

# SERVICE INSTRUCTION

## RUNNING MODIFICATIONS ON ROTAX® ENGINE TYPE 912 AND 914 (SERIES) SI-25-1997 R8

### Repeating symbols:

Please, pay attention to the following symbols throughout the Service Bulletin emphasizing particular information.

▲ **WARNING:** Identifies an instruction, which if not followed, may cause serious injury or even death.

■ **ATTENTION:** Denotes an instruction which if not followed, may severely damage the engine or could lead to suspension of warranty.

◆ **NOTE:** Information useful for better handling.

### 1) Planning information

#### 1.1) Engines affected

All versions of the engine type:

- 912 Series all
- 914 Series all
- all 912 pre-series engines
- all 914 pre-series engines

#### 1.2) Concurrent ASB/SB/SI and SL

none

#### 1.3) Reason

ROTAX® reserves the right to abandon or modify specifications, design, details, models or equipment at any time without obligation.

#### 1.4) Subject

Running modifications on ROTAX® engine type 912 and 914 (series).

#### 1.5) Compliance

NONE - For Information Only

▲ **WARNING:** Non-compliance with these instructions could result in engine damage, personal injury or death!

#### 1.6) Approval

The technical content is approved under the authority of DOA Nr. EASA.21J.048.

#### 1.7) References

In addition to this technical information refer to

- current issue of the Operator's Manual (OM)
- engine data sheet
- power, torque and fuel consumption curves
- current issue of the Illustrated Parts Catalog (IPC)
- Installation Manual (IM)
- all relevant Alert Service Bulletins (ASB)
- all relevant Service Bulletins (SB)
- all relevant Service Instructions (SI)
- all relevant Service Letters (SL)
- Maintenance Manual (MM)
- Users Guide

## 2) Material Information

### 2.1) Material - cost and availability

Price and availability will be supplied on request by ROTAX<sup>®</sup> Authorized Distributors or their Service Center.

### 2.2) Special tooling/lubricant-/adhesives-/sealing compound-

Price and availability will be supplied on request by ROTAX<sup>®</sup> Authorized Distributors or their Service Center.

## 3) Accomplishment / Instructions

All the measures must be taken and confirmed by the following persons or facilities:

- ROTAX<sup>®</sup> -Distributors or their Service Center
- Persons with the respective Aviation Authority

▲ **WARNING:** Proceed with this work only in a non-smoking area and not close to sparks or open flames. Switch off ignition and secure engine against unintentional operation. Secure aircraft against unauthorized operation. Disconnect negative terminal of aircraft battery.

▲ **WARNING:** Carry out work on a cold engine only.

▲ **WARNING:** Should removal of a locking device (namely lock tabs, self-locking fasteners) be required when undergoing disassembly/assembly, always replace with a new one.

◆ **NOTE:** All work has to be performed in accordance with the relevant Maintenance Manual.

### 3.1) Modified muffler clamp on engine 914

In the course of continuous development a modified muffler clamp part no. 851311 has been introduced instead of the exhaust clamp part no. 851310.

The tightening torque of the new clamp part no. 851311 is reduced from 20 Nm (180 in.lb.) to **15 Nm** (133 in.lb.).

### 3.2) Change of the slipping torque in the overload clutch

The slipping torque has been reduced to  $475 \pm 25$  Nm ( $350 \pm 18$  ft.lb.). Inspect has to be performed by ROTAX<sup>®</sup> authorized overhaul facilities.

### 3.3) Changing of the tightening torque for the oil pressure sensor

The tightening torque for the oil pressure sensor part no. 956357/956355 and 956410/956415 has been reduced from 30 Nm (266 in.lb) to **15 Nm** (133 in.lb) and must be considered for all 912 and 914 engines at the next assembly.

### 3.4) Changing of the tightening torque on the main current terminals of the starter relay and on the plus terminal of the electric starter

(see fig. 4)

The tightening torque of the cable connections on starter relay part no. 992819 and on electric starter has been reduced from 8 Nm (70 in.lb) to **4 Nm** (35 in. lb). The new tightening torque must be considered at assembly of all 912 and 914 engines.

Furthermore, if using the ROTAX<sup>®</sup> engine suspension frame, the fitting position of the electric starter is limited to only one position instead of formerly two positions, as otherwise the terminal (1) would collide with the engine frame.

