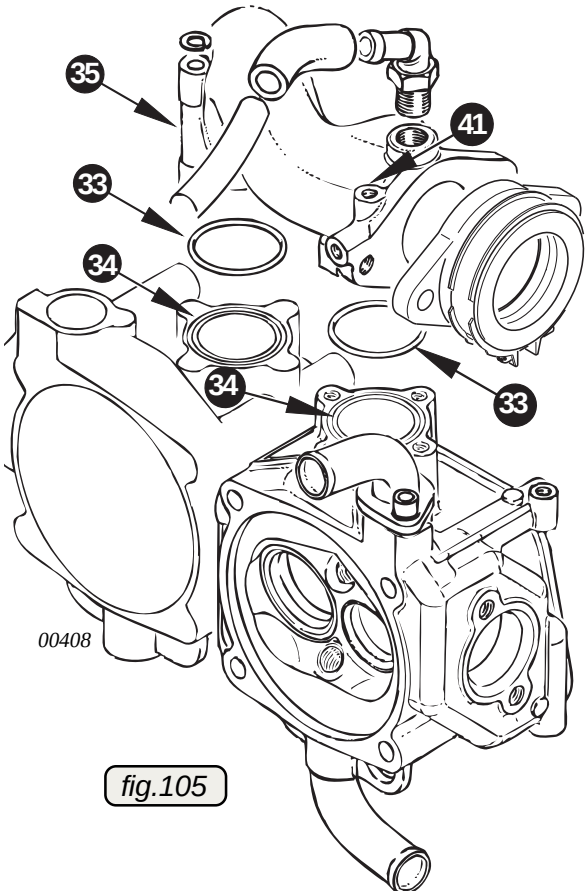


fig.105

d01382

13.4.13) Removal of trigger coil set

See fig. 106 and 107.

Because of the shielding ❻ the trigger coil ❺ set can be exchanged only in pairs. Remove the attachment screws ❼ with the distance sleeves ❽ and clamps and re-fit new trigger coil set. The stator ❾ need not be removed in this case.

The trigger coil ❶ is adjustable only to a limited extent. The gap ❷ between pick-up and trigger cam ❸ is dimension ⑦ in para 15. The axial position of the triggers should be in the middle over the trigger cam and may be offset by max. dimension ⑧ in para 15.

◆ NOTE: The two trigger coils for ignition circuit **A** (marked red and blue on cable ends) are fitted in the higher position, on distance sleeves ❺, these of ignition circuit **B** are fitted in the lower position.

■ CAUTION: Fit the clamps as to ensure perfect ground connection between shielding and ignition housing.

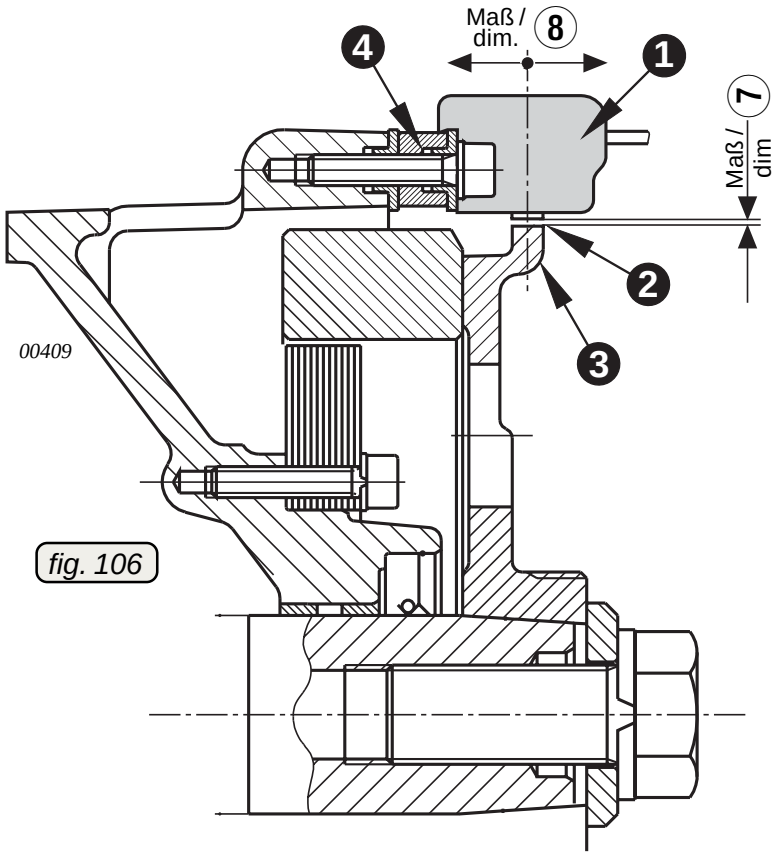


fig. 106

d01382

13.4.14) Stator removal and re-fitting

See fig. 107.

Block crankshaft with crankshaft locking screw, part no. *240 880,* see para 13.3.1.

Remove hex. screw ❿ M16x1,5 together with lock washer and washers. Place protection piece, part no. *877 410,* on crankshaft, screw puller, part no. *877 375,* fully onto thread ⓫ and press off magneto hub ⓬ together with magneto flywheel with hex. screw. Lay magneto hub ass'y aside so that no particles can be attracted.

◆ NOTE: For removal of stator the ignition housing need not be removed.

Remove four Allen screws ⓭ M5x25 and hose clamp. Remove stator ass'y ❾ from the centering ⓮ and make visual check. Check cable assembly for damage. The contact faces ⓯ between stator and ignition housing must be clean to assure good ground connection. Check of resistance values, see para 13.4.7.

Repair of the stator is not planned. At exchange or re-installation of the stator take care for correct routing of cable assembly. Every stator fixation is screwed together with a loading coil ground line. At assembly apply Lithium grease to the contact faces ⓴ of the stator and the screw heads.

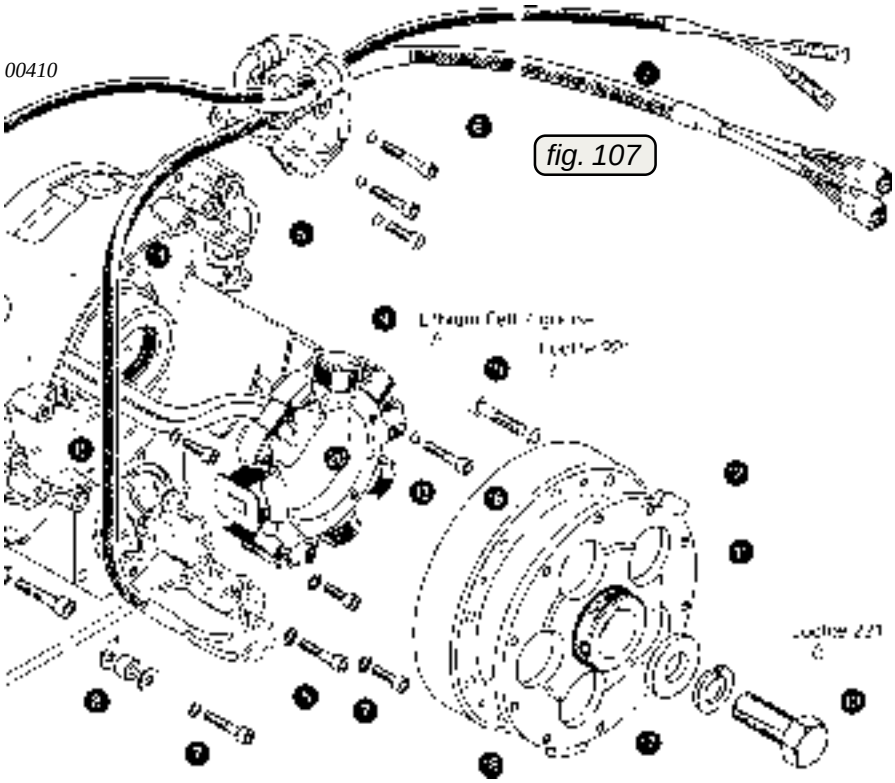


fig. 107

d01382

13.4.15) Magneto hub

See fig. 106 and 107.

Visually check magneto inner side ⓰ and the taper surface ⓱. Under normal circumstances dismantling of magneto hub is not necessary.

If it had been dismantled, clean the contact surfaces ⓲. Apply LOCTITE® 221 to all 10 Allen screws ⓳ (alternating 5 screws M6x30 and 5 screws M6x25) and torque to 10 Nm (90 in.lb.).

◆ NOTE: The hole pattern in the magneto ring is symmetrical and therefore it can be assembled in any position with the flywheel hub.

Check Woodruff key in crankshaft for tight fit and degrease tapers of crankshaft and magneto hub. Apply LOCTITE® 221 sparingly, however well spread into the taper of magneto hub.

Fit magneto hub, washer 17x36x5, spring washer. Apply LOCTITE® 221 to hex. screw M16x1,5, fit and immediate tighten to 60 Nm (531 in.lb.) +180° angle to rotation.

■ CAUTION: The Woodruff key serves for positioning and must remain in the groove.

Check the gap ⑦ between trigger coil and trigger cam with a feeler gage. The axial position of the trigger coil to the trigger cam (part of the flywheel hub) must be in the middle and offsetting must not exceed ⑧, see para 15.

13.4.16) Interference suppression box

See fig. 107/1.

13.4.16.1) Disassembly of interference suppression box:

The 2 electronic boxes, 4 double ignition coils and 2 feed-through capacitors are placed in the interference suppression box. On every suppression box you will find a successive serial number on its cover. Always state this number on inquiries..

To prevent any mix-up at a later stage, mark all 8 H.V. (high voltage) leads according to code on cover, prior to withdrawal. Remove 3 countersunk screws M4x8 and upper half of high voltage clip plate. Now, single H.V. leads can be exchanged as required. H.V. leads are available pre-assembled with connection to spark plug.

Mark all connections to ignition coils and then detach wiring. Remove 4 countersunk screws M4x12 from underside of electronic box and detach mass connection. The complete set of ignition coils can be withdrawn now. If need be, remove electronic boxes as well, after disconnecting shorting lines from capacitors. Check capacitors, renew as required. Check all other components.

d01383

13.4.16.2) Wiring diagram for interference suppression box

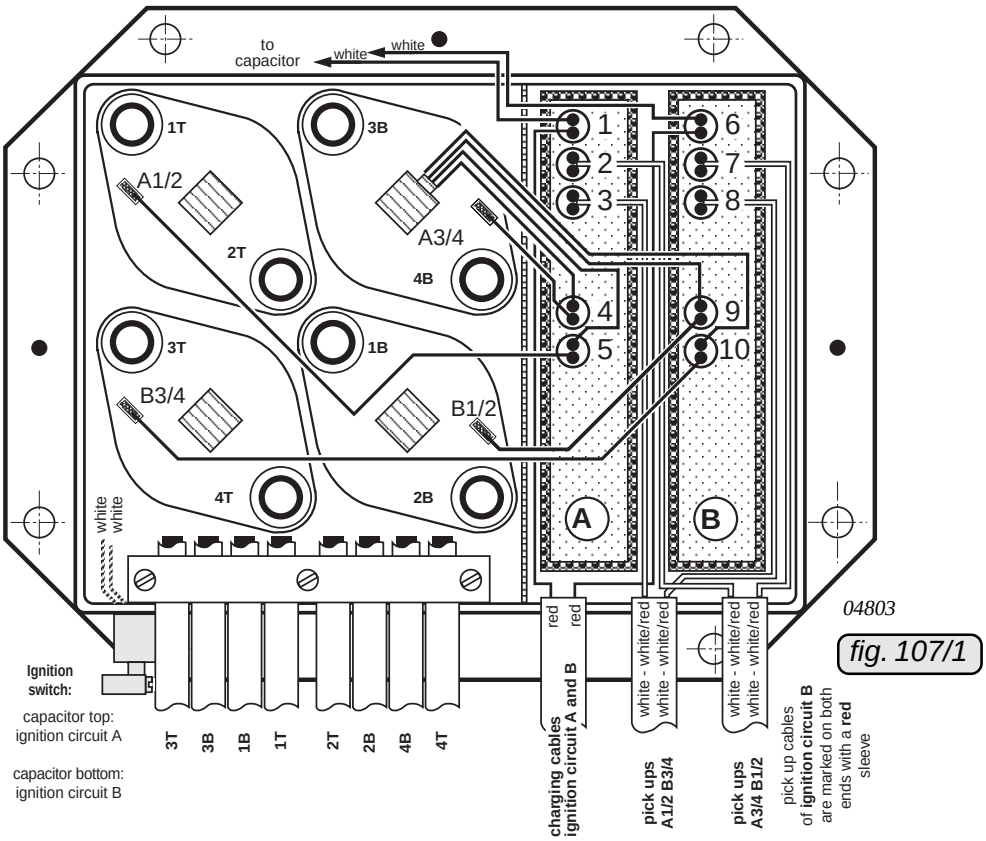


fig. 107/1

IGNITION CIRCUIT A

❶ charging cable, red
shorting cable, white (to capacitor)

❷ pick-up cable
white, for ignition circuit A-cyl. 3
white/red, for ignition circuit A-cyl. 4

❸ pick-up cable
white, for ignition circuit A, cyl. 1
white/red, for ignition circuit A, cyl.

❹ primary cable for ignition coil,
ignition circuit A, cyl. 3/4, black (ground)
ignition circuit A, cyl. 3/4, white

❺ primary cable for ignition coil,
ignition circuit A, cyl. 1/2, black (ground)
ignition circuit A, cyl. 1/2, white

IGNITION CIRCUIT B

❻ charging cable, red (of stator)
shorting cable, white (to capacitor)

❼ pick-up cable
white, for ignition circuit B-cyl. 1
white/red, for ignition circuit B-cyl. 2

❽ pick-up cable
white, for ignition circuit B, cyl. 3
white/red, for ignition circuit B, cyl. 4

❾ primary cable for ignition coil,
ignition circuit B, cyl. 1/2, black (ground)
ignition circuit B, cyl. 1/2, white

❿ primary cable for ignition coil,
ignition circuit B, cyl. 3/4, black (ground)
ignition circuit B, cyl. 3/4, white

d01383

13.4.16.3) Re-assembly of interference suppression box

Generally in reversed sequence to dis-assembly. Consult in any case the wiring diagram for the suppression box. Apply Lithium grease to all cable connections to prevent leakage current.

Put both electronic boxes into interference suppression box and place foam rubber filling pieces in position. Connect mass and primary wiring to ignition coils. Fit set of ignition coils into suppression box using 4 countersunk screws M4x12. Secure countersunk screws with LOCTITE® 221.

Arrange H.V. leads according to wiring diagram or to code on suppression box cover, in bottom part of clip-plate. Add top half, using 3 counter sunk screws M4x8, attach clip plate ass'y by two cheese-hd. screws M4x12 to box wall. Secure all screws, using LOCTITE® 221. Attach H.V. leads **1T** and **3B** to ignition coil support by cable retaining straps.

◆ NOTE: As every suppression box is numbered and essential data is registered under this number, it should be stated on all inquiries.

13.4.16.4) Installation of interference suppression box

For safety reasons don't expose suppression box to ambient temperatures above 60° C (140° F) and if possible attach by reason of vibration to aircraft frame. If for space reasons the box must be fitted to engine, make absolutely sure to use vibration absorbing mountings.

Verify all mass connections beginning from interference suppression box right to the engine. Clean contact surfaces as required and use footned spring washer at connection. See Service Instruction SI-25-1994.

◆ NOTE: Since design year 1992 the resistance sparing plug 12mm DCPR7E was introduced, see SB-912-01.

13.5) Temperature- and pressure measuring system

On the ROTAX® engine 912 there are three temperature measuring points. See Wiring Diagram in the aircraft manufacturer's Operating Manual.

13.5.1) Cylinder head temperature sensor

See fig. 108 and 109.

The two sensors ❶ for cylinders 2 and 3 are screwed into the bottom side of the cylinder heads. On the cylinder head only the material temperature of the head is measured and not the temperature of the cooling liquid. The operational temperature is 90 - 120°C (194 - 250°F) and must not exceed 150°C (300°F). If temperature is exceeded, check the

— cooling system
— temperature sensor
— monitoring instrument
— cable connection
— sensor cable

See Maintenance Manual type 912 Series (Line Maintenance) Chapter 05-50-00 para 2.7.If using 100 % anti-freeze (without adding water), coolant residues in the area of the sensor may result in too high material temperature readings. As a remedy add 20 % water.

The sensor has its grounding connection directly via the cylinder head.

The sensor resistance values are shown in the resistance temperature curve beside.

■ CAUTION: The resistance temperature curve was defined under the following conditions and is valid only under these circumstances.

Ambient temperature: 20°C (68 °F)

Deviation: max. ± 10%

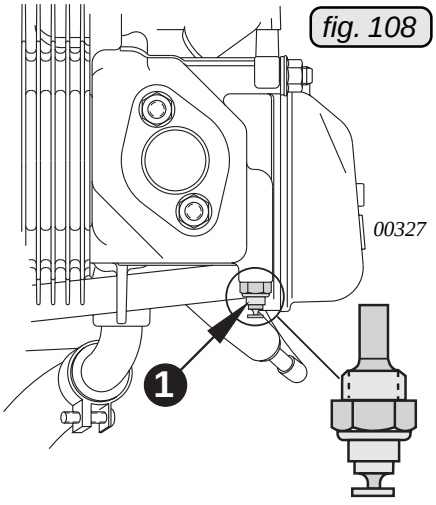


fig. 108

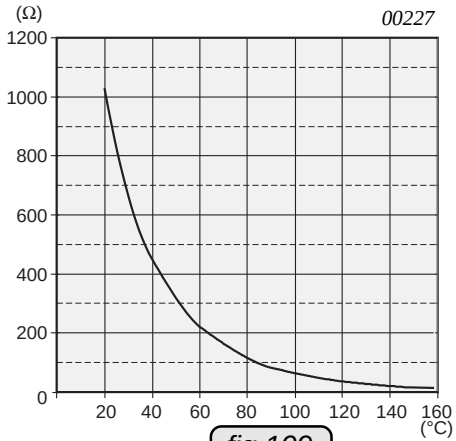


fig.109

d01383

13.5.2) Oil temperature sensor

See fig. 110.

For readings of the oil temperature, a sensor ❶ is fitted to the oil pump housing. The sensor is an NTC resistor and identical with the two sensors for cylinder head temperature.

The standard temperature should be between 90 and 110°C (194 - 230° F). If max. temperature 140°C (284° F) is exceeded, check

— oil system

— temperature sensor

— monitoring instrument

— cable connection

— sensor cable

See Maintenance Manual type 912 Series (Line Maintenance) Chapter 05-50-00 para 2.8.

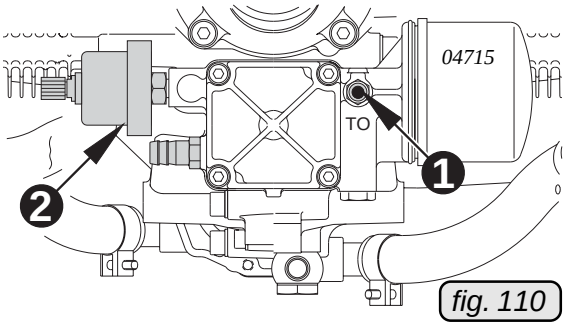


fig. 110

The sensor is grounded directly via the oil pump housing.

■ CAUTION: At replacement of a temperature sensor, always let the engine cool down to avoid burns.

After removal of the temperature sensor clean the thread in the oil pump housing. Secure new sensor with LOCTITE® 221 and tighten to 15 Nm (135 in.lb).

13.5.3) Oil pressure sensor

See fig. 110, 111 and 112.

The sensor ❷ for measuring of oil pressure is screwed into the oil pump housing.

The standard oil pressure in the engine is between 1,5 - 5 bar (22 - 73 psi). The sensor covers a range of 0 - 10 bar (0 - 145 psi).

■ CAUTION: The pressure range of the monitoring instrument must by all means be adapted to the pressure range of the sensor. Otherwise there will be wrong reading of the oil pressure.

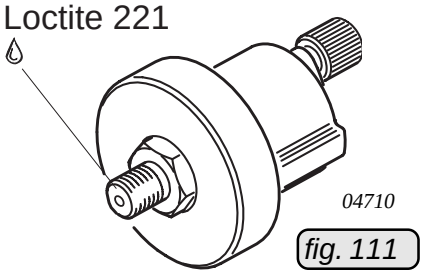


fig. 111

d01383

After removal of the oil pressure switch, clean the threads. Apply LOCTITE® 221 on the threads of the new sensor and tighten to 15 Nm (135 in.lb.).

If not reaching and/or exceeding the max. oil pressure, check the

— lubrication system

— oil pressure sensor

— monitoring instrument

— cable connection

— sensor cable

See Maintenance Manual type 912 Series (Line Maintenance) Chapter 05-50-00 para 2.9.

The grounding connection of the sensor is directly via the oil pump housing.

The sensor resistance values are shown in the resistance/pressure curve beside. Adjust your measuring instrument with a standardized (calibrated) instrument.

■ CAUTION: The resistance/pressure curve was made under the following conditions and is only valid under these circumstances:

Ambient temperature:	20°C (68 °F)
Voltage:	12 V
Deviation:	max. ± 5%

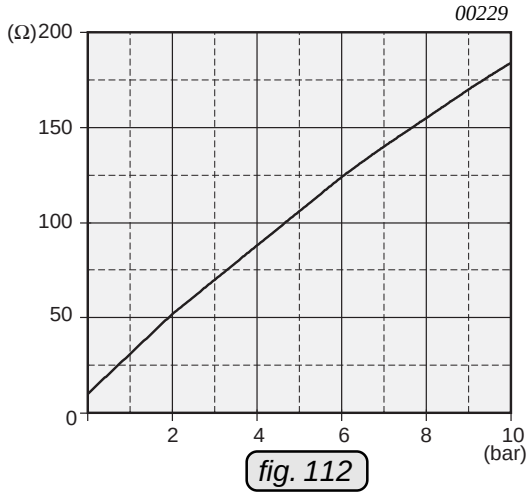


fig. 112

d01383

14) Maintenance of components

14.1) Electric starter

See fig. 113.

Remove 2 hex. nuts M5 ❶ with lock washers ❷ and washers ❸ from the bottom side of the ignition housing ❹. Disengage the clamp 76 you can remove the electric starter ❺ . The electric starter is kept in position by 2 distance sleeves ❻ and O-rings ❼.

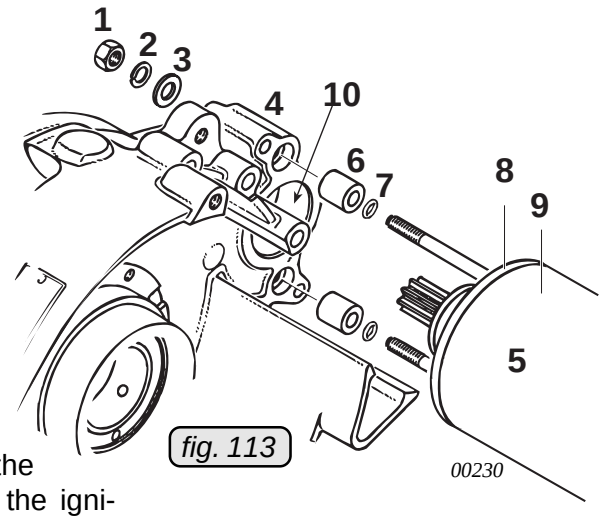


fig. 113

◆NOTE: When withdrawing the electric starter from the ignition housing, keep the bearing flange ❽ with starter housing ❾ and rotor support assembled. Otherwise the carbon brushes will be pulled off the rotor.