### 3.5) Changing of the tightening torque for the resistance thermometer

The tightening torque of the resistance thermometer (airbox temperature sensor) part no. 966430 and 966435 has been reduced from 20 Nm (178 in.lb) to **15 Nm** (133 in.lb). The new tightening torque must be considered at next assembly of engine type 914.

### 3.6) Determination of the tightening torque for screw nipple of Bowden cable

Tighten torque for screw nipple of Bowden cable part no. 897941 (servo motor) has been specified to **2,5 Nm** (22 in.lb). This tightening torque must be considered at next assembly of engine type 914.

### 3.7) Introduction of a new O-ring as replacement part on the choke valve

(see fig. 2)

On the 912/914 carburetor parts list the O-ring part no. 850510 has been replaced by O-ring part no. 950420. But consider when ordering parts, that the O-ring part no. 850510 remains in the list for the spare parts service of the electric starter 912/914.

### 3.8) Trigger coil kit part no. 965175 is not available any longer

(see fig. 3, 20, 21 and 22)

The trigger coil kit part no. 965175 and the trigger coil for the rev-counter part no. 264080 will no longer be supplied. For parts service the trigger coil kit part no. **965176** and rev-counter trigger coil part no. **264086** have to be ordered. Old and new version of these items are interchangeable but take note of the different trigger gap.

Trigger gap for the NEW trigger coil: **0,3 - 0,4 mm (0,012 - 0,016 in.)**

◆ NOTE: The fixation of the trigger coil is changed from cylindrical bore with centering to elongated bore. Take care of correct assembly. (see fig. 21)

### 3.9) Employment of exhaust mufflers on ROTAX® 912 engines:

The exhaust muffler part no. 973670 especially designed for the ROTAX® engines 912 S/ULS can be used also on the ROTAX engines 912 UL/A/F. Engine performance and specific fuel consumption remain unchanged or are slightly better when using this muffler part no. 973670.

The main advantage is the weight reduction. The weight is 2,2 kg, making this muffler 0,3 kg lighter than the muffler part no. 978482.

By optimizing the design of the muffler part no. 973670 the noise emission may seem subjectively higher compared with muffler part no. 978482. The exact measuring of the actual noise emission can be conducted only when the muffler is installed in the aircraft.

### 3.10) Adjustment of the tightening torque of the crankcase fasteners

Owing to continuous development and standardization the Allen screws M6, M8 and M10 of the crankcase joint have been introduced in the strength group 10.9 and with DACROMET®-coating.

◆ NOTE: DACROMET®-screws can be recognized by their silver metallic finish. Up to now these screws were bright galvanized and are recognizable by the yellow finish.

The tightening torque for the Allen screw M8 in DACROMET®-coating has been changed from 25 Nm to **30 Nm** (266 in.lb).

The tightening torque for the Allen screws M6 was increased from 10 Nm to **12 Nm** (107 in.lb).

The tightening torque for the Allen screws M10 remains unchanged at 35 Nm (310 in.lb).

■ ATTENTION: The Allen screws M8 of the galvanized type must not be tightened in excess of 25 Nm (221 in.lb).

The new type of Allen screws and the newly specified tightening torque are already in use on the following engines and must be considered on the next engine repair or overhaul:

- 912 UL commencing with engine S/N 4,403.811
- 912 ULS commencing with engine S/N 4,425.963
- 912 ULSFR commencing with engine S/N 4,429.535
- 912 A commencing with engine S/N 4,410.402
- 912 F commencing with engine S/N 4,412.807
- 912 S commencing with engine S/N 4,922.568
- 914 UL commencing with engine S/N 4,417.896
- 914 F commencing with engine S/N 4,420.215

**List of part no.:**

| item no. | New part no. | Qty. | Description         | Old part no. | application                        |
|----------|--------------|------|---------------------|--------------|------------------------------------|
|          | 440427       | 2    | Allen screw M8x100  | 440421       | crankcase                          |
|          | 640932       | 1    | Allen screw M8x90   | 440361       | crankcase                          |
|          | 440217       | 2    | Allen screw M8x80   | 440211       | crankcase                          |
|          | 841847       | 1    | Allen screw M8x65   | 841841       | crankcase                          |
|          | 640942       | 2    | Allen screw M8x45   | 841561       | crankcase 912                      |
|          | 640942       | 1    | Allen screw M8x45   | 841561       | crankcase 914                      |
|          | 840887       | 9    | Allen screw M6x30   | 840880       | crankcase                          |
|          | 440107       | 1    | Allen screw M8x50   | 841566       | crankcase 914                      |
|          | 941487       | 1    | Allen screw M10x110 | 941481       | crankcase*/engine suspension frame |
|          | 640572       | 2    | Allen screw M10x50  | 841946       | engine suspension frame assy. 914  |
|          | 840947       | 3/1  | Allen screw M10x35  | 840941       | engine suspension frame assy.      |

\* On the crankcase joint a lock washer part no. 945753 has to be used together with a washer.

◆ NOTE: In case of repair use exclusively DACROMET®-screws for the crankcase joint.

■ **ATTENTION:** Use only genuine ROTAX® replacement parts. Use of replacement parts other than ROTAX® parts will render any warranty granted by ROTAX® null and void (see warranty conditions).

### 3.11) Introduction of a new expansion tank assy.

(see fig. 5, 6 and 7)

In the course of further development and standardization the position of the expansion tank (1) has been optimized!

In this connection the following modifications became necessary:

- position of connection (2) to overflow bottle (from 0° to 30±3°)
- position of connection (3) to radiator (from 51° to 27±3°)
- angle of inlet socket (4) from cylinder 4 (34° inclined)
- length of inlet socket (5) from cylinder 3 (length increased by 13,4±3 mm)
- length of coolant hose (6) from cylinder 1 (length increased from 270 mm to 285 mm)
- length of coolant hose (7) from cylinder 4 (shortened from 100 mm to 85 mm)
- new spring type hose clamps (8) to attach the coolant hoses (expansion tank and water pump)

The new expansion tank and the new type of hose clamps have been already installed on the following engines:

- 912 UL commencing with engine S/N 4,404.020
- 912 ULS commencing with engine S/N 4,426.395
- 912 ULSFR commencing with engine S/N 4,429.589
- 912 A commencing with engine S/N 4,410.419
- 912 F commencing with engine S/N 4,412.808
- 912 S commencing with engine S/N 4,922.606
- 914 UL commencing with engine S/N 4,417.949
- 914 F commencing with engine S/N 4,420.235

**List of part no.:**

| Item no. | New part no. | Qty. | Description          | Old part no. | Application    |
|----------|--------------|------|----------------------|--------------|----------------|
| 1        | 922665       | 1    | expansion tank assy. | 922398       | cooling system |
| 8        | 851640       | 16   | spring type clamp    | 251875       | cooling system |
| 6        | *)           | 1    | coolant hose 285 mm  | 922542       | cylinder 1     |
| 7        | *)           | 1    | coolant hose 85 mm   | 922541       | cylinder 4     |

\*) water hose in meters part no. 922250.

- ◆ **NOTE:** Engines equipped with the old expansion tank, old hose clamps and coolant hoses of old length do not have to be retro fitted with the new equipment!  
At engine repair/general overhaul be aware that because of the small distance of the tubes (between cylinder 1 and 3) the spring type hose clamps can not be fitted on the expansion tank part no. 922398.  
Due to the different inlet and outlet positions on the expansion tanks, hoses of different length are required. Always verify correct hose length and slip-on length.

**Special tools:**

| Item no. | New part no. | Qty. | Description                       | Old part no. | Application       |
|----------|--------------|------|-----------------------------------|--------------|-------------------|
|          | 877840       | 1    | spring clamp pliers <sup>1)</sup> |              | spring type clamp |

<sup>1)</sup> e.g. HAZET®, BERNER® or equivalent. See fig. 7.

**Assembly:**

- Inspect the rubber plate (10).
- ◆ **NOTE:** Wear of up to 1 mm from original thickness can be tolerated!
- Install the coolant hose (6) 285 mm to cylinder 1 and the new coolant hose (7) 85 mm to cylinder 4. For attaching all the coolant hoses from expansion tank, water pump, cylinders, use the new spring type clamps.
- **ATTENTION:** Take care of appropriate slip-on length of the coolant hoses on the corresponding connection socket. Verify tight fit of clamps and hoses and check for leakage. Always fit the clamps such that they can not wear on any component and use a suitable tool (see fig. 7) for fitting them.