14.1.1) Electric starter disassembly

See fig. 114.

Remove supporting flange ❶ from starter housing ❷. Withdraw commutator bearing ❸ from starter housing and remove carbon brush holder ❹ together with springs from armature ❺. Withdraw armature and thrust washer ❻ from starter housing, clean parts carefully, see para 11.7.15.

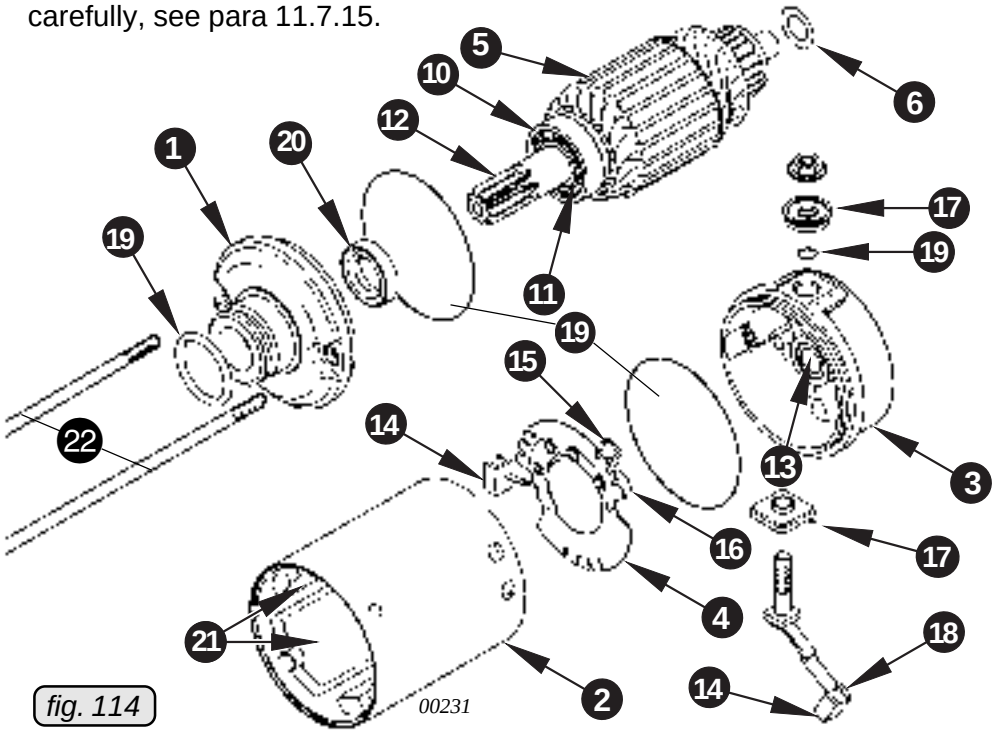


fig. 114

d01383

14.1.2) Electric starter single parts check

See fig. 114, 115 and 116.

After disassembly of starter, check the following parts:

Armature

Clean commutator, check for straightness, check visually, and if need be, slightly machine and undercut segments ❼ (see fig. 131). The insulation should start 0,5 mm (0,02 in.) below face of segments.

▲ WARNING: During this machining process material particles are set free and could possibly be inhaled.

Check armature at 12 or 24 Volt with test lamp between commutator ❽ and iron core ❾ for connection to ground. If the lamp lights up, renew armature.

Check windings for interruption, utilizing 2 or 4 Volt supply and interconnected amperemeter (measuring range 60 A) (see fig. 116). The armature has to be renewed if the ampere readings differ esentially between single segments. If the armature shows heavy signs of overheating, renew it.

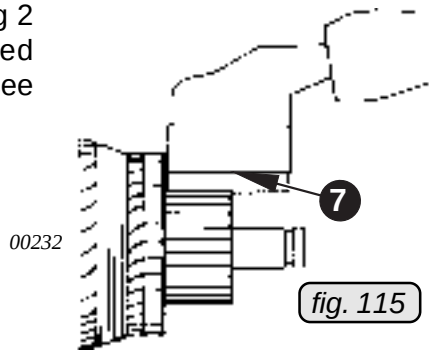


fig. 115

Check ball bearing ❿ 6002 Z. At renewal, fit it with closed side towards armature (open side ⓫ facing outward). Inspect teeth ⓬ and radial clearance of armature shaft in rotor support ❸.

Bearings

Check bearing sleeve ⓭, renew rotor support as necessary.

Carbon brushes

Carbon brushes ⓮ must be freely moving in their respective guides ⓯. Renew brushes that are too short (minimum 8 mm (0,32 in)). Check spring pressure and renew any brush spring ⓰ which shows evidence of heat damage. Check isolating sleeves ⓱ of the plus-pole carbon brush ⓲, renew as required.

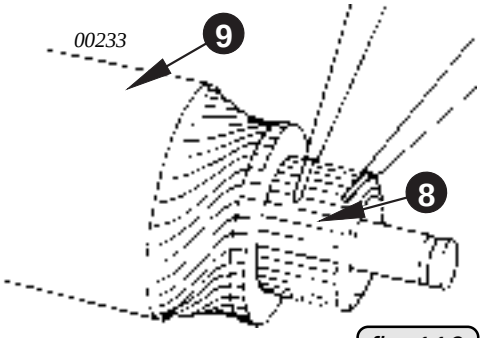


fig. 116

O-rings

Renew all o-rings ⓳ and oil seal ⓴ at overhaul of electric starter.

Starter housing

Visually check inner magnets ❷❶ for cracks.

Studs

Visually check both studs ❷❷ . They are to be removed only as required.

14.1.3) Electric starter reassembly

See fig. 113, 114 and 117.

Define the necessary number of shims ❻ to achieve the axial play ⑨ of the armature ❺, see para 15. Grease oil seal ❷⓪, the ball bearing ❿ and bearing bushing ❶❸. Insert armature into the bearing support❺, fit new O-ring 62x1,5 and push starter housing ❷ over armature.

Install carbon brush holder ❹ with springs. Fit the necessary number of shims ❻ onto armature shaft and the complete commutator support ❸ with new O-ring 62x1,5 on starter housing.

◆ NOTE: Take care for correct positioning and engagement of the guide pins.

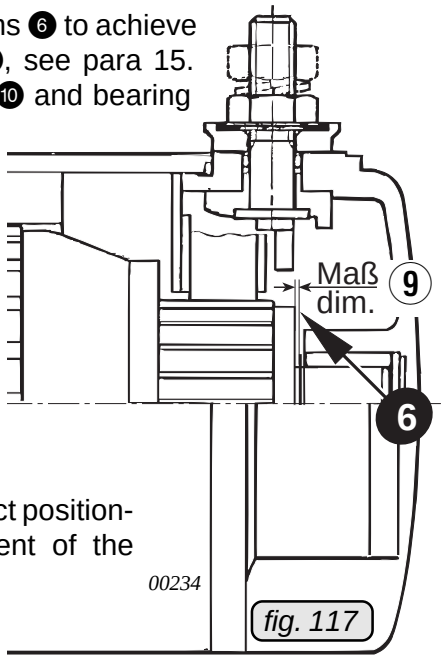


fig. 117

14.1.4) Electric starter mounting

See fig. 113.

Grease bearing ❿ slightly.Fit complete electric starter ❺ with new O-rings ❼ 4,7x1,4 and distance sleeves ❻ into the ignition housing ❹.

◆ NOTE: Take care that the electric starter does not come apart during insertion.

Tighten electric starter with washer ❸, lock washer A5 ❷ and hex. nut M5 ❶ and secure it with strap clamp 76 to ignition housing.

14.2) Sprag clutch

See fig. 118 and 120.

After removal of magneto hub and ignition housing, see para 13.3.3 and 13.3.4, the sprag clutch can be removed. Withdraw idle gear shaft ❶ and idle gear ❷ and both thrust washers 12,5x21,5x1 ❸ from both sides of the idle gear.

d01383

To determine wear, check the axial clearance of the sprag clutch housing. It should be dimension ⑩ in para 15. At no or too little axial clearance the sprag clutch may not disengage and the electric starter will be damaged.

Remove hex. nut ❹ M34x1,5 with socket wrench 46 a/f, *part no. 877 450*, from crankshaft.

◆ NOTE: The hex. nut ❹ has **left hand threads**!

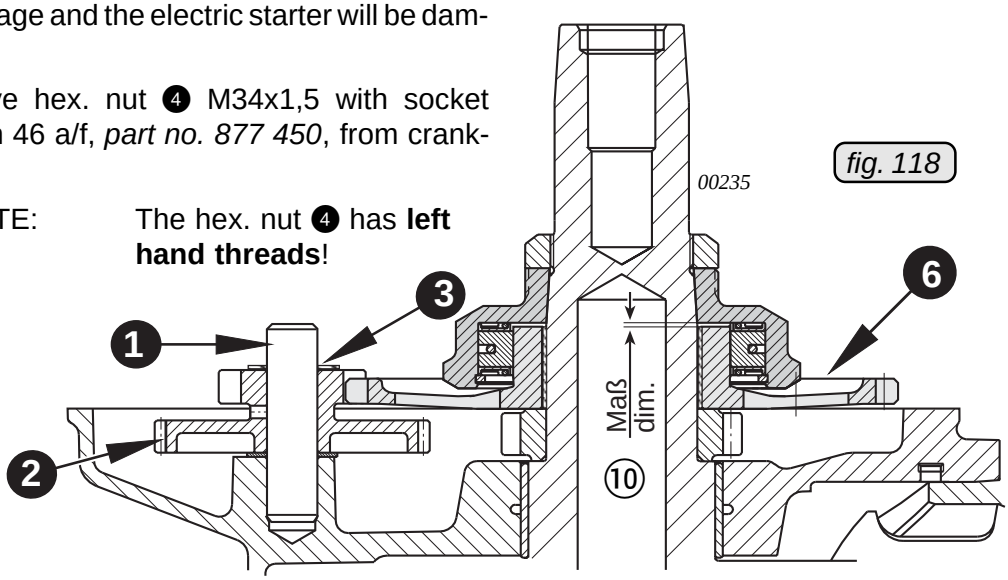


fig. 118

14.2.1) Sprag clutch removal

See fig. 119.

Insert protection piece, *part no. 877 410*, into crankshaft and remove sprag clutch housing ❺ with puller *877 375* from crankshaft. The freewheel gear ❻, the timing gear placed behind, the pump gear ❽ pressed onto the camshaft and the timing gear ❾ underneath can be removed only after splitting the crankcase.

Drive of mechanical rev. counter via worm gear ❼ pressed into camshaft.

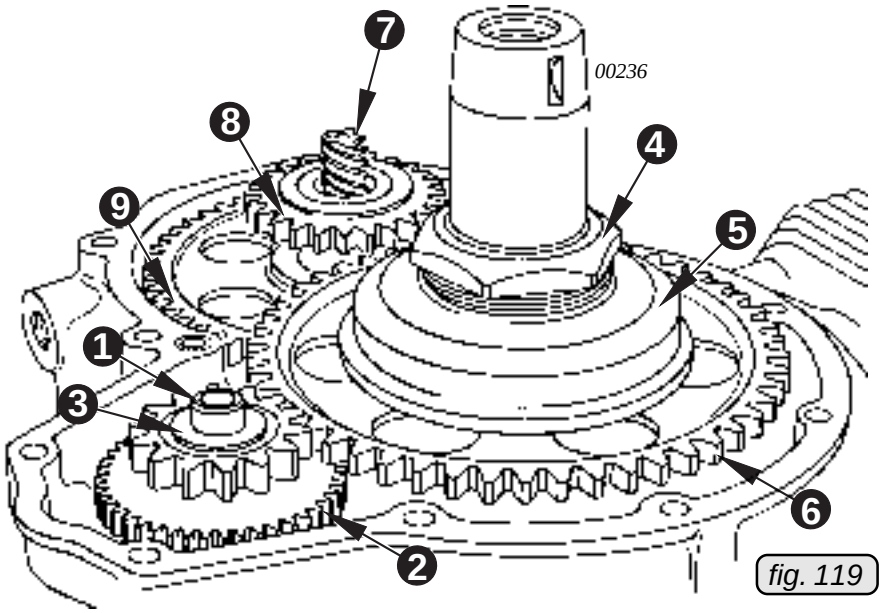


fig. 119

d01383

14.2.2) Sprag clutch disassembly

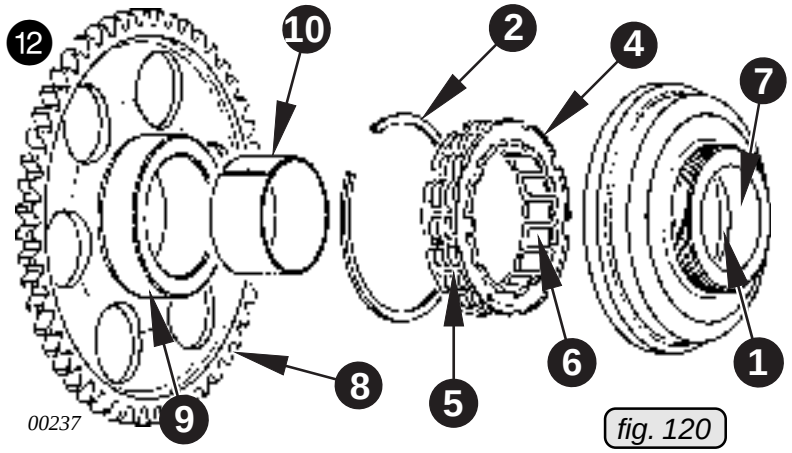


fig. 120

See fig. 120 and 121.

Visually check for accumulation of oil sludge in sprag clutch housing ❶. For cleaning, remove retaining ring ❷. Compress circlip ❸ in sprag clutch ❹ with circlip pliers and twist sprag unit out of the sprag clutch housing. Clean all parts. The circumferential helical spring ❺ must not be loose or wavy. Replace sprag unit if required.

The sprags ❻ must be freely moving and the surface must be free of scoring. Check engagement face in housing ❶.

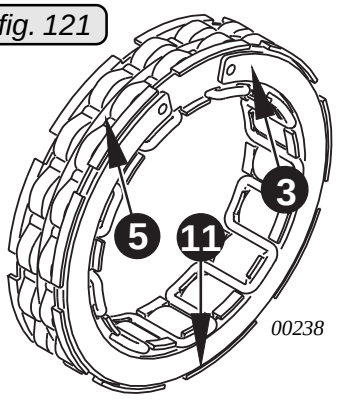
At detectable wear of gripping faces exchange corresponding parts. Inspect taper bore ❼ in housing. Verify teeth ❽ and sprag engagement face ❾ on free wheel gear and bearing bush ❿.

14.2.3) Sprag clutch reassembly

See fig. 118, 120, 121 and 122.

Place sprag clutch lubricated with motor oil into clutch housing with brake clip ❸ visible. At fitting of brake clip, compress slightly using circlip pliers and ensure that clip remains in position in the groove and engages fully on the catches ⓫ in sprag unit. Fit circlip ❷ in the groove ❶ with the bevel edge showing to the sprag clutch.

fig. 121



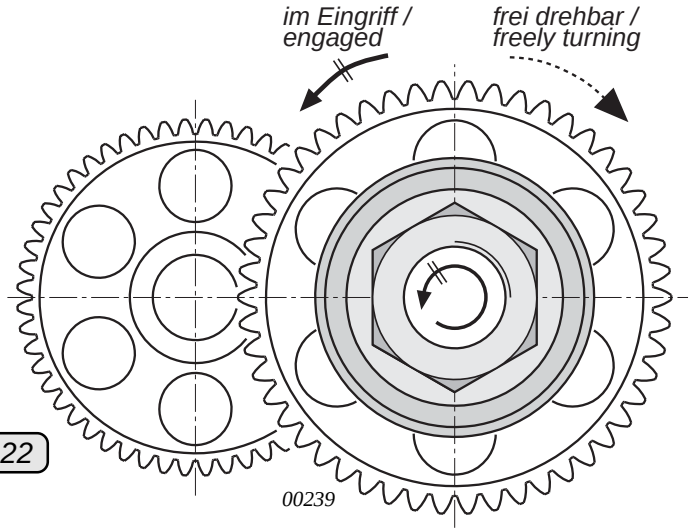


fig. 122

d01383

Lock crankshaft using fixing screw *241 965*. Degrease taper and threads of crankshaft and taper of clutch housing. Coat taper of clutch housing thinly with LOCTITE® 221 and fit on crankshaft. Turn freewheel gear ⓭ to facilitate aligning of the sprags ❻.

◆ NOTE: The freewheel gear ⓬ must engage on crankshaft ⓯ when turning counter-clockwise (left), looking towards magneto side of engine, and turn freely turning clockwise (right)!

Secure degreased hex. nut M34x1,5 with LOCTITE® 221 and tighten to 120 Nm (1060 in.lb).

◆ NOTE: The hex. nut has **left hand threads**!

◆ CAUTION: Check axial clearance ⑩ of free-wheel. See fig. 118 and para 15.

14.2.4) Reduction gear for electric starter

See fig. 123.

Inspect the toothing of the idle gear ❶. Deformed teeth ❷ generate a noise at engine start. Renew as required.

◆ NOTE: Commencing with model 95 the gear ratio has been changed from 44x14 to 50x11.

Place thrust washer ❸ 12,5x21,5x1 onto crankcase. Place intermediate gear ❶ lubricate intermediate gear shaft ❹. Fit thrust washer ❺ 12,5x21,5x1 on top of it.

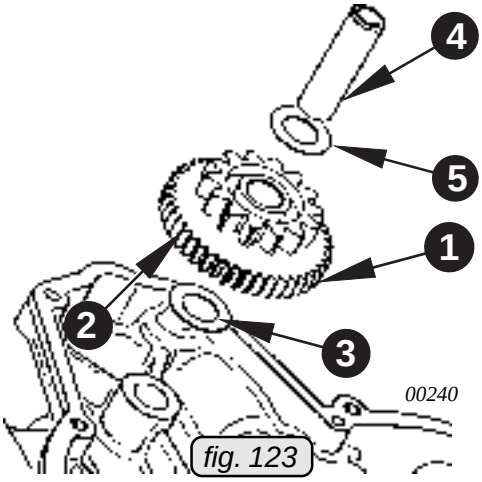


fig. 123

14.2.5) Ignition housing fitting

See para 13.3.9.

14.3) Rev. counter drive

See fig. 124, 125 and 126.

Driving gear of the mechanical rev. counter ❶ is offered as an option and it is driven via the worm gear ❷ pressed into the camshaft.

Remove Allen screw M5x16 ❸ and lock washer and withdraw rev. counter housing ❹ along with O-ring ❺ and rev. counter shaft ❻ from ignition housing, see para 13.3.9.

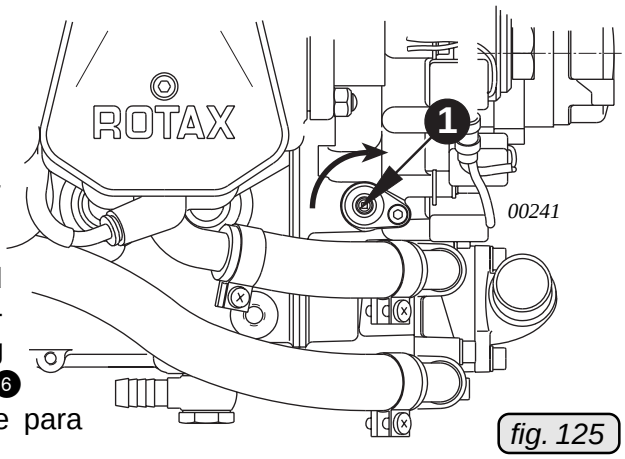


fig. 125

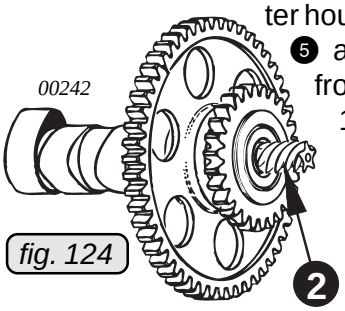


fig. 124

Inspect teeth ❼ and square end ❽ of rev. counter shaft. At oil leakage renew oil seal ❾ 6x11x3 resp. O-ring ❺. Press in new oil seal right down to stop in housing using punch, part no. *877 680*.

On engines without a mechanical rev-counter a cover plate is fitted instead of the rev-counter housing ❹.

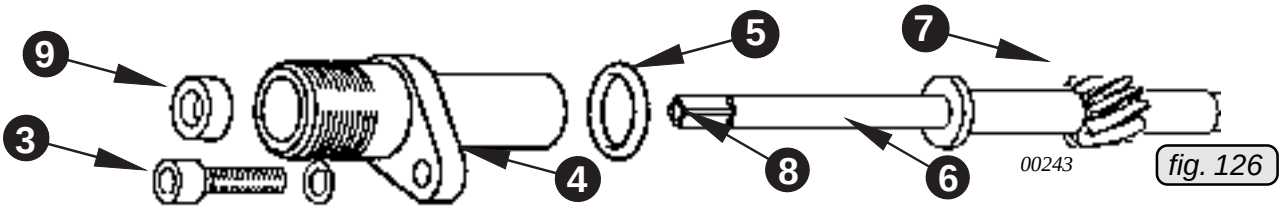


fig. 126

14.4) Propeller gearbox

See fig. 127, 128, 129 and 130.

Before removing the gearbox it is useful to check the slipping torque, see Maintenance Manual type 912 (Line Maintenance) Chapter 12-00-00 para 7.2.

Remove the remaining Allen screws M6 ❶ and 2 Allen screws M8 ❷ with lock washers crosswise from gear cover ❸. The gear cover is kept in position by 2 dowels. Screw puller ❹, part no. *877 660,* into the two M8 threads ❺ of gear cover. Now the complete gearbox can be pulled off with the impact puller ❻ without damaging the ball bearing and the propeller shaft.

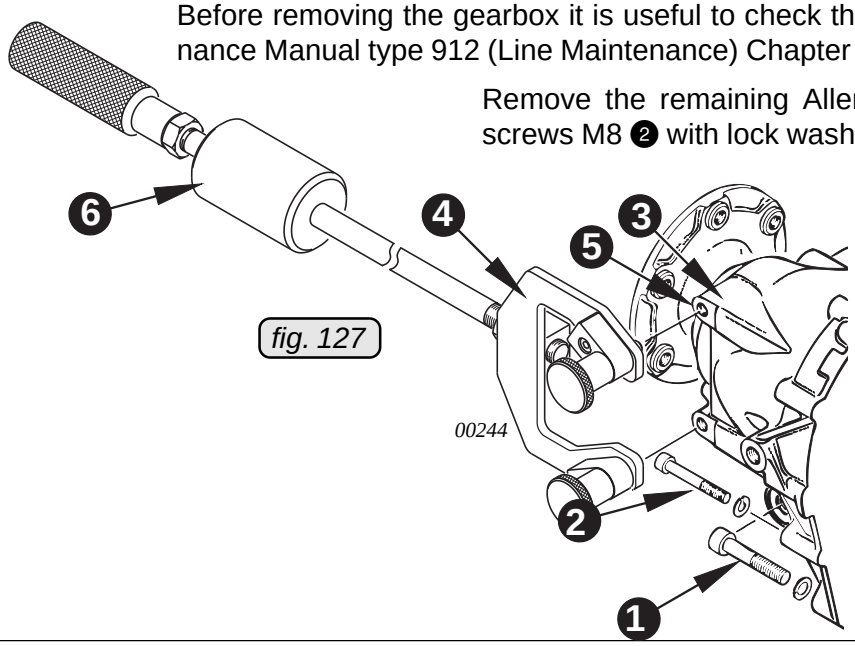


fig. 127

d01383

When the gearbox is loosened, it can be removed with 2 screwdrivers ❶ levering on the lugs ❷ provided on the gear cover.Do not lever on sealing face.