**3.12) Change of tolerance of axial clearance on electric starter**

(see fig. 8)

Owing to experience the following tolerance has been changed. Observe this change at engine repair / general overhaul:

| Electric starter         | new                                    | wear limit            |
|--------------------------|--|-----------------------|
| Rotor, axial clearance ⑨ | .. 0,1 ÷ 0,4 mm<br>(0,004 - 0,016 in.) | 0,7 mm<br>(0,028 in.) |

- Re-connect negative terminal of the aircraft battery after completion of any work.

**3.13) Introduction of a new throttle potentiometer for ROTAX® engine type 914**

(see fig. 9-12)

Owing to continuous further development and standardization, a new throttle potentiometer part no. 966481 (1) has been introduced.

In this connection the following modifications became necessary:

- New adapter flange (2) for attachment of the new throttle potentiometer.

Engines mentioned below are already standard equipped with the new throttle potentiometer and the new adapter flange:

- 914 F commencing engine S/N 4,420.316
- 914 UL commencing engine S/N 4,418.107

parts requirement:

| Fig item no | New part no | Qty per engine | Description            | Old part no | application |
|-------------|-------------|----------------|------------------------|-------------|-------------|
| (1)         | 966481      | 1              | throttle potentiometer | 966480      | ROTAX® 914  |
| (2)         | 861931      | 1              | adapter flange         | 861930      |             |

- ◆ **NOTE:** Do not retrofit engines with the old throttle potentiometer and the old adapter flange!
- **CAUTION:** When using the new potentiometer part no. 966481 on an existing CD carburetor you will also need adapter flange part no. 861931. Same also applies when replacing the existing adapter flange part no. 861930. Here the new potentiometer part no. 966481 must be used. When using the new throttle potentiometer or adapter flange, however, it has to be observed that in case of repair or major overhaul new calibration of the throttle position according to the latest Maintenance Manual ROTAX® 914 must be carried out.

### **Inspection of the throttle potentiometer:**

The disassembly, inspecting and installation of the new throttle potentiometer has to be performed in accordance with the relevant Maintenance Manual ROTAX® 914, and the following changes are to be considered in the resistance values.

- Measuring of resistance across turning range of fitted throttle.

To inspect the function of the throttle position potentiometer over operating range take the following readings:

**Resistance between the terminals (5) and (6):**(see fig. 10)

Throttle **open** (throttle lever pos. 115%): value must be less than 3,8 kΩ .

Throttle **closed** (throttle lever pos. 0%): value must be more than 100 Ω.

### **3.14) Introduction of new exhaust bends and exhaust manifold on ROTAX® 914**

(see fig. 13 to 15)

Owing to continuous further development, the exhaust bends were slightly re-worked. The couplings were optimized for their position.

- Position of the EGT connections (6) to the exhaust bends for cylinders 3 and 4 were routed such that installation of the new drip trays is possible.

The new exhaust bends and the new exhaust manifold have already been built into all of the following engines:

- 914 F commencing with engine S/N 4,420.364
- 914 UL commencing with engine S/N 4,418.248

parts requirement:

| <b>Fig item no</b> | <b>New part no</b> | <b>Qty per engine</b> | <b>Description</b>       | <b>Old part no</b> | <b>application</b> |
|--------------------|--------------------|-----------------------|--------------------------|--------------------|--------------------|
| 1                  | 979425             | 1                     | exhaust bend assy cyl. 1 | 979420/421/422     | ROTAX® 914         |
| 2                  | 979435             | 1                     | exhaust bend assy cyl. 2 | 979430/431/432     | ROTAX® 914         |
| 3                  | 979445             | 1                     | exhaust bend assy cyl. 3 | 979440/441/442     | ROTAX® 914         |
| 4                  | 979455             | 1                     | exhaust bend assy cyl. 4 | 979450/451/452     | ROTAX® 914         |
| 5                  | 979413             | 1                     | exhaust manifold         | 979411             | ROTAX® 914         |

◆ **NOTE:** If replacement of any single old part number is necessary, you must replace it with the same old part number. If the old part number is not available, the entire assembly including all 4 pipes and manifold must be replaced with new part numbers. New style pipes and manifold are not interchangeable with old style.

### **3.15) Introduction of new radiator cap**

(see fig. 16)

Owing to continuous further development and standardization in other engines the radiator cap with higher 1,2 bar (18 psi) opening pressure have been introduced.

The new radiator cap have already been built into all of the following engines:

- 912 A commencing with engine S/N 4,410.624
- 912 F commencing with engine S/N 4,412.864
- 912 S commencing with engine S/N 4,923.018
- 912 UL commencing with engine S/N 4,405.962
- 912 ULS commencing with engine S/N 5,643.240
- 912 ULSFR commencing with engine S/N 4,429.958
- 914 F commencing with engine S/N 4,420.412
- 914 UL commencing with engine S/N 4,418.628

#### **List of part no:**

| <b>Fig item no</b> | <b>New part no</b> | <b>Qty per engine</b> | <b>Description</b> | <b>Old part no</b> | <b>application</b>               |
|--------------------|--------------------|-----------------------|--------------------|--------------------|----------------------------------|
|                    | 922070             | 1                     | radiator cap       | 922075             | ROTAX® 912 (Series)/914 (Series) |

#### **3.15.1) Interchangeability of parts**

- All parts are interchangeable

### 3.16) Introduction of new carburetor flange

(see fig. 17 to fig. 19)

Owing to continuous further development and standardization in other engines the carburetor flange part no. 267788 introduced.

The new carburetor flange have already been built into all of the following engines:

- 912 A commencing with engine S/N 4,410.629
- 912 F commencing with engine S/N 4,412.868
- 912 S commencing with engine S/N 4,923.041
- 912 UL commencing with engine S/N 4,406.140
- 912 ULS commencing with engine S/N 5,643.549
- 912 ULSFR commencing with engine S/N 4,429.962
- 914 F commencing with engine S/N 4,420.421
- 914 UL commencing with engine S/N 4,418.676

#### List of part no:

| Fig item no | New part no | Qty per engine | Description       | Old part no | application                      |
|-------------|-------------|----------------|-------------------|-------------|----------------------------------|
|             | 267788      | 1              | carburetor flange | 267787      | ROTAX® 912 (Series)/914 (Series) |

■ **CAUTION:** Due to differences in spacing **don't use** the distance sleeve (1) included in delivery of the carburetor flange part no. 267788 in combination with the carburetor flange part no. 267787.

■ **CAUTION:** **Don't use** aluminum insert included in delivery of the carburetor flange part no. 267785 or 267780 in combination with the carburetor flange part no. 267788.

#### 3.16.1) Interchangeability of parts

- At exchange, take care of the following:
- If replacement of part no. 267788 is necessary **both** carburetor flange are to be replaced per engine. (Do not mix new style with old style on the same engine)
- Tighten clamp (2) of the carburetor flange part no. 267788 with tightening torque 2.5 Nm (22 in.lb ) (see fig. 19) .

### 3.17) Introduction of a new trigger coil part no. 264086 and trigger coil kit part no. 965179

(see fig. 20, 21, 22)

In the course of continuous development and for better assembly and maintenance a new trigger coil (part no. 264086) and trigger coil kit (part no. 965179) are introduced.

In this connection following modifications become necessary:

- The cylindrical fixation bore with centering are now carried out as elongated bore (fig. 20).
- 5 additional washers are necessary for fixation.

The new trigger coil kit and trigger coil have been already installed on the following engines:

- 912 A commencing with engine S/N 4,410.661
- 912 F commencing with engine S/N 4,412.888
- 912 S commencing with engine S/N 4,923.167
- 912 UL commencing with engine S/N 4,407.200
- 912 ULS commencing with engine S/N 5,644.871
- 912 ULSFR commencing with engine S/N 4,430.123
- 914 F commencing with engine S/N 4,420.473
- 914 UL commencing with engine S/N 4,419.037

### List of part no.:

| Fig<br>item no. | New<br>part no. | Qty.<br>per engine | Description           | Old<br>part no. | Application |
|-----------------|-----------------|--------------------|-----------------------|-----------------|-------------|
| 1               | 965179          | 1                  | trigger coil kit      | 956178          | ignition    |
| 2               | 264086          | 1                  | trigger coil          | 264085          | ignition    |
| 3               | 827800          | 5                  | washer A 5,5 DIN 6902 |                 |             |

The trigger coil kit part no. 965177 (before standardization of the ignition), see SI-912-013/914-016, is further on available under part no. 965177 with 5 additional washers part no. 827800 and a changed trigger coil fixation.

Trigger gap for trigger coil part no. 264086 (see fig. 22, measure IH02): **0,3 - 0,4 mm**

■ CAUTION: Because of the elongated bore are 5 additional washers part no. 827800 necessary for assembly.