■ CAUTION: When removing the gearbox, take care not to damage the bearing seat and the oil ring contact surface of propeller shaft.

Remove hex. nut M30x1,5 ❸ (by turning clockwise) with wrench 41 a/f, part no. *877 445*, and the drive gear with friction washer ❹ from crankshaft. If required, lever drive gear gently off with 2 screwdrivers.

◆ NOTE: The hex. nut ❽ has **left hand threads**!

Make sure that both dowels remain with crankcase and not with gear cover.

■ CAUTION: The gear pair has a continuous 6-digit serial number which is shown on drive gear front side ❺ and on dog gear. The gears are paired as a set and must not be exchanged individually!

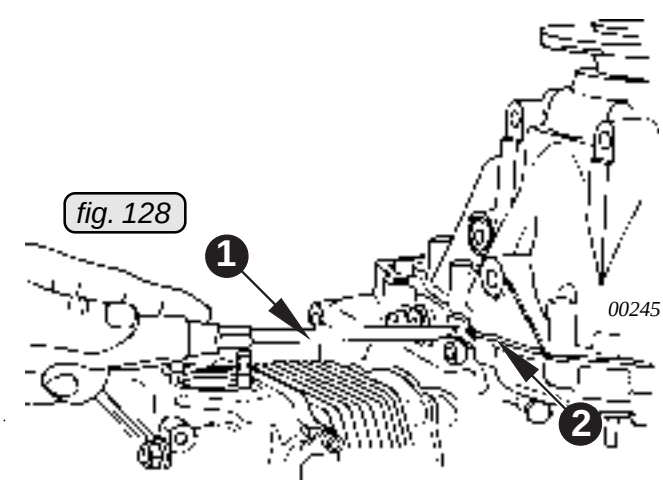


fig. 128

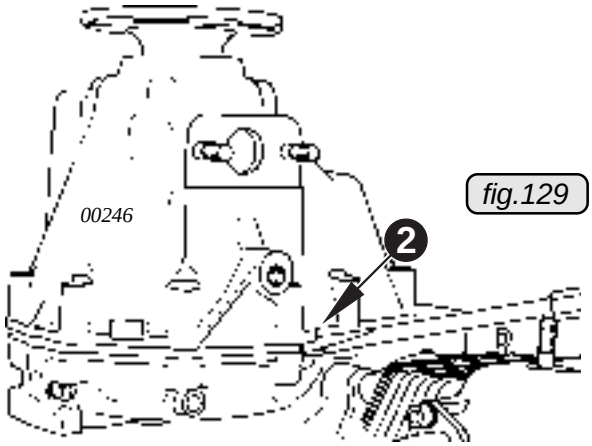


fig.129

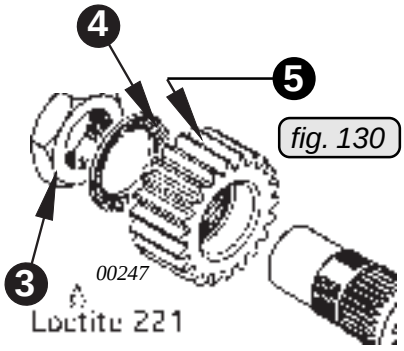


fig. 130

d01383

14.4.1) Roller bearing removal for configuration 1 and 2 only

See fig. 131.

After the propeller gearbox is removed, the crankcase side propeller shaft bearing and oil seal can be renewed if necessary. The roller bearing, sealing rings etc. can be easily removed after the crankcase has been disassembled.

Remove circlip ❶ with circlip pliers. Screw extractor ass'y ❷, part no. *877 615,* with 8 Allen screws M6x25 to the crankcase. Screw stud ❸ M10x45x20, part no. *941 180*, into the pull-in spindle ❹, part no. *877 580*, and screw hex. nut ❺ M24x1,5 onto the spindle.

For better guiding push the press-out tool ❻, part no. *877 592*, into the roller bearing ❼. Screw the Pull in spindle ❹ into extractor ❷ and fit the Pull in spindle in crankcase.

Push the pull-out plate ❽, part no. *877 560*, onto the stud at the backside of the crankcase and fix with hex. nut M10 ❾, part no. *242 091*.

Keep pull-in spindle with handle in position and turn hex. nut clockwise until the roller bearing ❼ with oil seal ❿ is pressed off the case. Unscrew hex. nut, remove pull-out plate with roller bearing and oil seal and withdraw spindle. Remove extractor ass'y from crankcase.

■ CAUTION: At this procedure the oil seal ❿ is damaged and must be renewed.

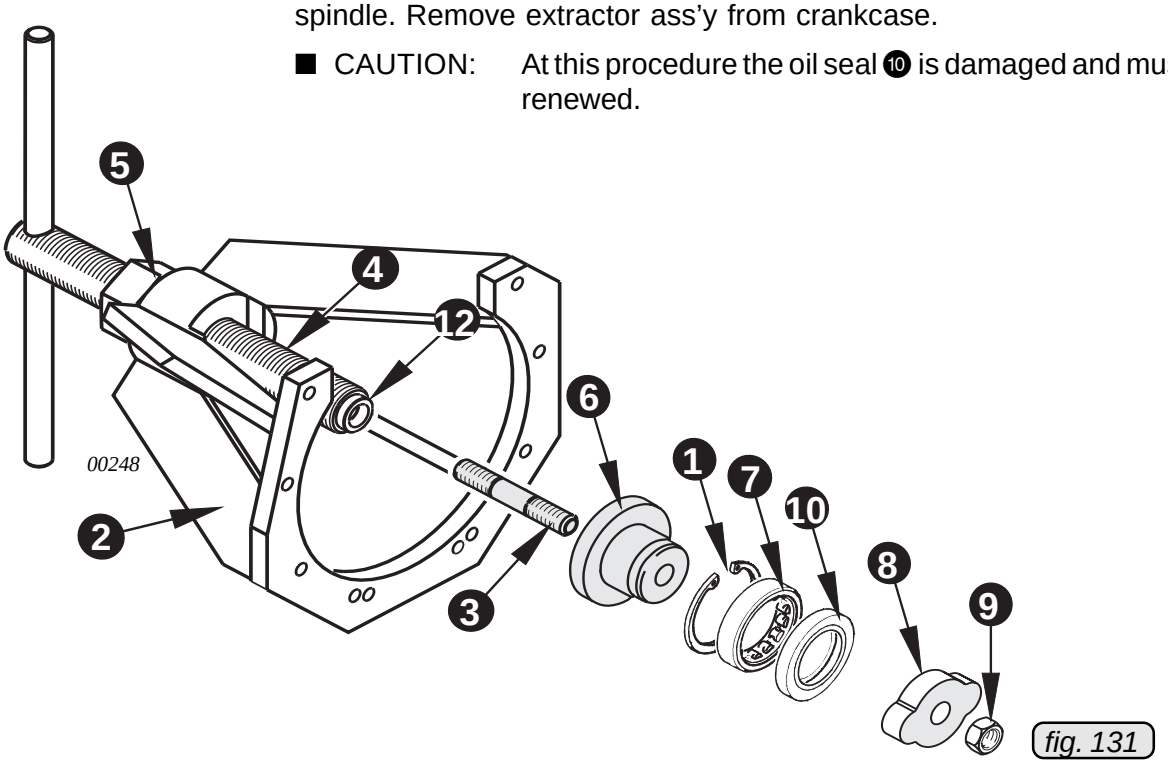


fig. 131

d01383

14.4.2) Roller bearing removal for configuration 3 only

See fig. 132.

After the propeller gearbox is removed ❸❼, the crankcase side propeller shaft bearing and oil inlet flange can be renewed, if necessary.

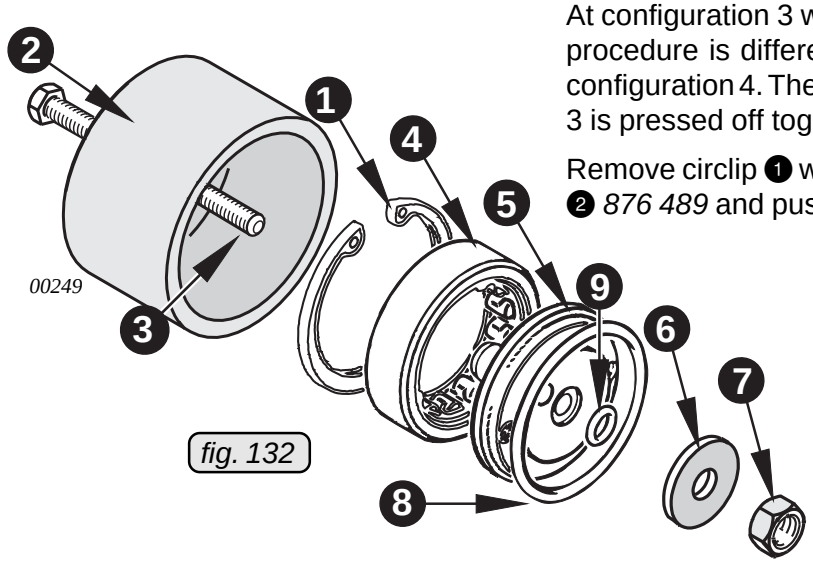


fig. 132

At configuration 3 with hydraulic governor the removal procedure is different from types configuration 2 and configuration 4. The roller bearing for type configuration 3 is pressed off together with the oil inlet flange ❺.

Remove circlip ❶ with circlip pliers. Position puller cap ❷ *876 489* and push hex. screw ❸ through cap, roller bearing ❹ and oil inlet flange ❺. At the opposite side fit washer ❻ and nut ❼. By turning hex. screw clockwise, the roller bearing is pressed off together with oil inlet flange. Detain nut ❼. Remove O-ring ❽ and both O-rings ❾.

14.4.3) Roller bearing removal for configuration 4 only

See fig. 133.

After the propeller gearbox is removed, the crankcase side propeller shaft bearing can be renewed, if necessary.

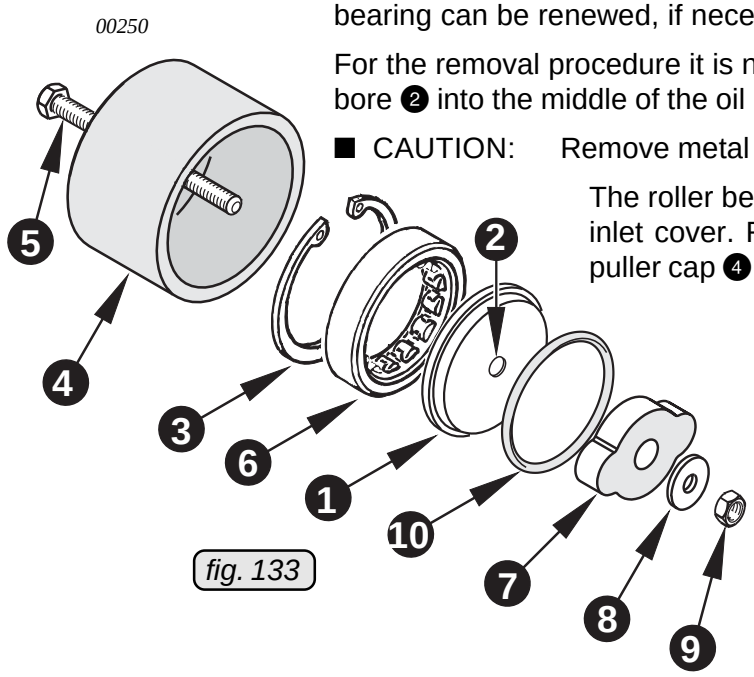


fig. 133

For the removal procedure it is necessary to drill a min. 6,2 mm (.24 in.) bore ❷ into the middle of the oil inlet cover ❶.

■ CAUTION: Remove metal chips carefully after drilling.

The roller bearing is pressed off together with the oil inlet cover. Remove circlip ❸ with circlip pliers. Fit puller cap ❹ *876 489* on gearbox side and push hex. screw ❺ through cap, roller bearing ❻ and the perforated oil inlet flange ❶. At the opposite side fit nut ❾ together with washer ❽. By turning hex. screw clockwise, the roller bearing is pressed off together with the oil inlet flange. Remove O-ring ❿.

d01383

14.4.4) Vacuum pump disassembly

See fig. 134.

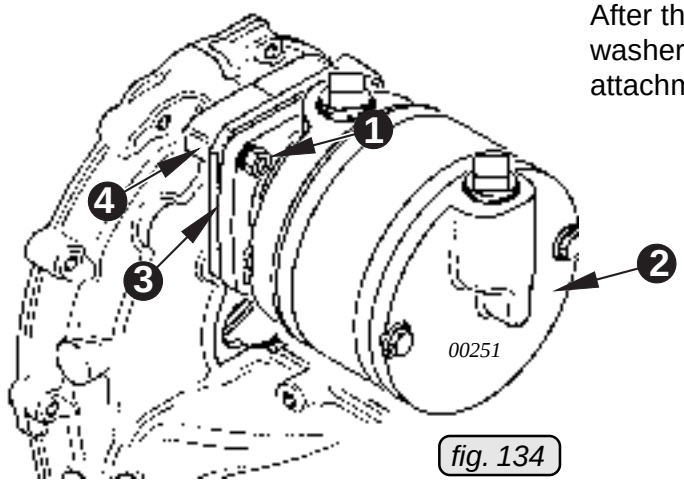


fig. 134

After the removal of the 4 nuts M6 ❶ along with washers the vacuum pump ❷, gasket ❸ and attachment flange ❹ can be taken off.

14.4.5) Vacuum pump drive disassembly

See fig 135.

Drive of vacuum pump via drive gear ❶ fitted on propeller shaft. Reduction ratio 22 : 29.

Check ball bearing ❷ and needle sleeve ❸. Check teething of drive gear ❶, vacuum pump gear ❹, drive sleeve ❺ and drive shaft of vacuum pump.

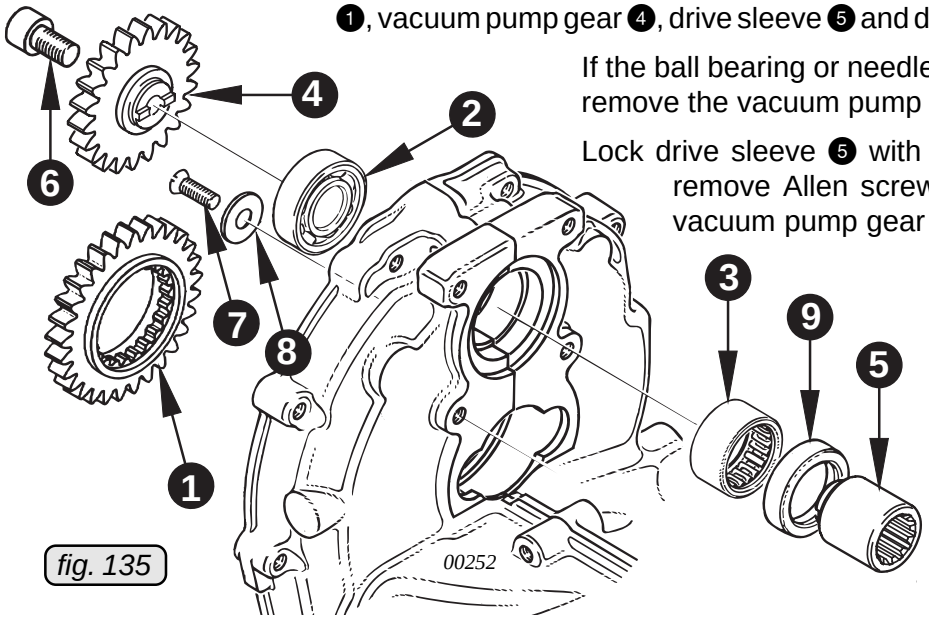


fig. 135

If the ball bearing or needle sleeve must be renewed, remove the vacuum pump as follows:

Lock drive sleeve ❺ with holder, part no. *242 660*, remove Allen screw ❻ M8x14 and withdraw vacuum pump gear ❹ with drive sleeve ❺.

Remove countersunk screw ❼ M5x12 with washer ❽ for ball bearing fixation.

Remove oil seal ❾ and press out needle sleeve and ball bearing with suitable step punch towards propeller flange. Clean bearing seat and check.

◆ NOTE: At this procedure the needle sleeve ❸, oil seal ❾ and ball bearing ❷ are damaged and must be renewed.

d01383

14.4.6) Drive for vacuum pump and hydraulic governor reassembly

See fig. 135, 136 and 137.

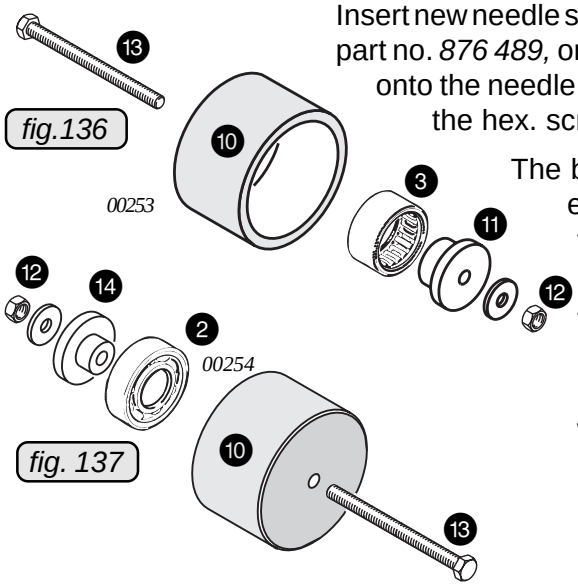


fig.136

fig. 137

Insert new needle sleeve ❸ lubricated with motor oil. Position puller cap ❿, part no. *876 489,* on gearbox side, place press-in tool, part no. *877 579* ⓫ onto the needle sleeve and fix with hex. nut ⓬ and washer. By turning the hex. screw ⓭ the needle sleeve is pressed in completely.

The ball bearing is pressed in with same procedure, however, the puller cap ❿, part no. *876 489,* is fitted on pump flange side, and the press-in tool ⓮, part no. *877 595,* is used.

Then press in new oil seal ❾ (grease sealing lip with motor oil) with assembly jig, part no. *877 276*. Apply LOCTITE® 221 to countersunk screw ❼ M5x12 and washer ❽ for ball bearing fixation and tighten.

Fit vacuum pump gear ❹ and drive sleeve ❺ and fix with holder, part no. *242 660*. Apply LOCTITE® 221 on Allen screw ❻ M8x14, fit and tighten to 25 Nm (220 in.lb.).

■ CAUTION: The length of the Allen screw ❻ M8x14 must be imperatively respected or it will interfere with the drive shaft for vacuum pump.

14.4.7) Vacuum pump

See fig. 138.

The vacuum pump serves as drive of pneumatic inertial navigation instruments.

◆ NOTE: The vacuum pump must not be dismantled and must be renewed completely, if necessary. Renewal at overhaul at the latest.

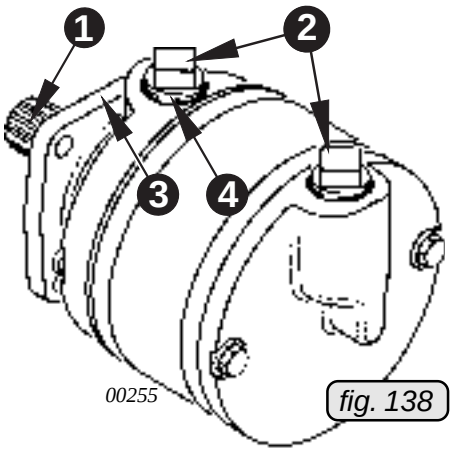


fig. 138

Remove and check toothing ❶, connections or plugs ❷ from the used vacuum pump. If in good order, re-use, but renew damaged ones as required. For fitting of hose connections, clamp vacuum pump with drive end downwards in vice using protective grips.

■ CAUTION: Clamp pump on flange ❸ only. Never clamp on pump housing as pump rotor would be damaged. Never install a pump which has been dropped!

Spray silicone on connection thread ❹ 3/8" NPT and let it dry. Do not use Teflon tape, sealing paint or thread grease at connections. Tighten connections exclusively by ring- or socket spanner and ensure correct positioning. Re-torque by 1,5 turns at the most.

d01383

14.4.8) Hydraulic governor disassembly

See fig.139 and 140.

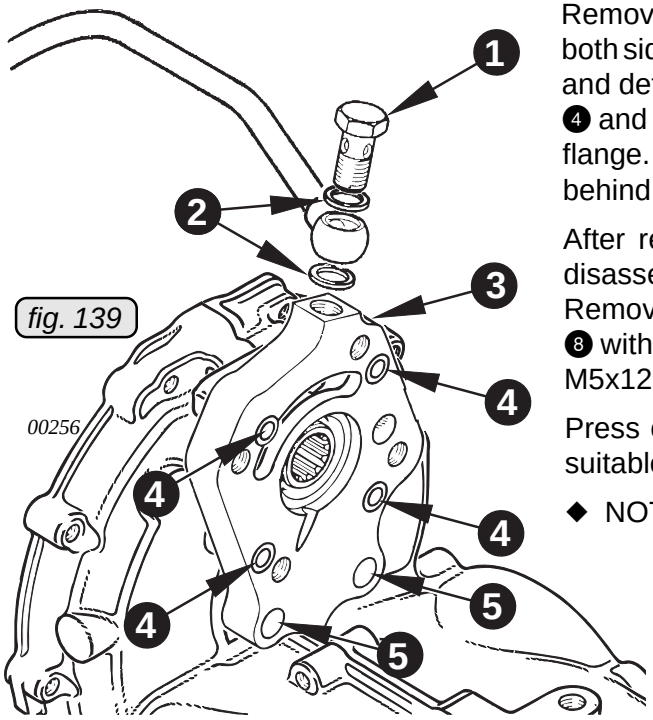


fig. 139

Remove banjo bolts M10x1 ❶ and sealing rings ❷ on both sides from governor flange ❸ and oil pump housing and detach oil line. Remove the 4 Allen screws M6x20 ❹ and the two Allen screws M6x16 ❺ securing oil inlet flange. Remove governor flange with O-ring 32x4 placed behind and spacer.

After removal of propeller gearbox the drive can be disassembled. Fix drive sleeve ❻ with holder 242 660. Remove Allen screw M8x16 ❼ and vacuum pump gear ❽ with drive sleeve ❾. Remove countersunk screw ❿ M5x12 with washer for ball bearing fixation.

Press out needle bearing ⓫ and ball bearing ⓬ with suitable step punch towards gearbox.

◆ NOTE: Needle bearing and ball bearing are dam aged by this procedure and must be replaced.

Check inner diameter ⓭ of propeller shaft and journal ⓮ of oil inlet flange. The wear will probably show as a flat area on the journal. Check teeth of drive gear and vacuum pump gear ❽. Visually check ball bearing ⓬ and roller bearing ⓰.

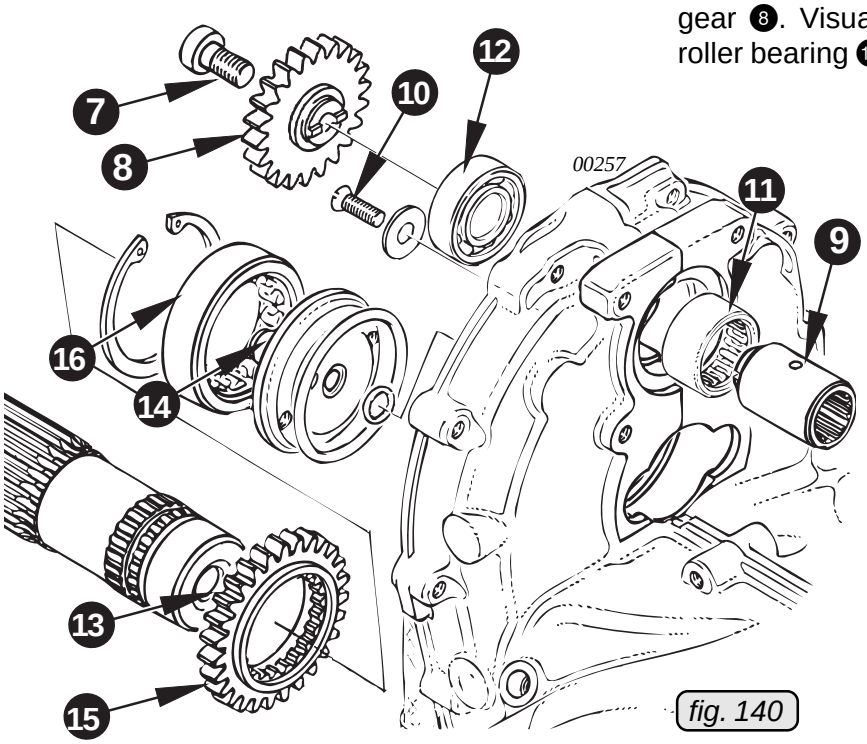


fig. 140

■ CAUTION: The fixation screw ❼ M8 for vacuum pump gear is for propeller governor drive **16 mm long** (.63 in.) and has a thin screw head. For vacuum pump drive, however, it is only **14 mm long** (.55 in.) with standard screw head.

Clean parts carefully and remove sealant residues. Check sealing surface and all oil bores in governor flange ❸ for free passage. Visually check needle bearing ⓫ as well as teeth and bearing surface of drive sleeve ❾. Care for clean connecting surface for oil pressure hose.

If service work is necessary on the propeller governor, it must be sent to the engine manufacturer.

d01383

dimension	new	wear limit

See para 15.

14.4.9) Drive for hydraulic governor reassembly

See fig. 141, 142 and 143.

Installation of needle sleeve and ball bearing as described in para 14.4.6. Grease new O-ring ❶ and insert it together with oil inlet flange ❷ into crankcase. Take care that both M6 threads are horizontal and the opening is in a position to let the oil pass. For better positioning tighten governor flange only slightly with 2 Allen screws M6x20 and oil inlet flange with 2 Allen screws M6x16.

Fit extractor ❸, part no. *877 615,* onto crankcase, place press-in tool ❹ *877 590* into roller bearing ❺, place it on centering ❻ and press it with spindle ❼ fully into crankcase. Fit circlip in groove with its sharp edge towards outside.

■ CAUTION: The oil inlet flange ❷ must be fitted well aligned and the O-ring ❶ must not be squeezed.

Remove governor flange ❽ again. Fit distance sleeve ❾ and new O-ring ❿ 32x4 into crankcase. Insert one each O-ring ⓫ 7x2 into the oil inlet flange and governor flange, keeping them in position with some multi-purpose grease LZ. Fit governor flange and fix it with 4 Allen screws ⓬ M6x20 with LOCTITE® 221 on the crankcase and 2 Allen screws ⓭ M6x16 on oil inlet flange.

■ CAUTION: Longer screws would damage the oil inlet flange!

◆ NOTE: Tightening torque 10 Nm (90 in.lb). Secure the 2 Allen screws for oil inlet flange and the 4 Allen screws for the governor flange with LOCTITE® 221.

Install hydraulic governor ⓮ and new gasket ⓯ with 3 Allen screws ⓰ M8x40 and 1x M8x35 with lock washers , tighten to 22 Nm (195 in.lb). Take care that teeth engage.

◆ NOTE: Fit screw ⓱ M8x35 on left side, bottom.

Install oil pressure line ⓲ free of stress on governor flange and on oil pump housing and with hose clamp on fuel pump.

The banjo screws tighten to 17 Nm (150 in.lb).

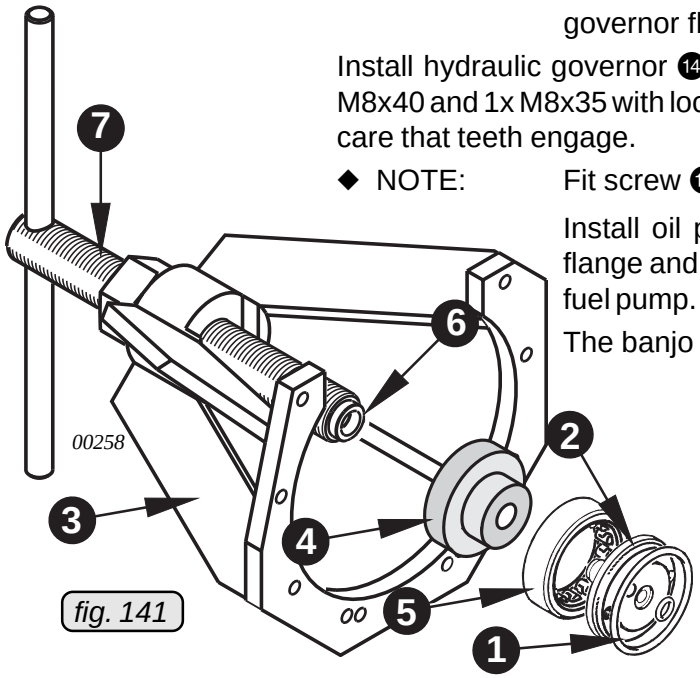


fig. 141

d01383

The plug screws ⓳ and ⓴ normally remain closed. On position ⓳ a pressure gauge for governor pressure check can be connected. The maximum regulating pressure is between 22 and 25 bar (320 ÷ 360 p.s.i.). The governor starts regulating at 3600 ÷ 3700 rpm.

At malfunction of propeller governing suspect the following as possible cause:

— adjustment of governor actuation

— function of propeller governor

— insufficient oil pressure, oil pressure fluctuations

— propeller pitch control.

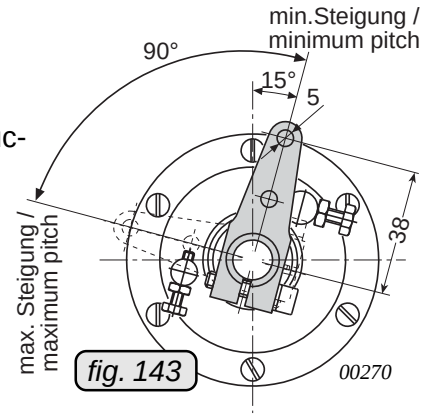


fig. 143

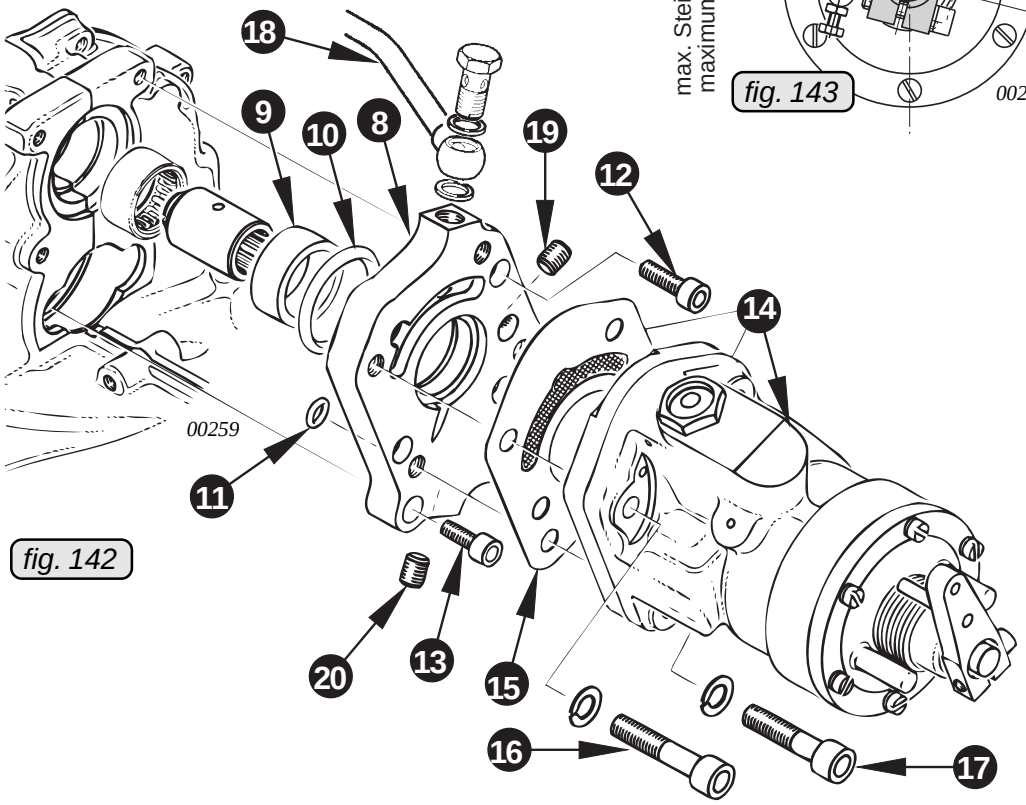


fig. 142

14.4.10) Propeller gearbox disassembly

See fig. 144, 145 and 146.

Place gearbox under suitable fixture ❶ and put pressure on dog gear ❷ via yoke, part no. 876 885, until ring halves ❸ come free and can be removed.

■ CAUTION: Depress the dog gear only so far that free movement of this gear is still warranted, as any further depression might destroy the gear cover.

d01383

Now release pressure from dog gear by turning spindle ❹ back and remove gearbox from fixture. Remove drive gear ❺, thrust washer ❻ and dog gear. Force apart bush ❻ with circlip pliers and withdraw from propeller shaft.

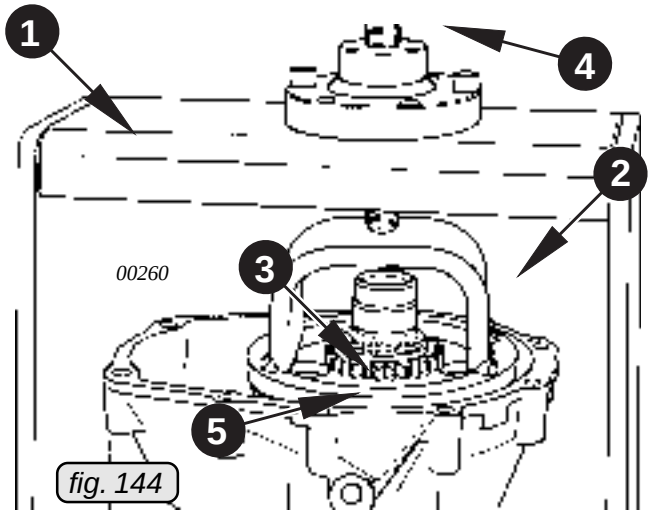


fig. 144

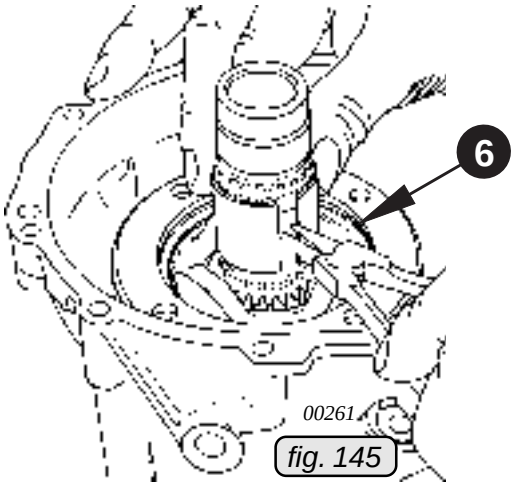


fig. 145

■ CAUTION: Do not overstress bearing bush ❻, otherwise it will become unusable.

Overload clutch disassembly

Remove overload clutch ❶, 3 disk springs ❷ 80x35x3, step sleeve ❸, washers ❹, eccenter ❺ for fuel pump and distance sleeve ❻.

With design year 1992 the inner centering ❸ of the disk springs was introduced.

◆ NOTE: For an intermediate periode the backlash between the dogs was changed from 30° to 15°. In the course of standardizing of the gearbox the backlash was changed again to 30°, and the gear width, crankshaft and gearbox housing was modified.

Refer to: standardization of gearbox for ROTAX® 912/ 914, SL 912-002.

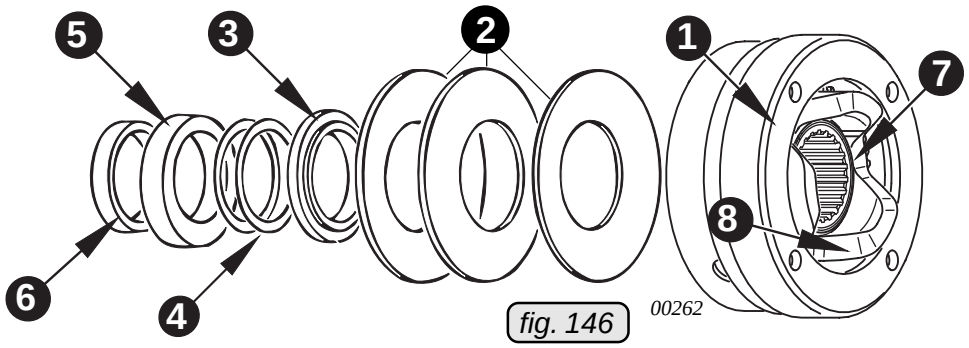


fig. 146

d01383

14.4.11) Propeller shaft disassembly

See fig. 147 and 148.

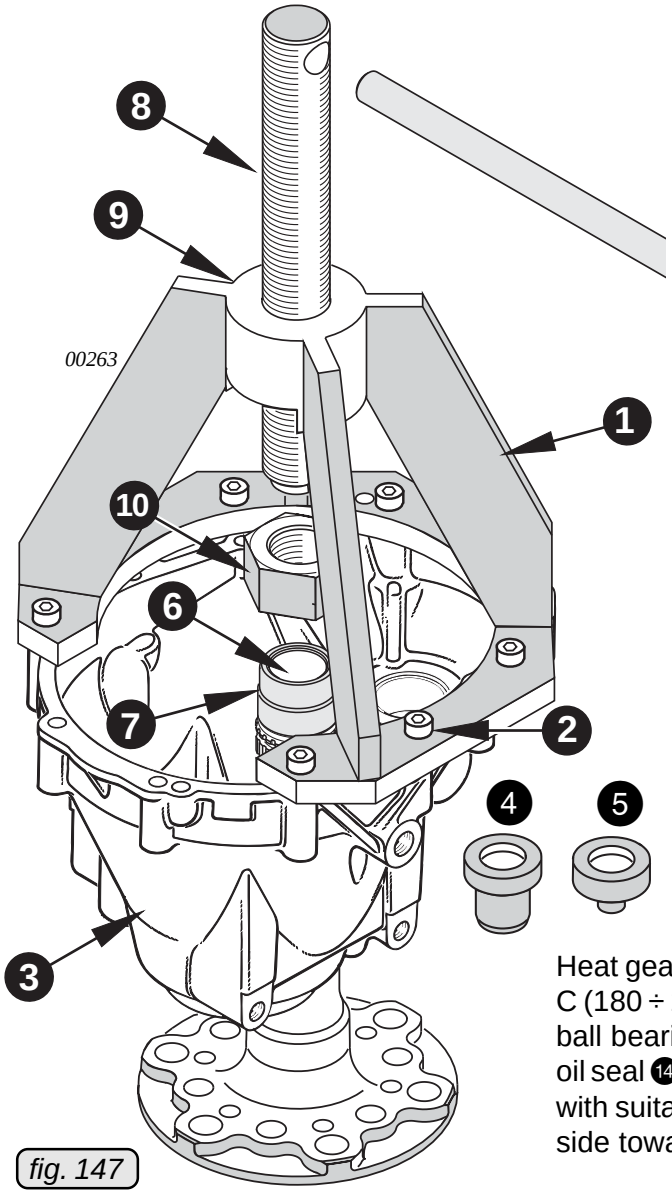


fig. 147

Place gear cover on a suitable fixture and press propeller shaft off with a hand press. To press off the propeller shaft, alternatively the extractor ❶, part no. *877 615* can be used.

Screw extractor with 6 x M6 screws ❷ onto gear cover ❸ and place protection piece ❹, part no. *877 605 (* for engine version configuration 2) or ❺, part no. *877 600* (for versions configuration 3 and 4) onto the end ❻ of propeller shaft ❼.

Insert spindle ❽ into the support ❾ of the extractor ❶ and screw hex. nut ❿ M24x1,5 from inside onto the spindle ❽. By turning the spindle clockwise, the propeller shaft is pressed off the gear cover.

■ CAUTION: The protection piece ❹ or ❺ must be used without fail as the machined internal diameter of propeller shaft will be damaged. If the propeller shaft will be removed the ball bearing should be renewed.

For removal of ball bearing ⓫ unscrew the 4 hex. screws ⓬ M7x16 with washers ⓭ from gear cover ❸.

Heat gear cover to 80 ÷ 100° C (180 ÷ 210° F) and remove ball bearing ⓫ together with oil seal ⓮ and radius shim ⓯ with suitable punch from outside towards inside.

■ CAUTION: At this procedure the oil seal ⓮ and the ball bearing ⓫ is damaged and must be renewed.

◆ NOTE: Commencing with model 1995 onwards size of oil seal ⓮ was changed from 40x52x7 into 40x55x7 and hex. hd. screws ⓬ from M6 to M7.

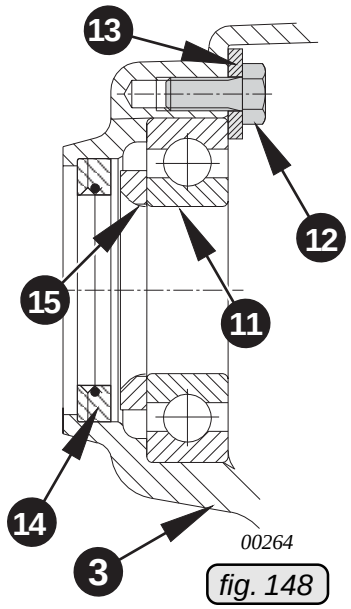


fig. 148

d01383

14.4.12) Gearbox components check

See fig. 149, 150, 151, 152, 153 and 154.

Clean disassembled gearbox with kerosine or gasoline and check the following components:

— Verify crankshaft bearing bushing ❶ fitted in gear cover, for inside diameter ⑪ and tight fit, see para 15.

— Take dimensions of both bearing seats ❷ and ❸ on propeller shaft. See dim. ⑫ and dim. ⑬ in para 15. Inspect oil seal contact area ❹ and ❺. Verify propeller shaft between centres for straightness and propeller flange for out-of-true ⑭, see para 15.

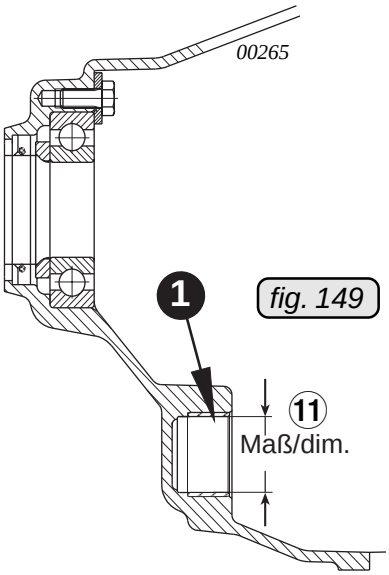


fig. 149

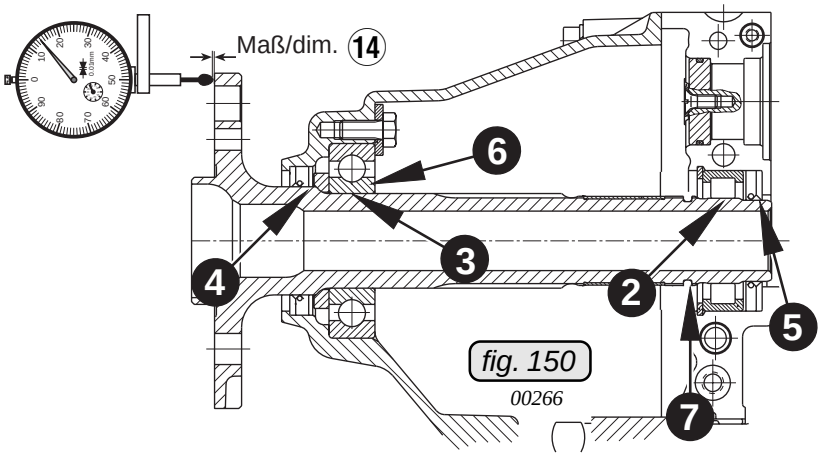


fig. 150
00266

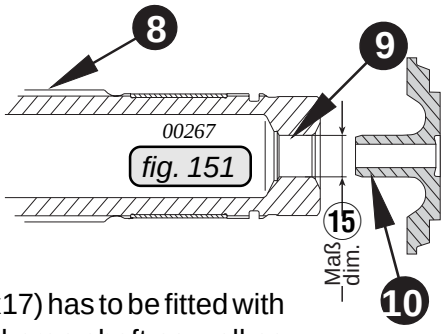


fig. 151

— The surface of propeller shaft must be free of fretting corrosion on the bearing seats ❷ and ❸. The ball bearing ❻ 6207 E (35x72x17) has to be fitted with a press fit between inner race and prop shaft as well as with a press fit between outer race and gearbox cover. Inspect groove ❼ for ring halves and teeth ❽ for wear or damage.

On configuration 3 check the inner diameter ❾ of propeller shaft in the area of oil inlet flange ❿, see dim. ⑮ in para 15.

Inspect propeller shaft for cracks by magnetic particles inspection method (MPI), see para 11.4. Check tangential intensity of magnetic field with test instrument DEUTROMETER® 3870. Nominal value is 10 ÷ 50 A/cm. At indication of cracks renew the respective part. Clean and demagnetize the part. The maximum admissible remaining magnetism must not exceed 1,2 A/cm. Register the results of the magnetic particle inspection in the respective Form Sheet, see para 16.3.

d01383

— Visually inspect dog gear ⓫ and dog hub ⓬ or pitting on gear teeth and/ or ramps ⓭. Ensure that ramp tops of dog gear are clearing valley of dog hub. Check gap ⑯ between ramp top and valley, see para 15. Slight wear and pitting on the dogs is permissible.

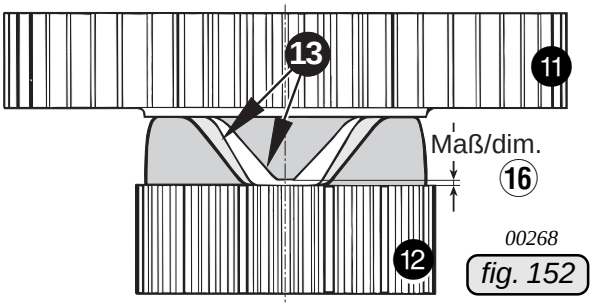


fig. 152

— Inspect teeth of drive gear ⓮ for wear and damage.
— Inspect eccenter for fuel pump and pump plunger for wear, see para 13.1.5.
— Check step collar for wear.
— Measure thickness of plastic thrust washer ⓰, between dog gear ⓫ and drive gear ⓯, see dim. ⑰ in para 15.
— Check length of dog gear bush ⓱ (of hardened steel) for wear.
— Visually check ring halves ⓲ for damage and wear, renew as required.
— Check the disk springs ⓳. At visible wear of disk springs in the contact area ⓴ they have to be renewed. Check dimension ⑱ of the released disk spring. See para 15.

dimensions	**new mm (in.)**	**wear limit mm (in.)**

See Dimension Sheets in para 15.