■ CAUTION: Because of no centering of the new trigger coil and clearance between screw and elongated bore, all trigger coils have to be pushed clockwise on block during adjustment of the trigger coil gap (see fig. 21).

■ CAUTION: For adjustment of the trigger coil gap a feeler gauge has to be used.

### 3.18) Correction of tightening torque for fly wheel hub on ROTAX<sup>®</sup> 912/914 Series

The tightening torque of hex. screw M16x1,5 for fly wheel hub has been reduced from 60 Nm (530 in.lb) +180° to 45 Nm (400 in.lb) +180° (pre-tighten to 45 Nm + subsequent angle of rotation of 180°) and has to be considered on all 912 and 914 engines at the next assembly.

### 3.19) Summary

The instructions have to be conducted accordingly.

Approval of translation to best knowledge and judgement - in any case the original text in German language and the metric units (SI-system) are authoritative.



#### 4) Appendix

The following drawings should convey additional information:

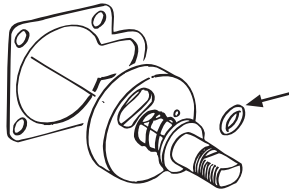
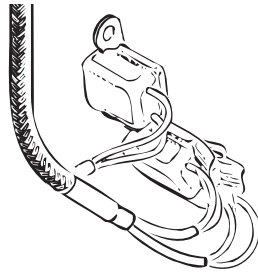


fig. 2

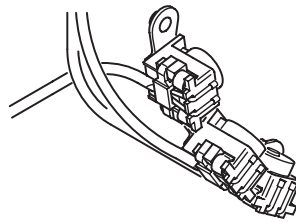
02979

O-Ring TNr. **850510**  
 Identifizierung: schwarz  
 O-ring part no. **850510**  
 Identification: black colour  
 Alt (old)

O-Ring TNr. **950420**  
 Identifizierung: grün  
 O-ring part no. **950420**  
 Identification: green colour  
 Neu (new)



Alt (old)



Neu (new)

02980

fig. 3

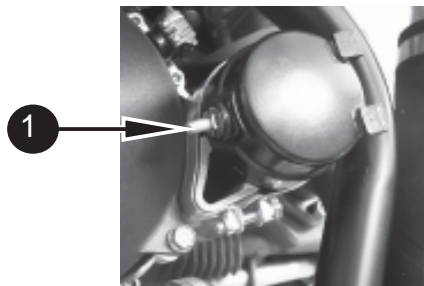
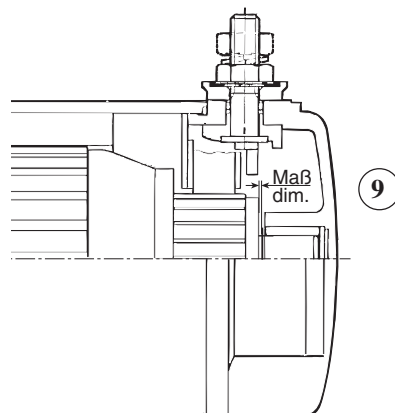