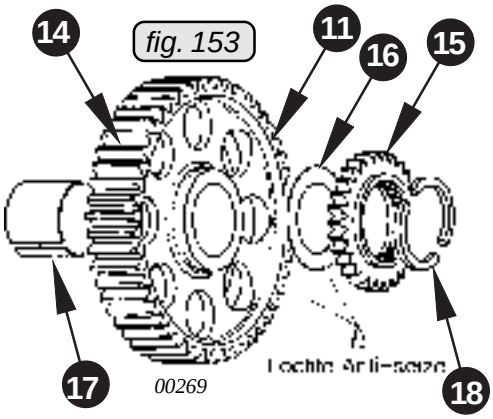


fig. 153

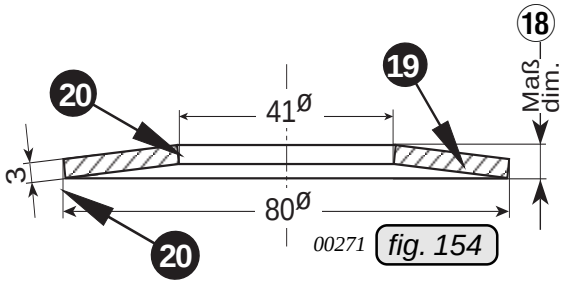


fig. 154

d01383

14.4.13) Propeller gearbox refitting

See fig. 155, 156 and 157.

Heat up gear cover ❶ in oven to approx. 100° C (214° F), insert oil seal ❷ 40x55x7 (sealing lips lubricated with motor oil) from the inside, using punch, part no. *876 518*. Add distance ring ❸ 36x50x5,5 with rounded side ❹ towards oil seal. Press in ball bearing ❺, utilizing press-ring, part no. *877 320,* and insertion punch, part no. *877 275*. Fix bearing in position, using 4 hardened washers ❻ 7,2/18,8/3 and hex. screws ❼ M7x16.

◆ NOTE: Secure screws with LOCTITE® 221 and tighten to 15 Nm (135 in.lb).

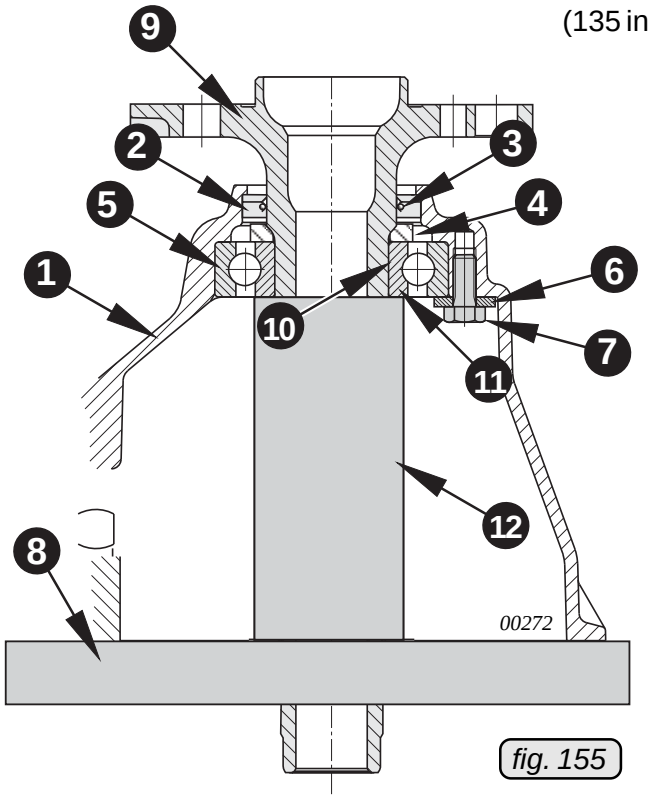


fig. 155

If fitted pull out both dowel pins from gear cover and place gear housing on a suitable support ❽ with a recess for the propeller shaft. Apply LOCTITE® Anti-Seize to bearing seat ❿ 35 mm (1,4 in.) diameter and press propeller shaft ❾ from outside into gear cover.

■ CAUTION: Do not tap!

Make absolutely sure to support the inner ring ⓫ of the bearing with suitable tube ⓬. It is an advantage if gear cover is still warm at this stage.

Turnaround gearcover. Fit distance sleeve ⓭ 35,2x42x8 and eccenter ⓮ for fuel pump. Then fit step collar ⓯ with diameter 40,8 mm (1,6 in) facing towards disk spring, 2 disk springs ⓰ placed against each other and the 3rd disk spring ⓱ with the back facing the previous disk spring. Take care that the disk springs rest on the centering collar ⓲. Apply LOCTITE® Anti-Seize to teeth of pre-assembled overload clutch ⓳ and slide into position on propeller shaft. Carefully fit bearing bush ⓴ lubricated with motor oil on propeller shaft, using circlip pliers. Apply LOCTITE® Anti-Seize on dogs of dog gear ㉑ and fit it. Slide plastic thrust washer ㉒ 33,2x51x1,2 coated on both sides with LOCTITE® Anti-Seize, and drive gear ㉓ onto propeller shaft.

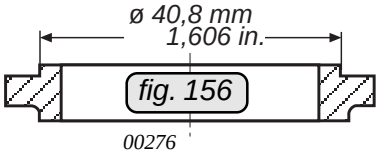


fig. 156

■ CAUTION: If the disk springs are not fitted centrically, the dog gear cannot be depressed enough to allow insertion of the ring halves. Do not increase the press force, but disassemble the gearbox again and fit disk springs better centered.

◆ NOTE: Apply LOCTITE® Anti-Seize on the contact surfaces of the disk springs, on the dogs and the tooth profile of the propeller shaft.

d01383

14.4.14) Disk spring pre-tension adjust

See fig. 157 and 144.

With springs in the released state, the face ㉔ or the ring halves must be in line with the upper edge ㉕ of the groove in propeller shaft. Compensate the difference by using shims ㉖ placed without fail between eccenter collar ⑭ and step collar ⑮.

After pre-tensioning of disk springs, depress dog gear ㉑ with assembly ring, *part no. 876 885*, until the ring halves can be inserted. Insert ring halves and release disk springs, see para 14.4.10.

■ CAUTION: Never depress springs completely, otherwise the dog gear will damage the gear cover. The ring halves must be completely inserted in the groove on propeller shaft!

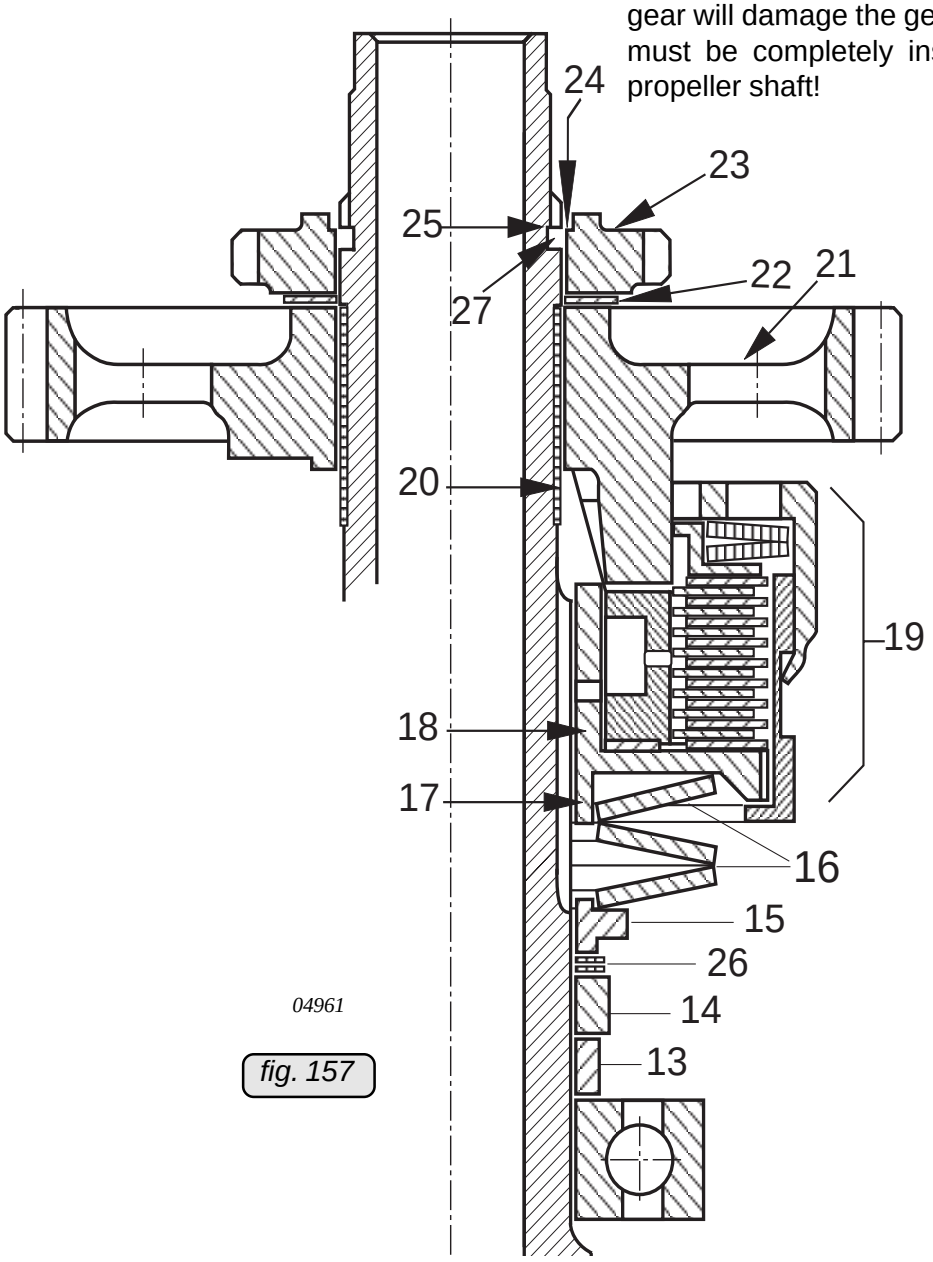


fig. 157

d01383

14.4.15) Propeller gearbox installation

See fig. 158, 159 and 202.

Check the crankshaft ❶ on power takeoff side for out-of-roundness, see dim. ⑲ in para 15. Slide drive gear ❷ onto crankshaft ❸. Fit friction washer ❺ VS 30 and hex. nut ❹ M30x1,5 secured with LOCTITE® 221. Torque to 200 Nm (1770 in.lb).

■ CAUTION: Dog gear and drive gear are paired and marked with a continuous serial number ❻ and must not be exchanged individually.

◆ NOTE: Verify alignment of crankshaft see fig. 202 and dim. ㉙ in para 15. Before rotating the crankshft remove one spark plug per cylinder. At excessive out of roundness, remove hex nut ❹ M30x1,5 and check again. If not out of tolerance replace hex nut ❹ M30x1,5 and friction washer ❺ VS30.

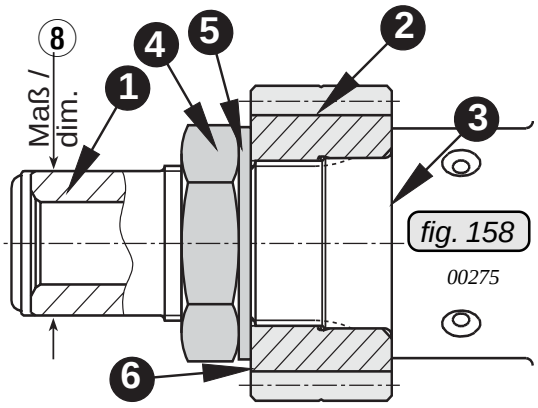


fig. 158
00275

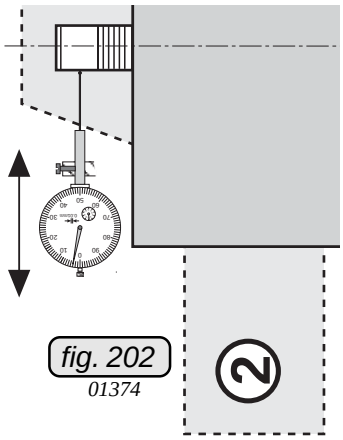


fig. 202
01374

Clean the sealing surfaces of gearbox and and crankcase. Insert both dowels ❹ 6x20 into crankcase. Lubricate oil seal 30x52x7 (sealing lip) for propeller shaft in crankcase and bearing bore for propeller shaft with motor oil.

◆ NOTE: There is no oil seal fitted on types 912 configuration 3 and 912 configuration 4!

Keep the rollers of the roller bearing in position with multi-purpose grease LZ to facilitate assembly of propeller shaft.

Position gear cover with completely pre-assembled gear unit, previously coated on sealing surface with sealing compound LOCTITE® 574.The propeller shaft or the drive sleeve must be turned slightly to allow engagement of the drive gear. By gently tapping on the gear cover with a plastic mallet (not on propeller shaft) the gearbox is fitted on crankcase.

d01383

◆ NOTE: If at a gap of approx. 10 mm (.4 in.) (gear cover to crankcase) resistance, is felt the rollers must be better aligned.The drive sleeve must be turned slightly to allow engagement of the drive gear in the vacuum pump gear.

■ CAUTION: If excessive force is applied at assembly, the roller bearing or the drive for vacuum pump or hydraulic governor can be damaged. If oil gets on the sealing surface due to difficult assembly, clean it and apply again sealing compound LOCTITE® 574.

Tighten gearbox evenly with 2 Allen screws M8x45 and 8 Allen screws ❼ M6x45 with lockwashers crosswise. Tightening torque for M8 = 25 Nm (220 in.lb) and for M6 = 10 Nm (90 in.lb).

Check gear backlash with dial gauge ❽ radially on propeller flange ❾, see dim. ⑳ in para 15.

If the studs ❿ for attachment of fuel pump ⓫ have been removed, fit the 2 studs M8x23/14 secured with LOCTITE® 221 into the gear cover and tighten to 8 Nm (70 in.lb).Install fuel pump with insulating gasket ⓬ and tighten with lockwasher and hex. nut ⓭ M8. Torque to 15 Nm (133 in.lb).

Remove crankshaft locking screw and screw in crankshaft plug screw with Cu sealing ring and tighten to 22 Nm (195 in.lb). For inspection turn crankshaft with wrench 24 a/f on hex. screw on magneto side.

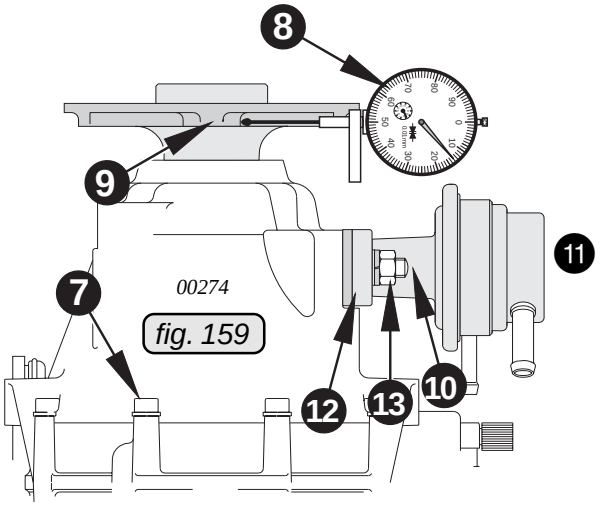


fig. 159

d01383

14.5) Cylinder head removal

See fig. 160 and 161.

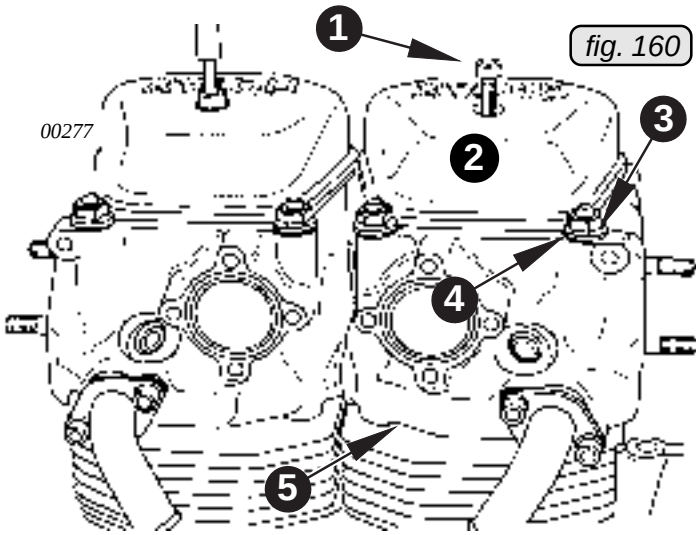


fig. 160

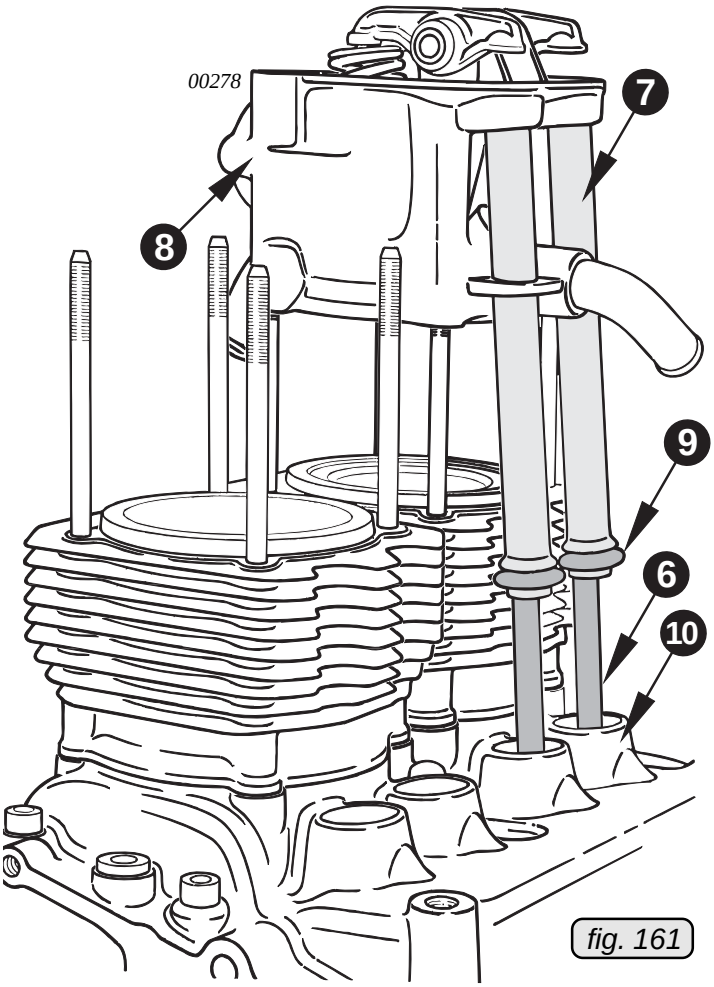


fig. 161

d01383

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

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

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

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

■ CAUTION: Do not damage sealing surface!

Keep both push rods ❻ in oil return tubes ❼ in position and remove cylinder head ❽. The oil return tubes remain with the cylinder head. Remove O-rings ❾ 16x5 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. Lay aside push rods, coordinated to cylinder heads by numbers to avoid any mix up at reassembly.

14.5.1) Cylinder head disassembly

See fig. 162.

If the cylinder head is not removed and the rocker arms should be dismantled, turn crankshaft to set the piston of the respective cylinder to ignition T.D.C. and to have only little pressure 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 collar nut may be in an unfavourable position as to prevent removal of the rocker arm shaft. In this case loosen the nut.

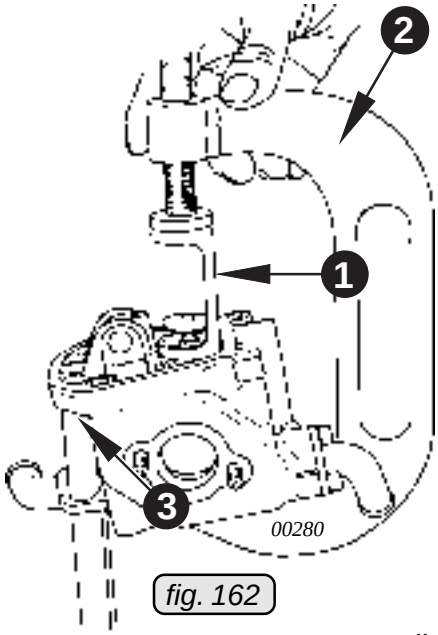


fig. 162

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 the removal of valves, clear off burrs which may be present on valve stems to prevent damage to valve stem seal and valve guide. Mark valves coordi nately.

Repeat this procedure for the second valve and clean cylinder head.

Check oil return tubes ❷ for leaks (visual check). At leaks in the area ❸ the tubes affected must be renewed. For this procedure, heat cylinder head to approx. 180° C (356° F). Extract tubes and remove any glue residues from bore. Apply LOCTITE® 648 on the new oil tubes in the area of the two grooves and push tubes into position in the cold cylinder head.

◆ NOTE: Apply LOCTITE® only on the cold part!

Prior to removal of the coolant elbow mark or take dimensions of its location to ensure proper position at re-installation. Heat cylinder head to approx. 80-100°C (180-210°F) and unscrew coolant elbow. Remove residues of securing agent with a tapping drill M18x1 (part no. 877 570) and check threads. Apply LOCTITE® 648 on cylinder head and on new coolant elbow and screw elbow into the cold cylinder head. Allow cylinder head to cure for approx. 10 minutes at 80° C (176° F).

Carbon deposits on the sealing surface to the cylinder, should be removed carefully with lapping fleece or solvent.

◆ NOTE: At reassembly coat cylinder sealing face thinly with LOCTITE® 221.

At slight wear, valve and valve seat may be re-lapped, using emery paste. Because of seat armour, restrict re-lapping to 0,2 mm (.008 in.) max.

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 is allowed.

Renew valve stem seals. If the engine has been "run hot", check in any case hardness of cylinder head material, see para 14.5.7.

14.5.2) Valve guides

See fig. 163 and 164.

Check diameter of valve stem ❶ and int. dia. of valve guide ❷ dim. ㉒ and dim. ㉑ in para 15.

If wear limit is reached, renew valve guide.

For this procedure sent the cylinder head to an authorized overhaul facility.

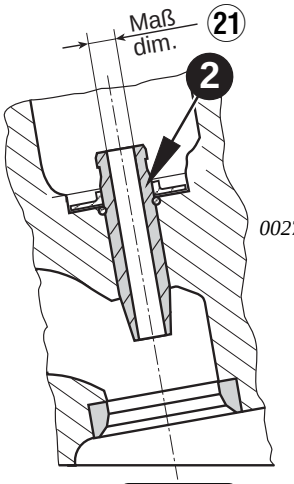


fig. 163

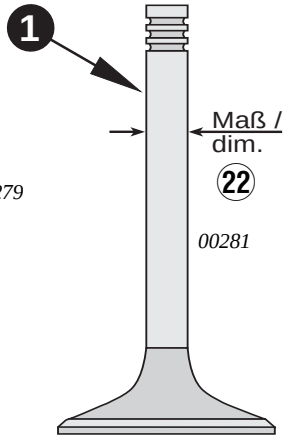


fig. 164

dimensions (in.)	new mm (in.)	wear limit mm

See Wear Limits in para 15.