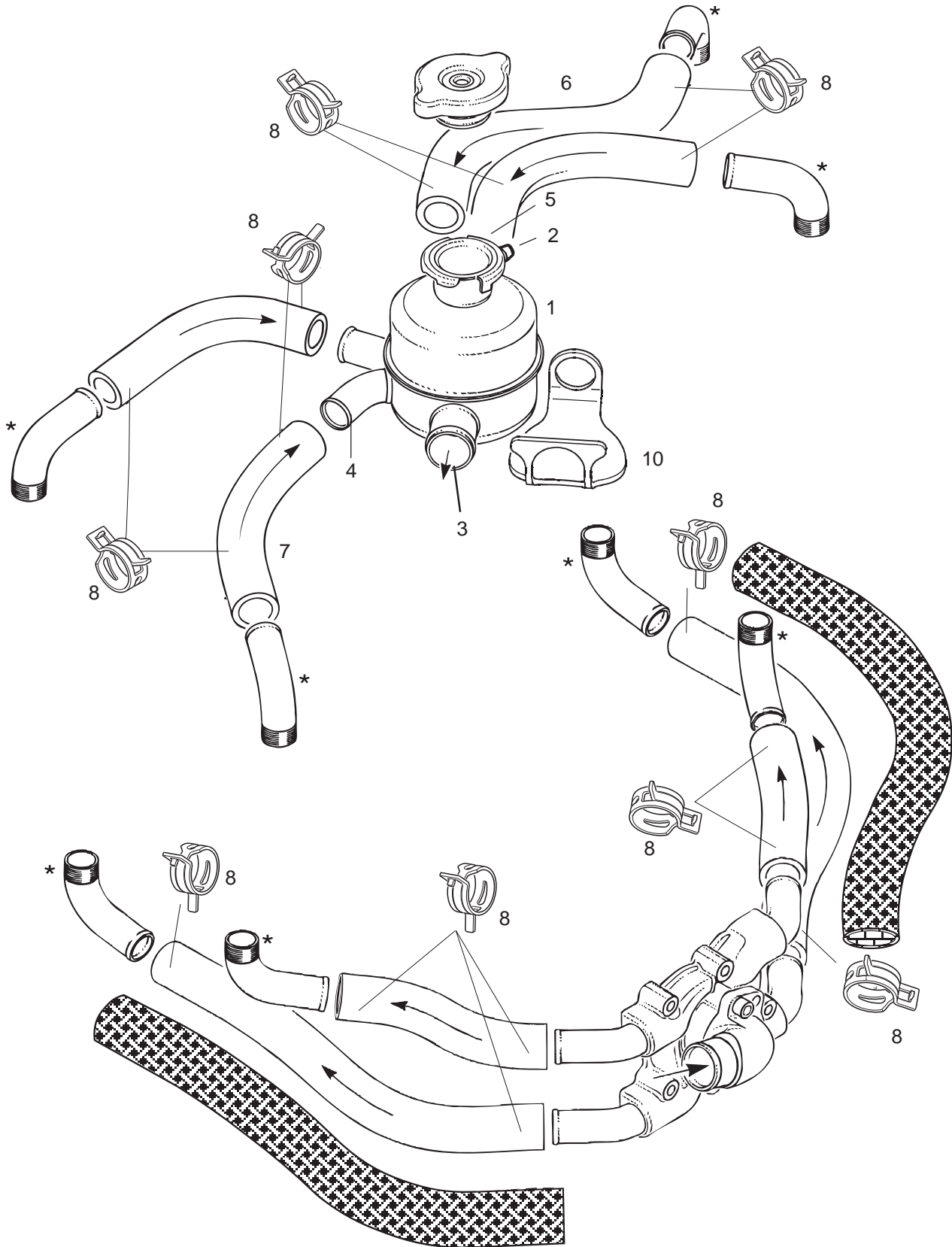
fig. 4

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fig. 8



04555

fig. 5

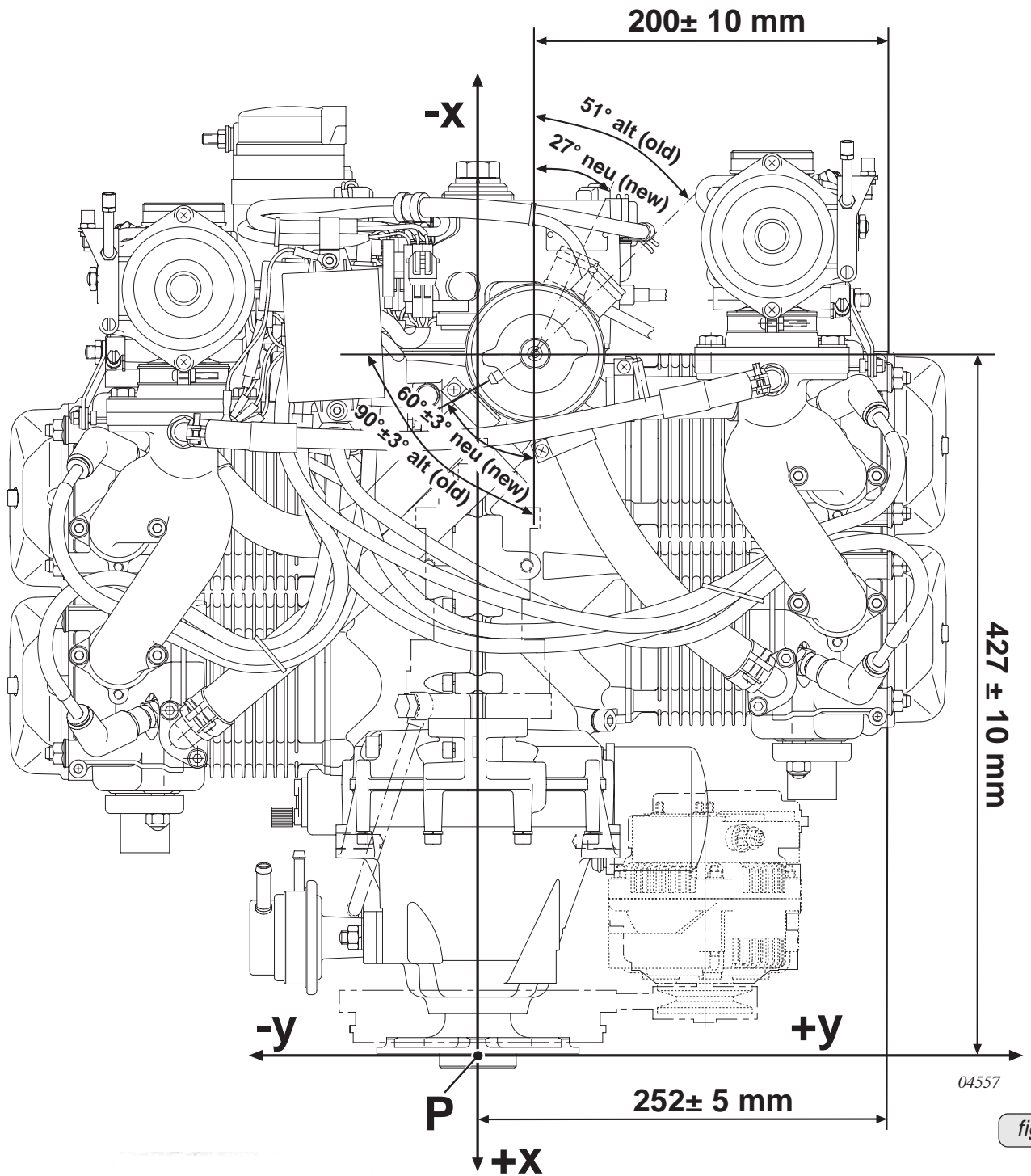