14.5.3) Valve seats

See fig. 165.

Ensure sealing surfaces ❶ of valve seats are clean. If necessary, re-lap using emery paste, see para 11.7.16. Check Imprint width, see dim. ㉓ in para 15. At presence of burned spots or deformation, send cylinder head for overhaul to an authorized overhaul facility.

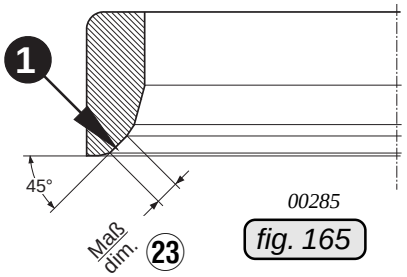


fig. 165

dimensions (in.)	new mm (in.)	wear limit mm

See Wear Limits in para 15.

d01383

14.5.4) Valves

See fig. 166.

Clean valves and check valve head ❶ for wear. Place valve on V-blocks ❷, roll them for checking out-of-true with dial gauge (max. admissible out-of-true, measured on valve head, see dimension ㉔ in para 15.

The sealing surface on the valve head is armoured and must **not be** reworked, seal-lapping by emery paste is allowed only, see para 11.7.16. Renew valve as necessary. Minimum rim thickness ❹ of the valve head is 1,2 mm (0,047 in.). Check holding grooves ❺ on valve stem. Check valve cotters, replace as necessary.

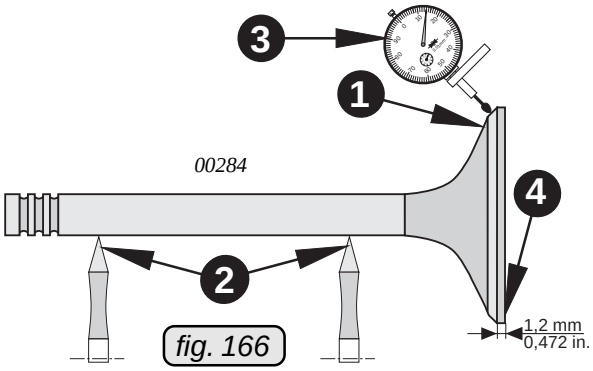


fig. 166

The thermal stress is higher on the exhaust valves (dia. 32 mm = 1,3 in.) therefore direct special attention when checking this valve. Seal-lap both valves and check for leakage.

14.5.5) Valve springs

See fig. 167 and 168.

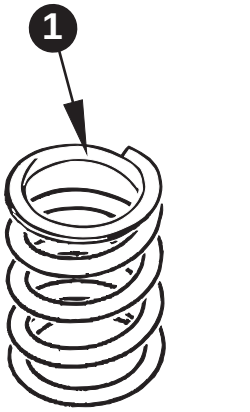


fig. 167

One spring retainer per valve is used. The spring ❶ got a wire gage of 3,85 mm (0,15 in). The same springs are on inlet and exhaust valves. Spring rate non progressive. Visually check springs for fracture and deformation.

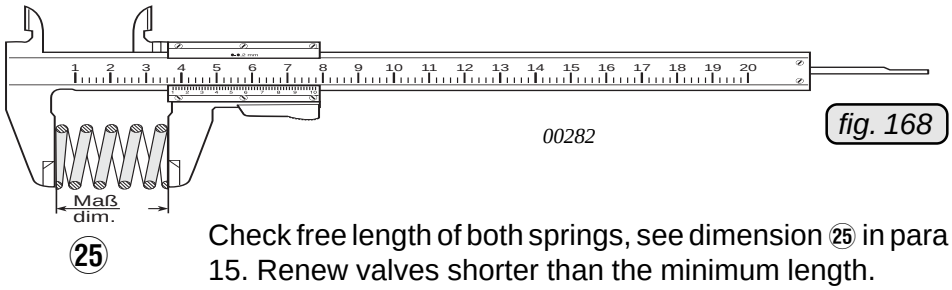


fig. 168

Check free length of both springs, see dimension ㉕ in para 15. Renew valves shorter than the minimum length.

◆ NOTE: In design year 1997 the single spring retainer was introduced, see SI-14-97.

◆ NOTE: Actual spring length should be as equal as possible, on inlet and outlet side. Renew as required.

Dimensions	New	Wear limits

See Wear Limits in para 15.

d01383

14.5.6) Rocker arm

See fig. 169 and 170.

The rocker arm bearing surface ❶ is lubricated via the hollow push rod ❷ towards the ball cup ❸. The oil flows through the bores ❹ in the rocker arm. The oil exit and in consequence the splash oil lubrication of the complete valve mechanism is via bore ❺. The rocker arms for inlet and outlet are different.

Check rocker arm shaft and rocker arm bearing ❻ for traces of seizure. Visually inspect valve stem contact area ❼ and ball cup ❸ of rocker arm. Excessive signs of wear indicate lack of oil. Slightly rework of valve stem contact area ❼ on rocker arm is allowed. Check oil bores ❹ in rocker arm for free passage.

Dimensions **New** **Wear limits**

See Wear Limits in para 15.

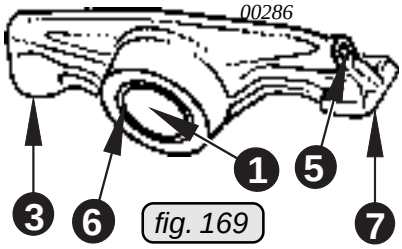


fig. 169

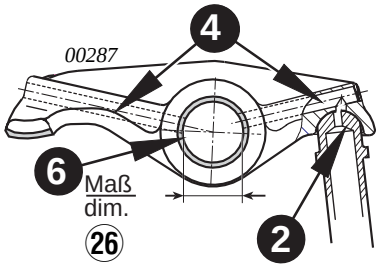


fig. 170

14.5.7) Cylinder head hardness test

See fig. 211.

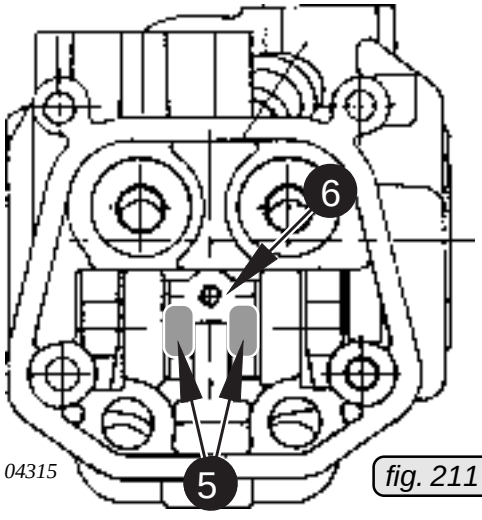


fig. 211

If the engine has exceeded the maximum cylinder head temperature (e.g. the cylinder head temperature has exceeded 180° C or (356 F) for more than 30 minutes). Verification of cylinder head hardness is mandatory and must be carried out.

Check hardness in the area ❺ of the bearing support.

For minimum hardness, see Wear Limits in para 15.

Do not damage sealing surface for O-ring 6,4 x 1,8 ❻.

d01383

14.5.8) Cylinder heads reassembly

See fig. 172.

Place valve spring support ❶ on valve guide and fit new valve stem seal ❷ (on inlet side only). Insert valve ❸ pre-oiled with motor oil, place inner and outer valve spring ❹ and spring retainer ❺ in position. Compress valve springs by utilizing valve spring mounting device and clamp. Insert valve cotters ❻ and release springs, see para 14.5.1. Same procedure for the exhaust valve ❼.

◆ NOTE: Ensure correct positioning of valve cotters.

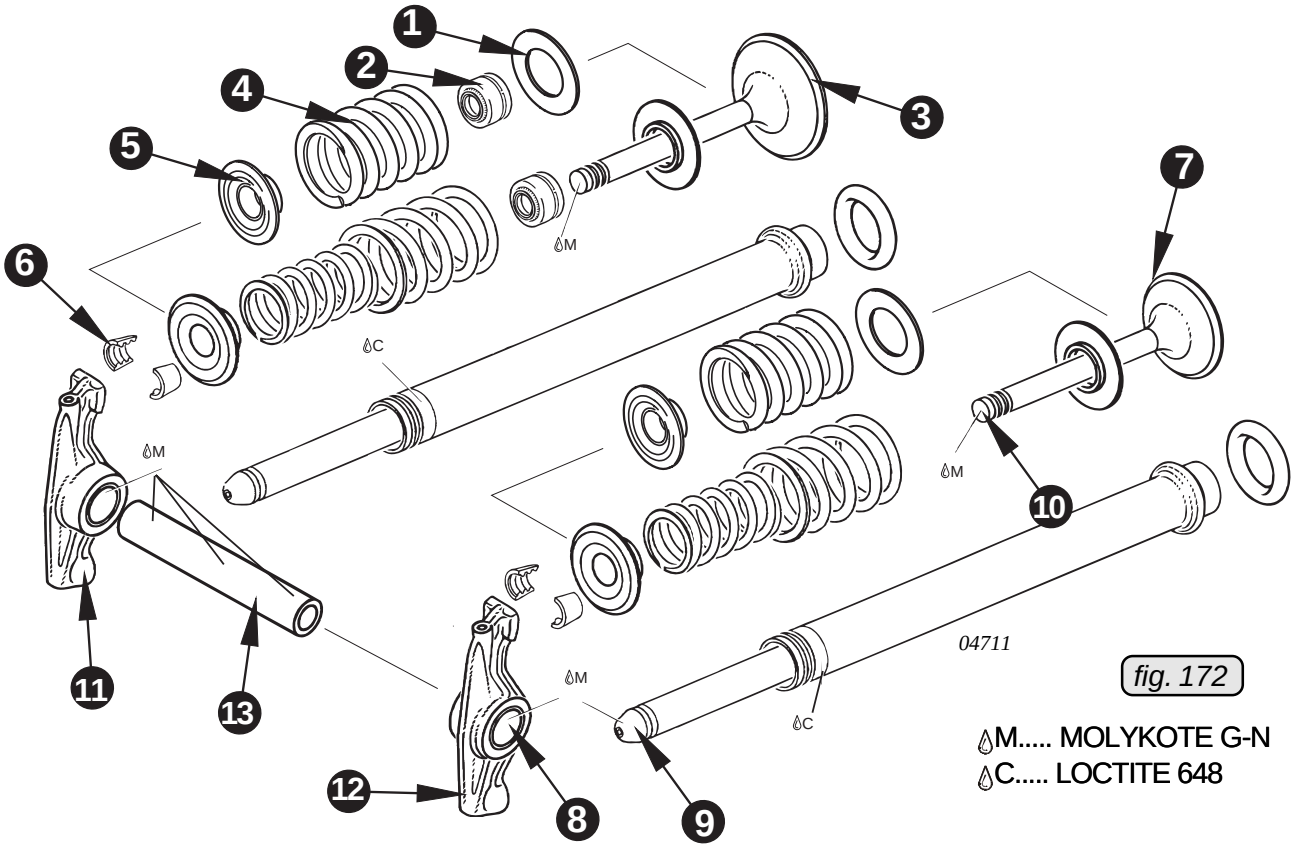


fig. 172

M..... MOLYKOTE G-N
C..... LOCTITE 648

Apply MOLYKOTE® G-N to rocker arm bore ❽, push rod head ❾ and valve contact area ❿.Bring inlet rocker arm ⓫ and exhaust rocker arm ⓬ into position, Apply MOLYKOTE® G-N to both sides of rocker arm shaft ⓭ and fit into bearing bores in cylinder head, see para 11.7.18.

◆ NOTE: The rocker arm shaft must slide easily into the bore. Do not apply force!

Lubricate all internal parts with motor oil and check for easy movement., see para 11.7.1.

d01383

14.6) Cylinder and Piston disassembly

See fig. 173 and 174.

◆ NOTE: Prior to removal, mark cylinders and pistons to ensure correct position at reassembly. Cylinders are identical, pistons have offset centres of pin to piston!

Set piston to top dead centre position and with arrow mark facing gearbox. This arrow ❶ has to face gearbox on all 4 cylinders and serves as positioning aid for the pistons having offset centres.

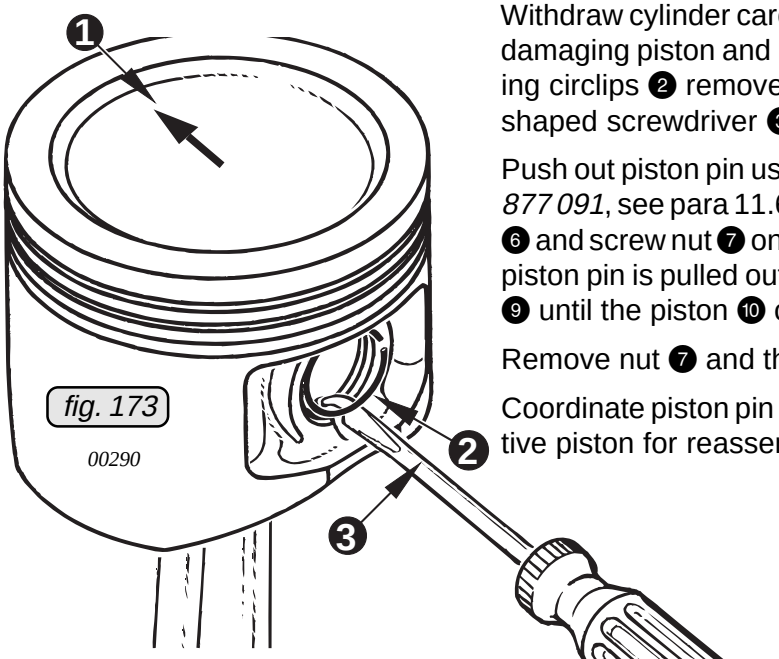


fig. 173

Withdraw cylinder carefully. Support piston by hand to avoid damaging piston and piston rings, see para 11.6. After moving circlips ❷ remove piston pin circlips using the specially shaped screwdriver ❸, see para 11.4.

Push out piston pin using guide punch with puller ❹, part no. *877 091*, see para 11.6. Insert puller spindle ❺ into piston pin ❻ and screw nut ❼ onto it. Turning the spindle clockwise, the piston pin is pulled out of the conrod ❽ into the puller sleeve ❾ until the piston ❿ can be removed.

Remove nut ❼ and the puller ass´y.

Coordinate piston pin to keep each piston pin with its respective piston for reassembly.

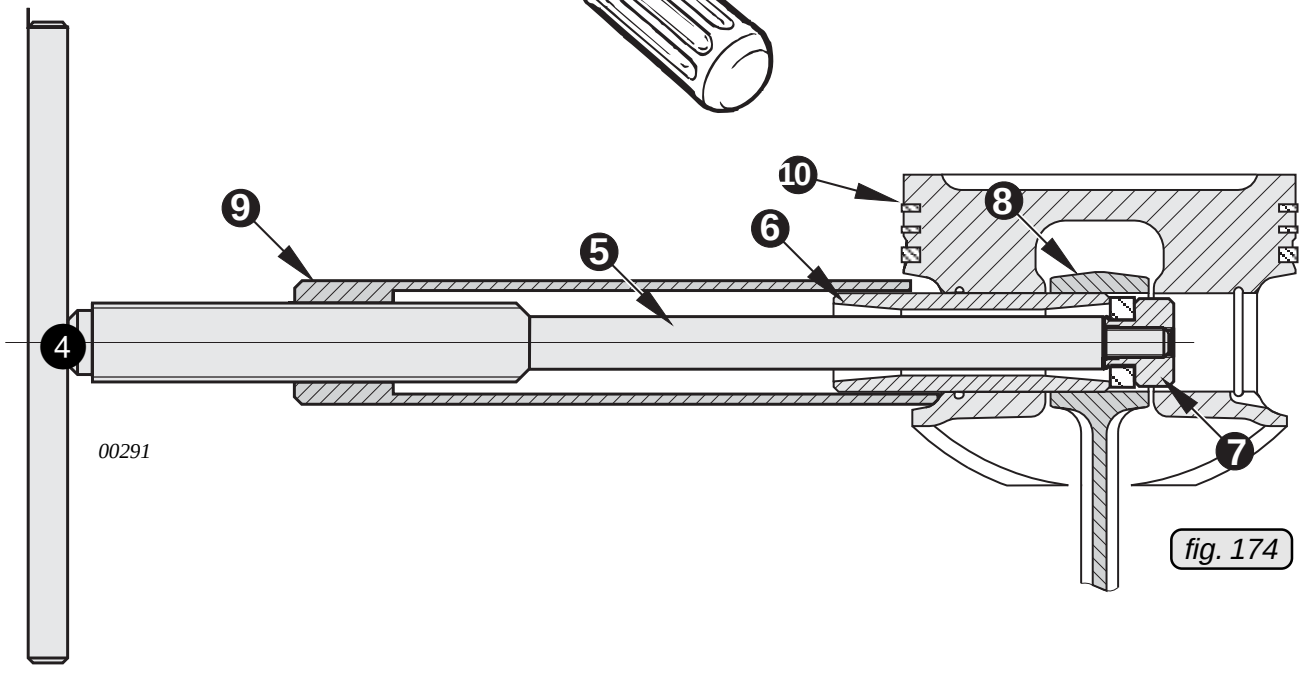


fig. 174

d01383

14.6.1) Piston check

See fig. 175 and 176.

The engine type 912 Series has cast light alloy, full skirt pistons. The piston axis is offset by 1 mm (.039 in.).

Remove piston rings using a pair of piston ring pliers.

■ CAUTION: Make absolutely sure to re-fit rings in their initial position.

Check piston rings and ring grooves for oil carbon residues. The best way to clean piston ring grooves is by using a piece of a broken ring. Increased amount of residue is to be expected when using AVGAS 100LL. Remove carbon deposits from piston crown.

Visually check and measure piston. Piston and/or cylinder must be renewed if piston to wall clearance exceeds 0,1 mm (.004 in.). To determine this clearance, measure cylinder bore by internal caliper with dial gauge, to find the biggest piston dia. (most probably found at the position ❶ depicted), see dimension ㉗ in para 15.

Comparing the 2 dimensions — smallest cylinder dia. less biggest piston skirt dia. — is the piston to cylinder clearance.

Visually inspect groove for piston pin circlip ❷. At presence of a burr remove it carefully. If the groove is excessively worn (> 0,3 mm = .012 in.), renew piston.

2 dimension groups of pistons are available, marked by a **red** or **green** colour dot on piston crown. **Nominal dimension differs by 0,01 mm**. The piston with red dot is the smaller one. The nominal dimension is stamped on the piston crown. There are no oversize pistons planned. The piston is supplied only complete with 3 rings.

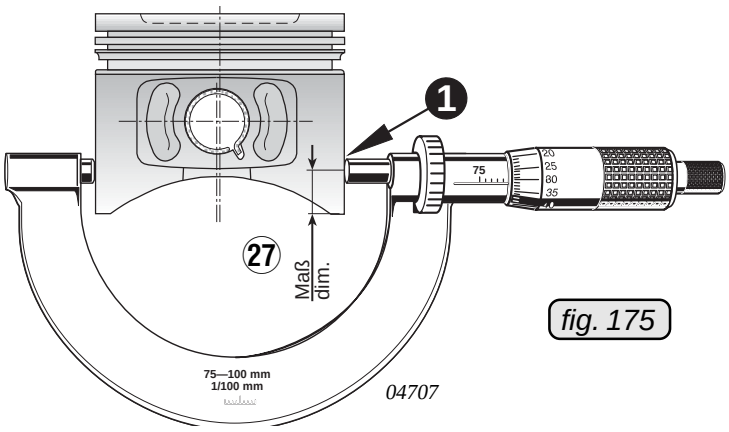


fig. 175

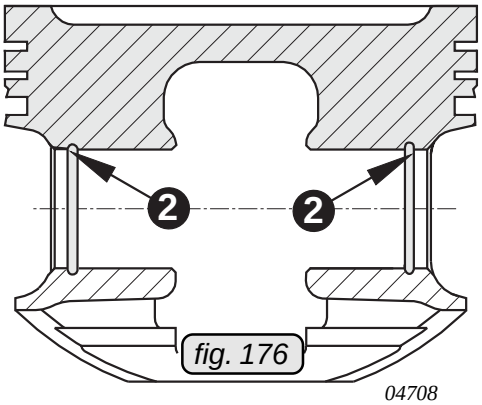


fig. 176

d01383

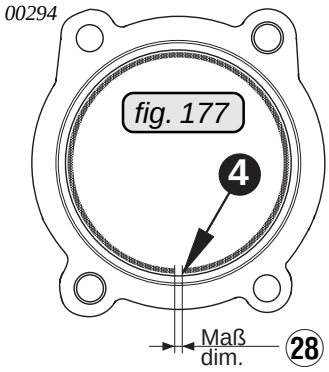
14.6.2) Piston rings check

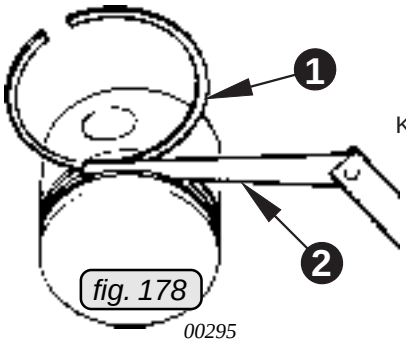
See fig. 177, 178 and 179.

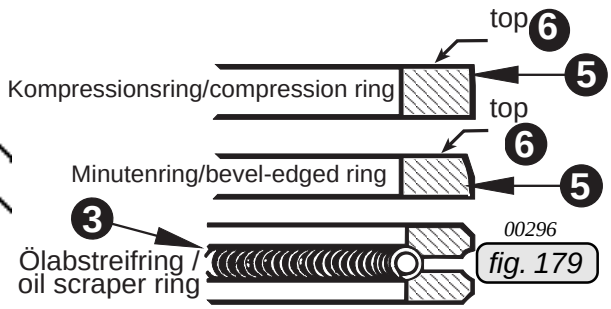
Check cleaned piston rings for correct end gap and flank clearance. With the rings ❶ fitted on piston, measure flank clearance by feeler gauge ❷. Increased amount of residues in the spiral spring ❸ of oil scraper ring indicates use of AVGAS 100LL.

To determine ring end gap ❹ remove ring from the piston using piston ring pliers, insert ring into a new cylinder, utilizing a piston as pusher and measure ring end gap ❹ by feeler gauge ❷, see dim. ㉘ in para 15.

At inspection of ring surface ❺ the portion of surface contact can be seen and indicating the wear. Fit piston rings using piston ring pliers, with marking ❻ "TOP" or the dot mark towards piston crown.







14.6.3) Dimensions of pistons and piston rings

See fig. 175, 177, 178 and 179.

Dimensions	New	Wear limits

See Wear Limits in para 15.

14.6.4) Piston pin

Measure piston pin and check for traces of seizure in area of con-rod seat. In case of distinct traces of seizure, renew piston pin even if dimensions are correct.

Dimensions	New	Wear limits

See Wear Limits in para 15.

The circlips for axial piston pin securing must be used only once and therefore must be renewed.

14.6.5) Cylinder check

See fig. 180 and 181.

The cylinder walls are “GILNISIL”-coated. All 4 cylinders are identical. Clean cooling fins ❶ of cylinder. Remove carbon deposits from top end ❷ of cylinder bore with suitable tool (e.g. lapping fleece) or solvent. Clean sealing surfaces ❸ on top and bottom, make visual check.

Measure cylinders as per illustration and record dimensions in the Dimension Sheet, para 16. Determine piston to cylinder clearance, see para 14.6.1. If the wear limit of the cylinder is reached, renew cylinder and piston.

Dimensions	New	Wear limits

See Wear Limits in para 15.

◆ NOTE: Slight carbon residues on the cylinder sealing surface indicate leakage. True up cylinder and cylinder head by lapping the mating surfaces with lapping paste (e.g. valve lapping paste or equivalent) until required sealing is achieved.

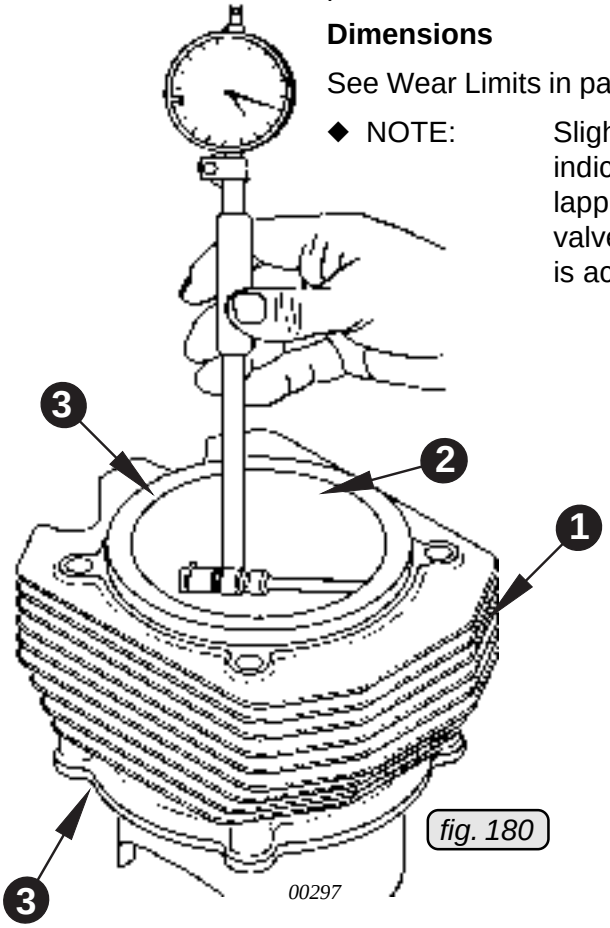


fig. 180

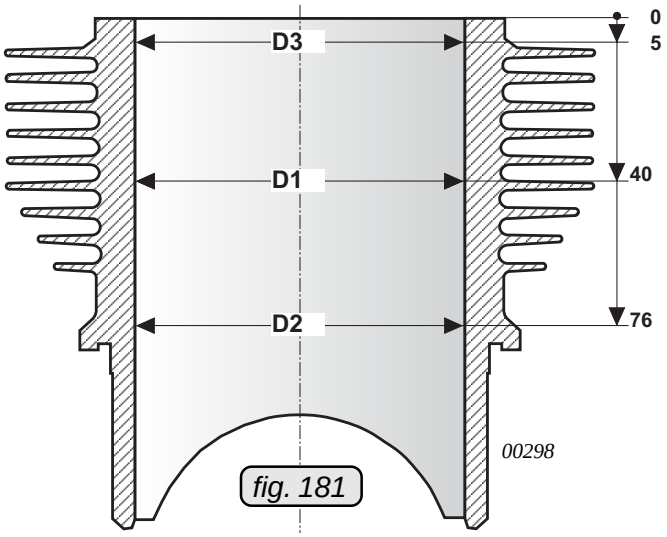


fig. 181

d01383

14.7) Hydraulic valve tappets

See fig. 182, 183 and 184.

Remove valve tappet ❶ from crankcase using a specially shaped screwdriver ❷. Never engage at circlip ❸. This would cause valve tappet to fall apart.

■ CAUTION: Lay aside tappets in a manner to ensure refitting in their initial place.

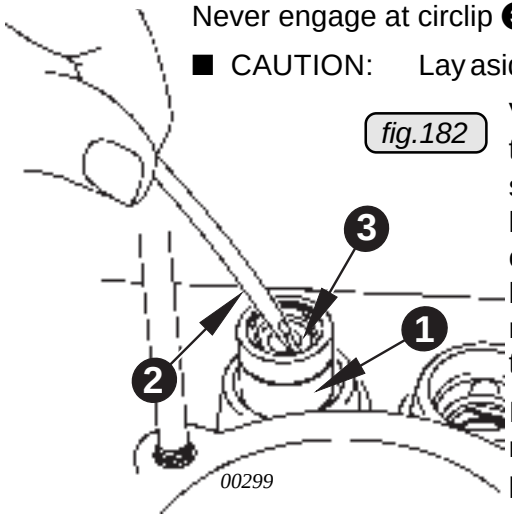


fig.182

Visually inspect hydraulic valve tappets. The hydraulic tappets rotate during engine operation. Therefore, the camshaft lobes ❹ should be worn evenly. Failure of the hydraulic tappets to rotate properly will result in unevenly worn camshaft lobes. Any visible pitting on the contact face of the hydraulic tappet is a cause for part rejection and the tappet must be replaced. It is not permissible to re-work the face of the hydraulic tappet!

If a valve tappet must be renewed, closely inspect its respective camshaft lobe. Disassembly of a hydraulic tappet is not permitted.

The new valve tappet is supplied dry and will pump itself full with oil during starting procedure. Oil enters the valve tappet through bore ❺. The securing ring ❸ keeps the valve tappet plunger ❻ in position when the tappet is removed.

■ CAUTION: The first start of a repaired engine should be without ignition, until the required oil pressure is built up.

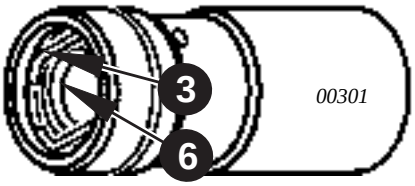


fig.184

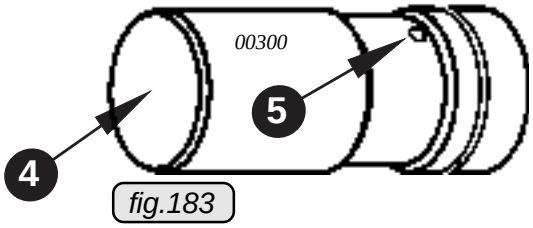


fig.183

14.8) Push rods

See fig. 185.

Clean and inspect visually the push rods ❶. Pay attention to tight fit of the two ball heads ❷ pressed into the rod. If the engine has exceeded the maximum admissible speed this may have caused bending of the push rods. Check push rods supported on V-blocks for straightness, see dim. ㉙. Through the bores ❸ oil passes from the valve tappet to the rocker arm.

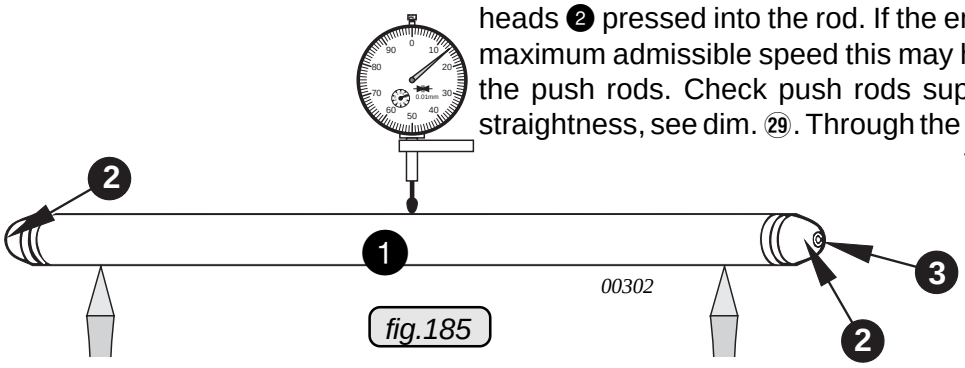


fig.185

d01383

14.9) Displacement parts reassembly

14.9.1) Hydraulic valve tappets

Lubricate bearing bore ❶ for valve tappets ❷ in crankcase with motor oil. Apply LOCTITE® Anti-Seize to the contact surfaces ❸ of the valve tappets, lubricate their outside with motor oil and insert them according to the recorded position into the crankcase. The valve tappets must be able to turn without resistance in the crankcase.

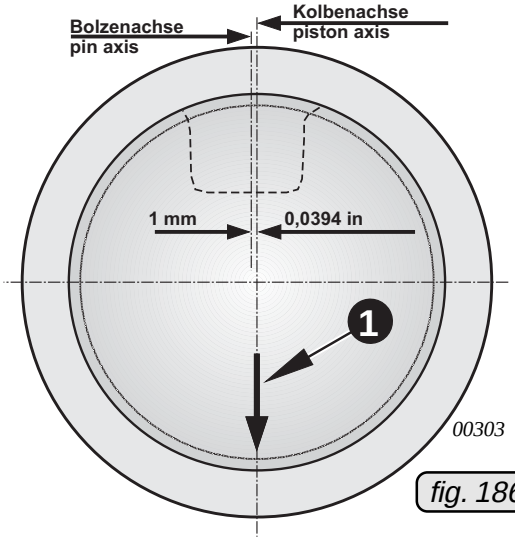


fig. 186

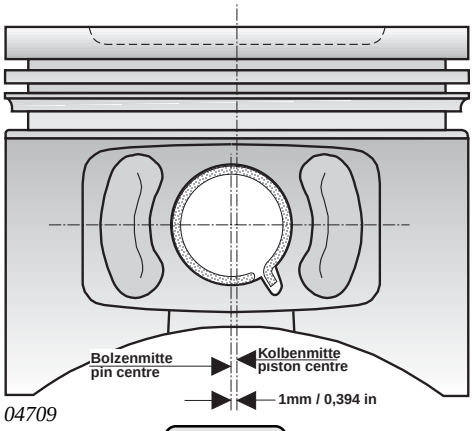


fig. 187

14.9.2) Piston fitting

See fig. 186, 187, 188, 189, 190 and 191.

The piston pin centre is offset from piston centre and the piston must be installed with the arrow ❶ on piston crown showing towards propeller shaft. This means that on cylinders **1** and **3** the **narrower side** ❷ of the pistons must be below the conrod, and on cylinders **2** and **4** the **narrower side** ❸ of the piston must be above the conrod.

Install the piston as shown on fig. beside. The offsetting of piston pin bore is 1 mm (.039 in.).

If the arrow ❶ on piston crown is no more visible, the piston must be measured.

Apply MOLYKOTE® G-N slide paste over the whole of the piston pin ❹ , coat bore ❺ in conrod and the bore in piston ❻. Insert piston pin with installation pusher, *part no. 877 011* (slide fit).

The piston pin may also be inserted with the use of the piston pin extractor ass'y ❼, *part no. 877 091*. Push piston pin into the piston, insert puller spindle ❽ from the opposite side and fit on nut ❾. By turning the spindle clockwise, the piston pin can be pulled up to the circlip groove ❿.

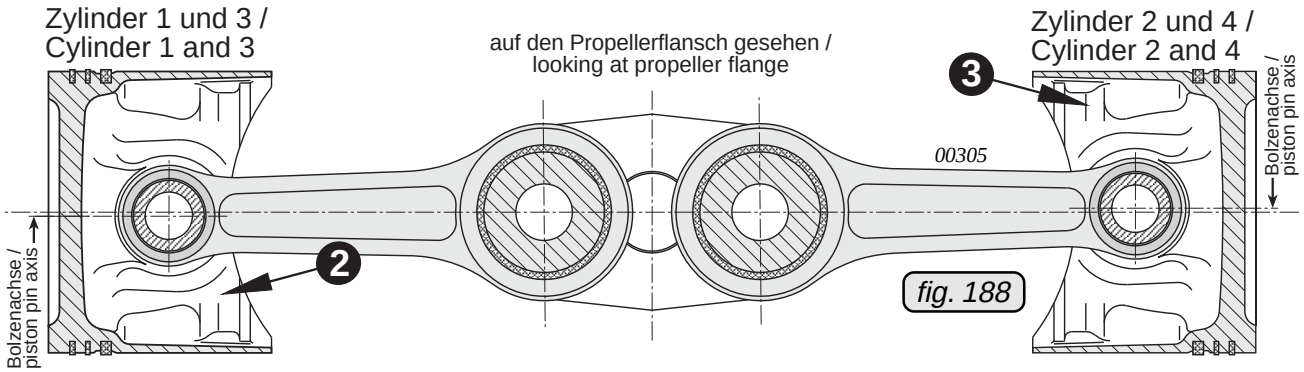


fig. 188

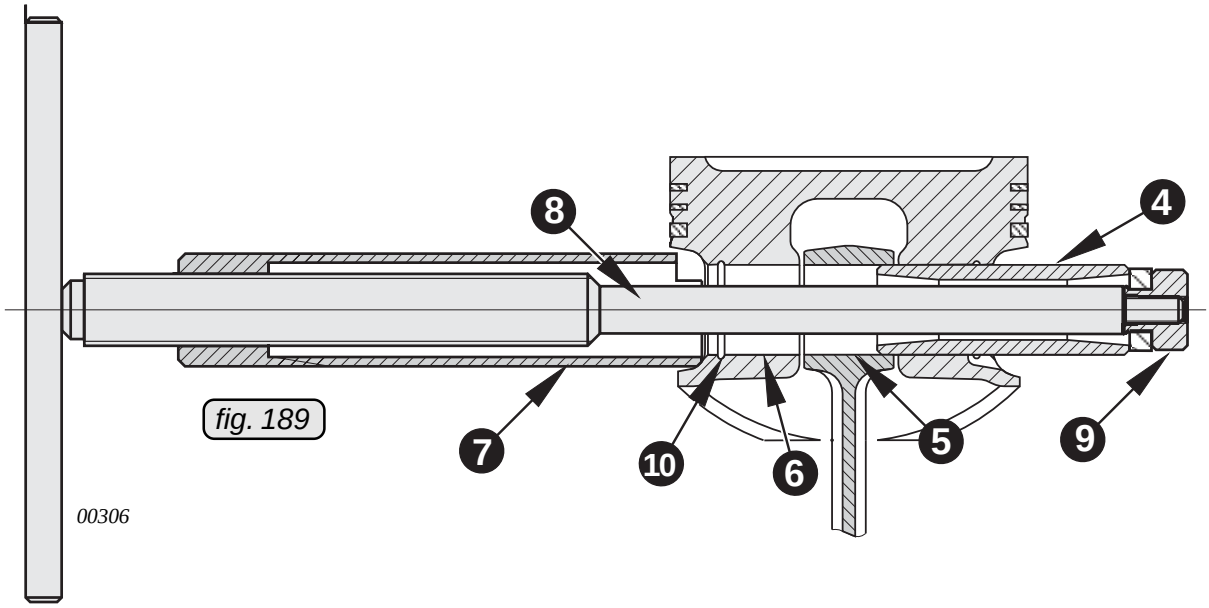


fig. 189

Fit piston pin circlips with circlip installation tool *part no. 877 805*. For this procedure push the circlip ⓫ with the insertion jig ⓬ into the locating sleeve ⓭ until it engages in the groove ⓮. Now position the complete circlip installation tool ⓯ on the piston. Support piston with hand and push circlip ⓫ with a strike at the insertion jig ⓬ into the groove ⓰ of the piston. Apply same procedure on the opposite side of the piston. See Service Instruction SI-2ST-001 and SI-21-1997.

▲ WARNING: Always use new piston pin circlips! Used or circlips already fitted once exert insufficient tangential force thus allowing circlips to turn with consequent wear of the circlip groove.

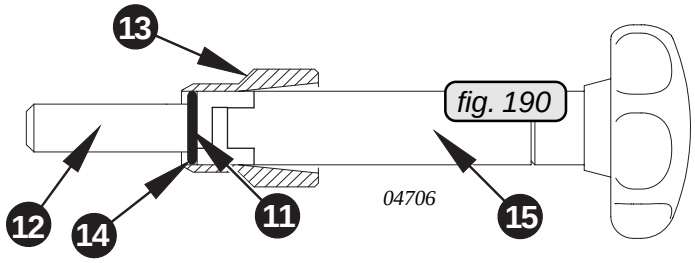


fig. 190

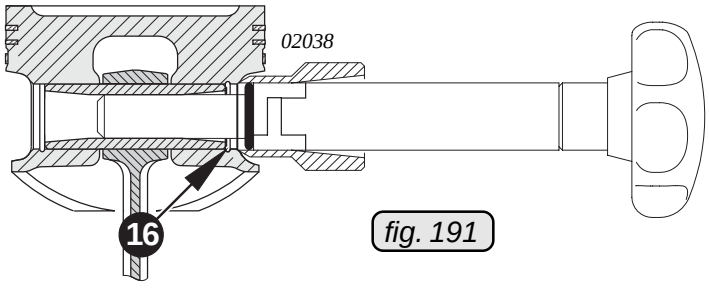


fig. 191

d01383

14.9.3) Fitting of cylinder

See fig. 191.

Place O-ring 87x2 on cylinder spigot and lubricate cylinder.

◆ NOTE: On the type 912 S/ULS/ULSFR an O-ring 7x2 at the cylinder base for damping of the studs has been introduced with start of serial production. See the groove at the cylinder base.

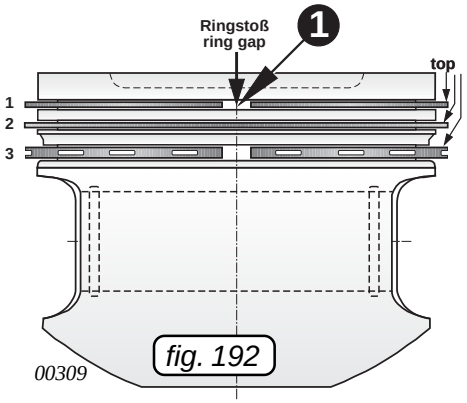


fig. 192

Pay attention to position of piston ring gaps ❶. The gap of the 1st and 3rd piston ring should be in the middle of piston skirt, and the 2nd ring be turned by 180°. The ring gap should never be in the area of the piston pin bore.

Check whether piston pin circlips are installed. Lubricate piston, compress rings with piston ring spanner and mount the coordinated cylinder with care. Same procedure with the other cylinders.

■ CAUTION: To avoid ring breakage, use piston ring spanner!

14.9.4) Fitting of cylinder head

See fig. 193, 194 and 195.

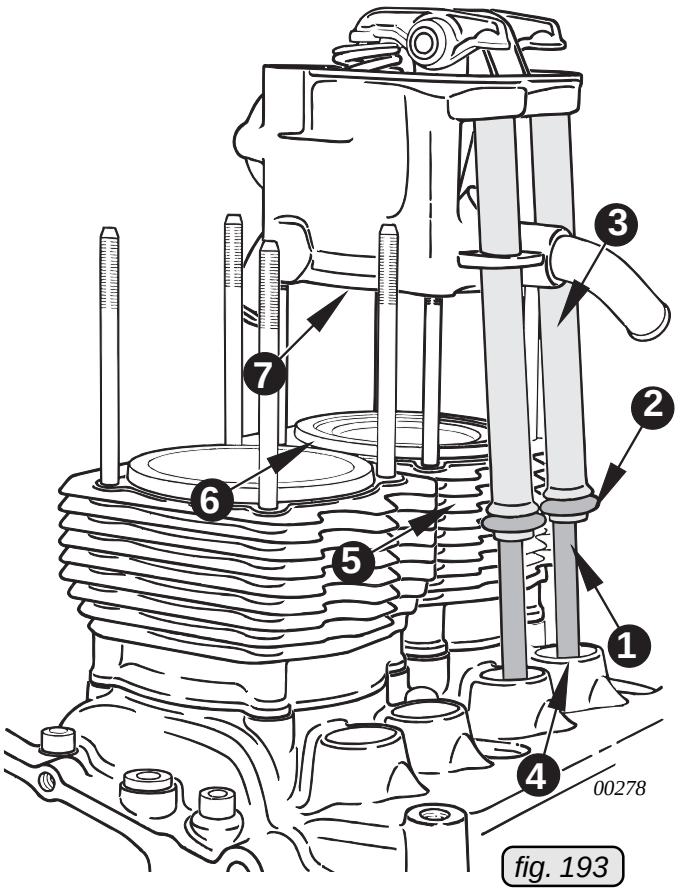


fig. 193

Install respective pushrod ❶ in both oil return tubes on pre-assembled cylinder head and place pre-oiled O-ring ❷ 16x5 on oil return tube ❸.

Mount cylinder head until O-rings ❷ on both oil return tubes rest in crankcase ❹. Now lift cylinder ❺ until the centering ❻ of cylinder engages in the cylinder head recess ❼.

◆ NOTE: This is a safety measure to prevent jamming of cylinder head resulting in leakage.

Fit cylinder head and cylinder together on crankcase. Tighten cylinder head crosswise with 2 collar cap nuts M8 and 2 hex. nuts M8 along with washers, tightening slightly only! Pay attention for squeezing O-rings ❷ evenly into crankcase.

Repeat same procedure, if necessary, on the cylinder heads.

d01383

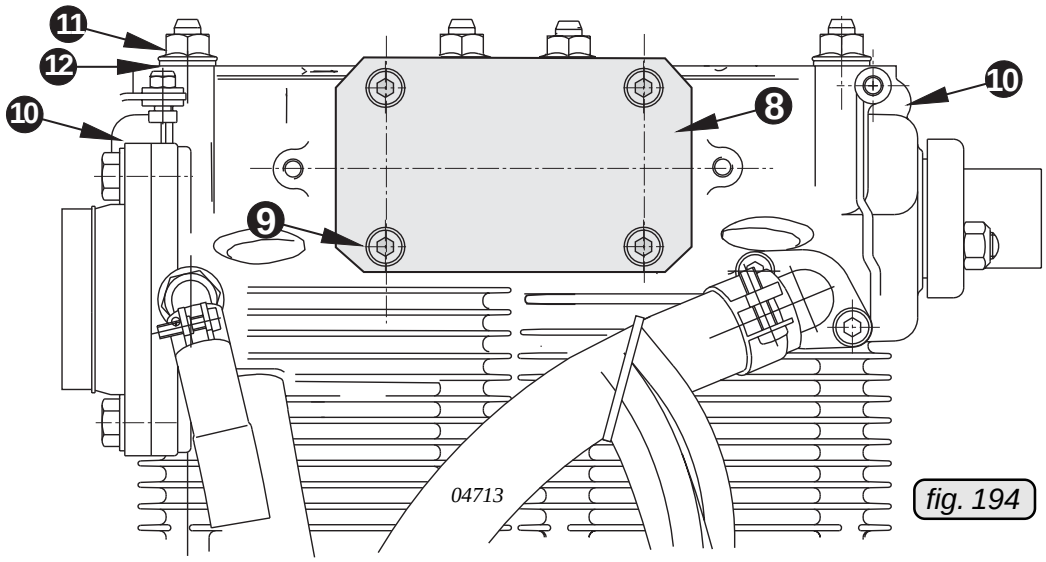


fig. 194

Attach cylinder aligning tool ❽, to intake flange of cylinder heads ❿ by 4 screws ❾ M6x25. Align cylinder heads, thus warranting a plane support for intake manifold. Fit collar cap nut and collar nut ⓫ along with washer ⓬ and tighten cylinder heads crosswise to 22 Nm (195 in.lb). Remove 4 screws ❾ and cylinder aligning tool.

Lubricate all moving parts in rocker arm compartment. Place O-ring ⓭ 105x2,5 and O-ring ⓮ 6,4x1,8 on valve cover ⓯, put cover in position and tighten Allen screw ⓰ M6x30 along with washer ⓱ to 10 Nm (90 in.lb).

Between the outside shape of the valve covers a gap of at least 0,2 mm has to remain. The valve covers must not touch each other.

■ CAUTION: Do not ever change the length of valve cover screw! Check whether threads are damaged. If this screw is loose or worn or if the valve cover is leaking, the oil return to the oil tank by "blow-by gas" will not or not sufficiently function.

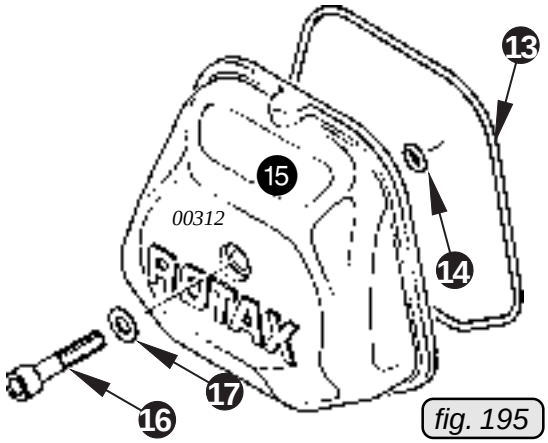


fig. 195

Screw in resistance spark plugs and tighten to 20 Nm (180 in.lb). Fit spark plug connectors according to coding sleeves on spark plugs, see para 13.4.11.

◆ NOTE: Proceed as per Wiring Diagram.

d01383

14.10) Fitting of coolant hoses

See fig. 005.

Fix all coolant hoses coming from expansion tank to the coolant exit on cylinder heads with spring type clamps 23 mm (.905 in.). Also fit the coolant hoses between water pump and coolant entry into cylinder heads with spring type clamps 23 mm (.905 in.).

◆ NOTE: Position the hose clamps so that no neighbouring coolant hoses can be damaged.

14.11) Fitting of intake manifolds

See fig. 012, 105 and 195.

Place both intake manifolds showing inwards, together with O-rings 34-2 ❶ on cylinder head and attach with 4 each Allen screws M6x25 ❷ and M6x70 ❸ along with lock washers. Torque to 10 Nm (90 in.lb), see also para 13.4.12.

◆ NOTE: Do not squeeze the O-rings.

Attach compensating tube ❹ and the hoses ❺ on both ends with hose clamps 15/9 ❻. Share hose clamp ❻ to attach one each bracket ❼ for carburetor support.

◆ NOTE: Verify position of hose clamp with head of the clamp screw towards propeller flange and lugs of clamp pointing upwards to achieve the proper pretension of carb support spring.

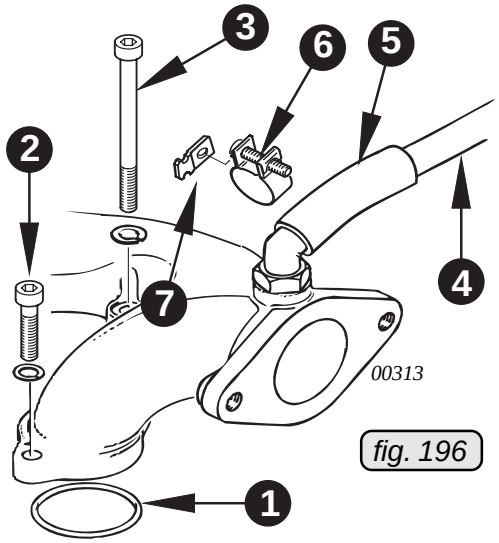


fig. 196

14.12) Fitting of an extra carburetor support

See fig. 197 and 198.

Check tension spring ❶ for mobility on cheese head screw ❷ and engage spring on bracket ❸ by using a suitable tool. Ensure that the two lugs ❹ of the clamp point upwards. Rectify as required.

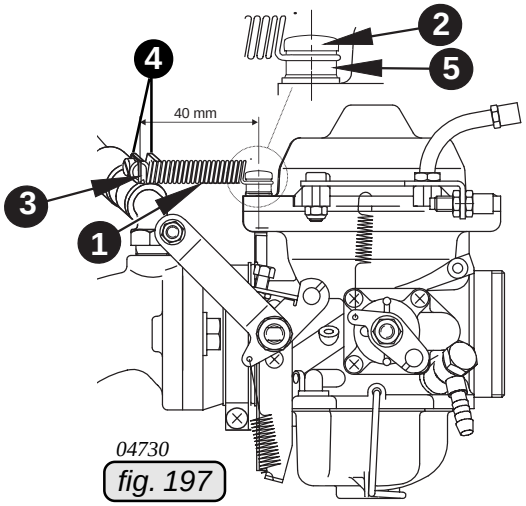
■ CAUTION: To render the carburetor support effective, a distance of 40 mm (1,57 in.) between cheese head screw ❷ and bracket ❸ has to be maintained.

If instead of the Allen screw and the spacer a cheese head screw is fitted the support kit part no. 887.730 (fig. 198) has to be used.

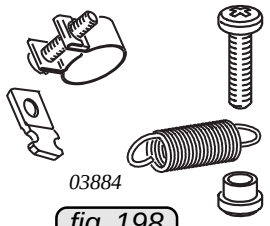
Same procedure with the 2nd carburetor.

d01383

◆ NOTE: From design year 1996 onwards the additional arburetor support is fitted already in the serial production. For all engines prior to this design year we recommend the retro-fitting of this support. Consult the Service Bulletin SB 912-10.



04730
fig. 197



03884
fig. 198

14.13) Connecting of the fuel lines

The fuel lines from the tank to the fuel pump, from fuel pump to the two carburetors and the return line to tank have to be routed at engine installation in accordance to specifications of the aircraft builder.

■ CAUTION: At tightening of joints on the fuel lines do not apply any forces or moments on fuel pump connections and prevent bending of the connecting tubes. Refer to para 13.1.6.

15) Wear limits sheets

15.1) Wear limits for ROTAX® 912 UL/A/F

Designation	*new* mm	*new* (in.)	*wear limit* mm	*wear limit* (in.)	*actual dim.* int. / exh.
Cylinder/Piston					*EV / AV*
see para 16.1 Form sheets					
Piston pin					
piston pin bore	20,001÷20,005	(0,7874 ÷ 0,7876)	20,04	(0,789)	
piston pin	19,992÷19,995	(0,7870 ÷ 0,7872)	19,97	(0,786)	
clearance,pin in piston	0,006÷ 0,013	(0,0002 ÷ 0,0005)	0,5	(0,002)	
con-rod bore,small end	20,010÷20,020	(0,787 ÷ 0,788)	20,04	(0,789)	
clearance, pin in con-rod	0,015÷ 0,028	(0,0006 ÷ 0,001)	0,05	(0,002)	
Piston rings					
1st compression ring					
height of groove	1,52 ÷ 1,54	(0,059 ÷ 0,061)	1,6	(0,063)	
height of ring	1,478÷ 1,49	(0,058 ÷ 0,059)	1,45	(0,057)	
ring / groove clearance	0,03 ÷ 0,062	(0,001 ÷ 0,002)	0,1	(0,004)	
ring end gap ㉘	0,15 ÷ 0,35	(0,006 ÷ 0,014)	1,0	(0,04)	
2nd compression ring (bevel-edged)					
height of groove	1,27 ÷ 1,29	(0,050 ÷ 0,051)	1,35	(0,053)	
height of ring	1,228÷ 1,24	(0,048 ÷ 0,049)	1,20	(0,047)	
ring / groove clearance	0,03 ÷ 0,062	(0,001 ÷ 0,002)	0,1	(0,004)	
ring end gap ㉘	0,3 ÷ 0,5	(0,011 ÷ 0,02)	1,0	(0,04)	
3rd ring (oil scraper ring)					
height of groove	3,01 ÷ 3,03	(0,118 ÷ 0,119)	3,1	(0,122)	
height of ring	2,975÷ 2,99	(0,117 ÷ 0,118)	2,95	(0,116)	
ring / groove clearance	0,02 ÷ 0,045	(0,0008 ÷ 0,002)	0,1	(0,004)	
ring end gap ㉘	0,15 ÷ 0,40	(0,006 ÷ 0,016)	1,0	(0,04)	
Cylinder head					
wear on valve seat	0,0 ÷ 0,0		max. 0,3	(0,012)	
valve guide bore ㉑	7,006÷ 7,018	(0,275 ÷ 0,276)	7,15	(0,282)	
valve stem ㉒	6,965÷ 6,98	(0,274 ÷ 0,275)	6,94	(0,273)	
stem clearance	0,026÷ 0,053	(0,001 ÷ 0,002)	0,15	(0,006)	
sealing face width, inlet valve ㉓	1,40 ÷ 1,90	(0,055 ÷ 0,075)	2,40	(0,094)	
sealing face width, exhaust valve ㉓	1,50 ÷ 2,00	(0,059 ÷ 0,079)	2,50	(0,098)	
out-of-true on valve head ㉔	0,00 ÷ 0,01	(0,0 ÷ 0,0004)	0,03	(0,0012)	
rocker arm ㉖ with cast iron bush	12,000÷12,018	(0,472 ÷ 0,473)	12,09	(0,476)	
rocker arm ㉖ with bronze bush	12,000÷12,027	(0,472 ÷ 0,474)	12,10	(0,476)	
rocker arm shaft	11,983÷11,994	(0,471 ÷ 0,472)	11,95	(0,470)	
rocker arm, radial clearance	0,006÷ 0,035	(0,0002 ÷ 0,001)	0,10	(0,004)	
depth of wear on contact face of valve stem	0,0 ÷ 0,0		0,25	(0,01)	
spring length at testload, inner	31,6 ÷30,4	(1,244÷ 1,197)	30,0	(1,181)	
spring length at testload, outer	33,6 ÷32,4	(1,323÷ 1,276)	32,0	(1,260)	
spring length at testload, single	33,6 ÷32,4	(1,323 ÷ 1,276)	32,0	(1,260)	
spring rate, inner spring	13,25 N/mm	(75,66 lbf/in)			
spring rate, outer spring	33,25 N/mm	(189,86 lbf/in)			
spring rate, single	39,7 ÷59,9 N/mm	(226,69÷342,03 lbf/in)			

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Designation	*new* mm	*new* (in.)	*wear limit* mm	*wear limit* (in.)	*actual dim.* int. / exh.
Hardness of cylinder head (fill in if requested)					*EV / AV*
cylinder head no. **1**	min. 85 HB 2,5/62,5/30	.....		.....	
cylinder head no. **2**	min. 85 HB 2,5/62,5/30	.....		.....	
cylinder head no. **3**	min. 85 HB 2,5/62,5/30	.....		.....	
cylinder head no. **4**	min. 85 HB 2,5/62,5/30	.....		.....	
Propeller gearbox					
wear depth on dogs	0,00	0,00	0,20	(0,008)	
length of bearing sleeve, dog gear	29,6 ÷ 29,8	(1,165 ÷ 1,173)	29,00	(1,142)	
axial clearance of propeller shaft	0,02 ÷ 0,07	(0,0008 ÷ 0,0028)	0,30	(0,012)	
propeller shaft ø 35 mm (1,378 in) ⑫	35,009 ÷ 35,02	(1,378 ÷ 1,379)	35,003	(1,378)	
propeller shaft ø 31,5 mm (1,24 in) ⑬	31,481 ÷ 31,47	(1,240 ÷ 1,239)	31,460	(1,239)	
prop. flange, axial out-of-true ø 122 (4,8 in) ⑭	0,00 ÷ 0,05	(0,00 ÷ 0,002)	0,06	(0,002)	
propeller shaft, internal dia. ⑮	11,00 ÷ 11,02	(0,433 ÷ 0,434)	11,05	(0,435)	
oil inlet flange, journal dia. ⑮	10,935 ÷ 10,96	(0,430 ÷ 0,431)	10,88	(0,428)	
radial clearanc ⑮	0,04 ÷ 0,085	(0,0016 ÷ 0,003)	0,16	(0,006)	
dog clearance ⑯	1,00 ÷ 1,20	(0,039 ÷ 0,047)	0,50	(0,019)	
thickness of thrust washer ⑰	1,075 ÷ 1,325	(0,042 ÷ 0,052)	1,00	(0,039)	
disk spring, free length ⑱	5,20 ÷ 5,40	(0,205 ÷ 0,213)	4,50	(0,177)	
gear backlash ⑳	0,07 ÷ 0,15	(0,003 ÷ 0,006)	0,20	(0,008)	
Crankshaft					
out-of-round, magneto side ①	0,00 ÷ 0,03	(0,00 ÷ 0,0012)	0,06	(0,002)	
out-of-round, p.t.o. side ①	0,00 ÷ 0,03	(0,00 ÷ 0,0012)	0,06	(0,002)	
bearing,magneto side ④	31,99 ÷ 32,00	(1,259 ÷ 1,260)	31,95	(1,258)	
ignition housing ③	32,02 ÷ 32,03	(1,261 ÷ 1,261)	32,10	(1,264)	
radial clearance, magneto side	0,02 ÷ 0,04	(0,0008 ÷ 0,0016)	0,12	(0,005)	
bearing, p.t.o. side ⑲	27,99 ÷ 28,00	(1,102 ÷ 1,102)	27,95	(1,100)	
gearbox cover ⑪	28,02 ÷ 28,03	(1,103 ÷ 1,104)	28,10	(1,106)	
radial clearance, p.t.o. side	0,02 ÷ 0,04	(0,0008 ÷ 0,0016)	0,12	(0,005)	
Sprag clutch					
axial clearance ⑩	0,30 ÷ 0,50	(0,012 ÷ 0,019)	0,7	(0,028)	
Water pump					
impeller clearance ⑤	0,40 ÷ 0,50	(0,016 ÷ 0,019)	0,7	(0,028)	
Oil pump					
pump plunger, axial clearance ②	0,00 ÷ 0,07	(0,00 ÷ 0,028)	0,2	(0,008)	
Ignition unit					
spark plug, electrode gap ⑥	0,7 ÷ 0,8	(0,028 ÷ 0,031)	0,9	(0,035)	
gap 7 for "old type" trigger coil	0,4 ÷ 0,5	(0,016 ÷ 0,020)	0,5	(0,020)	
gap 7 for trigger coil with clamps	0,3 ÷ 0,4	(0,012 ÷ 0,016)	0,4	(0,016)	
trigger coil, axial offsetting ⑧	0,0 ÷ 0,2	(0,000 ÷ 0,008)	0,3	(0,012)	
Electric starter					
armature, axial clearance ⑨	0,1 ÷ 0,2	(0,004 ÷ 0,008)	0,3	(0,012)	
Push rod					
out of round ㉙	0,0 ÷ 0,1	(0,0 ÷ 0,004)	0,2	(0,008)	

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15.2) Wear limits for ROTAX® 912 S/ULS

Designation	*new* mm	*new* (in.)	*wear limit* mm	*wear limit* (in.)	*actual dim.* int. / exh.
Cylinder/Piston					*EV / AV*
see para 16.1 Form sheets					
Piston pin					
see para 15.1					
Piston rings					
1st compression ring					
see para 15.1					
ring end gap ㉘	0,25 ÷0,5	(0,01 ÷ 0,02)	1,0	(0,04)	
2nd compression ring (bevel-edged)					
see para 15.1					
ring end gap ㉘	0,25 ÷0,5	(0,01 ÷ 0,02)	1,0	(0,04)	
3rd ring (oil scraper ring)					
see para 15.1					
ring end gap ㉘	0,1 ÷ 0,3	(0,004 ÷ 0,012)	1,0	(0,04)	
Cylinder head					
see para 15.1					
Propeller gearbox					
see para 15.1					
Crankshaft					
see para 15.1					
Sprag clutch					
see para 15.1					
Water pump					
see para 15.1					
Oil pump					
see para 15.1					
Ignition unit					
see para 15.1					
Electric starter					
see para 15.1					
Push rod					
see para 15.1					

d01383

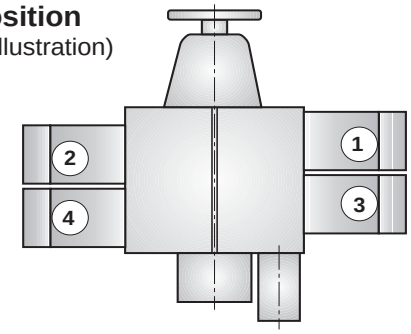
16) Form Sheets

16.1) Form Sheet for Cylinders and Pistons for ROTAX® 912 UL/A/F/ULS/S

ROTAX AIRCRAFT ENGINES — **Protocol for Maintenance** — *Form Sheet no. 17-036/E—00 10 18*

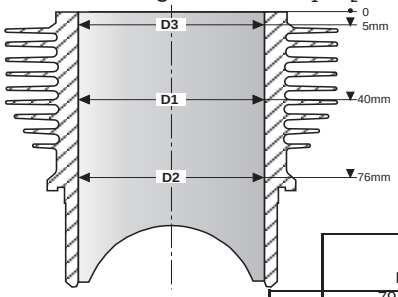
Form Sheet 3 ROTAX _____ **for engine no.:** _____

Cylinder and piston position
(mark appropriate position on illustration)



1) Cylinder

Checking of the dia. D_1, D_2 and D_3

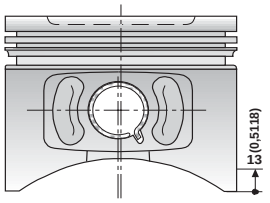


		nominal min.	nominal max.	wear limit	actual	re.
D_1	A	79,500 (3,1299)	79,512 (3,1304)	79,58 (3,1331)		
		84,000 (3,3071)	84,012 (3,3076)	84,08 (3,3102)		
	B	79,512 (3,1304)	79,524 (3,1309)	79,59 (3,1335)		
		84,012 (3,3087)	84,024 (3,3080)	84,09 (3,3106)		
D_2		D_1 act.	D_1 act.+0,015 (+0,0006)			
D_3		D_1 act.-0,008 (-0,0003)	D_1 act.+0,008 (+0,0003)			

2) Piston

Weight with rings, but without piston pin _____ g piston prod. code _____

Check of nominal diameter DN at height 13 mm (0,5118 in.) for ø piston 79,5 ø (3,1299)
height 13 mm (0,5118 in.) for ø piston 84,0 ø (3,3071)



	nominal piston red	nominal piston green	wear limit	actual	re.
79,5ø DN (3,1299ø)	79,488 ÷ 79,502 (3,1294 ÷ 3,1300)	79,498 ÷ 79,502 (3,1298 ÷ 3,1300)	79,39 (3,1256)		
84,0ø DN (3,3071ø)	83,988 ÷ 84,002 (3,3066 ÷ 3,3072)	83,998 ÷ 84,012 (3,3070 ÷ 3,3076)	83,89 (3,3028)		

3) Grading and clearance

	clearance nominal	clearance wear limit	clearance actual	re.
cylinder A with piston "red"	0,000 ÷ 0,024 (0,000÷0,0009)	0,13 (0,0051)	D1-DN=	
cylinder B with piston "green"	0,000 ÷ 0,026 (0,000÷0,0010)	0,13 (0,0051)	D1-DN=	

Mechanic: _____ Date: _____

Tester: _____ Date: _____

04725 *d01383*

16.2) Form sheet for ext. generator

fig. 209

04727

Formblatt Nr. KD-17-048/A—96 05 17

Prüfprotokoll für ext. Genearor/
Inspection protocol for alternator

Generator, Teile Nr.: / *Alternator, part no.:* ____ Generator, Serien Nr.: / *Alternator, serial no.:* ____ Eingebaut in Motor Nr.: / *Installed in engine no.:* ____ RP Auftr.Nr.: / *repair order no.:* ____

Rotor / *rotor*: neu / *new* — min: — ist / *actual*:

Schleifringe / *slip ring:* ø14,40 mm — ø14,20 mm — ø ____ mm Bemerkung / *remark:* ____

Rotorwelle Lagersitz / *rotor shaft bearing seat:* ø14,98 mm — ø14,95 mm — ø ____ mm Schiebesitz / *sliding seat:* ____

Rotorwelle, Sichtkontrolle antriebseitig / *rotor shaft, visual check drive side:* ____

Rotorwelle, Sichtkontrolle abtriebseitig / *rotor shaft, commut. side:* ____ Lüfterflügel / fan blades: ____

Bemerkung / *remark*: ____

Kohlebürsten / *carbon brushes*: neu / *new* — min. — ist / *actual*

Länge der Plus-Kohle / *Plus brush*: 13,5 mm — 9,0 mm — ____ mm

Länge der Minus-Kohle / *Minus brush*: 13,5 mm — 9,0 mm — ____ mm

Bemerkung / *remark*: ____

Statordeckel / *stator cover*: neu / *new* — max — ist / *actual* — Bemerkung / *Remark*

Lagersitz / *bearing seat:* ø31,995mm — ø32,00 — ø ____ mm — Preßsitz / *pressfit:* ____

Statorgehäuse / *stator housing*: neu / *new* — max. — ist / *actual* — Bemerkung / *Remark*

Lagersitz / *bearing seat:* ø34,988 mm — ø35,00 — ø ____ mm — Preßsitz / *pressfit:* ____

Rk-Lager / *ball bearing*: antriebseitig ø35 mm / *drive side35 mm*ø ____ abtriebseitig ø32 mm / *commut. side 32 mm*ø ____

Startorwicklung / *stator winding* (jede Phase gegen Sternpunkt, +20°C/ *each phase against wye center, +20°C*): soll/ *nominal*: 0,1÷0,4 Ω ist / *actual*: ____

Rotorwicklung/ *rotorwinding* (Schleifring gegen Schleifring, +20°C/ *collector ring against collector ring, +20°C*): soll/ *nominal*: 2,8÷3,2 Ω ist / *actual*: ____

Prüflauf / *test run:*
(dynamisch bei +50°C, mit verstellb. elektr. Last und 44000µF Kondensator/ *dynamic at +50°C, with adjustable electrical load and 44000µF condenser*)

n 1/min. / *rpm*	soll, min. / *nominal, min.*	ist / *actual*	Spannung / *voltage*
8000	37A	____ A	13,5V konst. / const.
n 1/min. / *rpm*	Abregelspannung soll / *reg. voltage nom.*	Abregelspannung ist / *reg. voltage act.*	Prüflast
8000	14,2÷14,8 V	____ V	3÷10A

Regler / *regulator*: ____ **Diodenplatte / *diode plate:*** ____

Bemerkungen / *remarks*: ____

Unterschrift Prüfer / *Signature Tester*: ____ **Datum / *Date*:** ____ **Abt. / *Dep.*:** ____

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16.3) Form sheet for crack inspection

Formblatt Nr. KD-17-038/C-97 02 18

Materialprüfung / Material inspection
bei Instandsetzungen / *at repairs*

Magnetpulver-Rißprüfung für Motortype:
Magnaflux - inspection for engine type: .....

Motor S/N / Engine s/n: .....

Kurbelwellen S/N / Crankshaft s/n: .....

Propeller-Getriebe S/N / Propeller gear s/n: .....

Bezeichnung ***Description***	Teile Nr.: ***Part no.***	Anz**eichen / Findings** ***nein/no***	 ***ja/yes***	**Bemerkung** ***Remark***
Klauenrad / *Dog gear*		☐	☐	
Antriebsrad / *Drive gear.*		☐	☐	
Propellerwelle / *Propeller shaft*		☐	☐	
Magnetnabe / *Magneto flywheel.*		☐	☐	
Nockenwelle / *Cam shaft.*	HV 10 min.680			

Prüfer / *Tester* _____ Datum / *Date* _____ Abt./ *Dept.:* _____

Vert.: ACG Halter/*Owner* RP KD

04728 *fig. 208*

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The Sky is the Limit.SM

ROTAX®

AIRCRAFT ENGINES

Motornummer
Engine serial no.

Flugzeugtype
Type of aircraft

Flugzeugkennzeichen
Aircraft registration no.

ROTAX® Vertriebspartner

ROTAX® authorized distributor