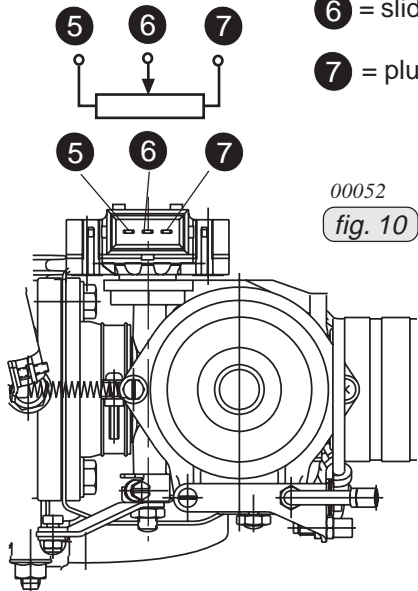


fig. 6



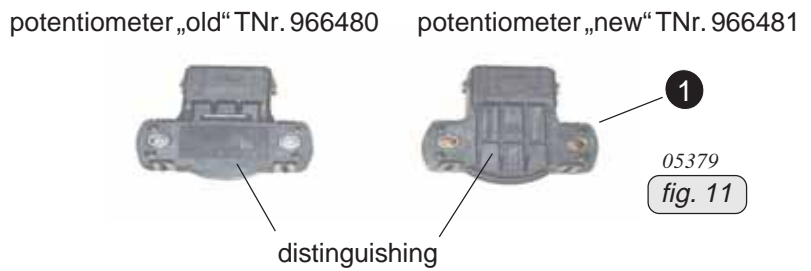
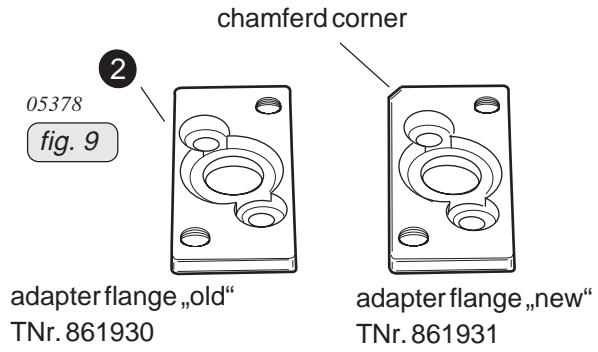
04593

fig. 7

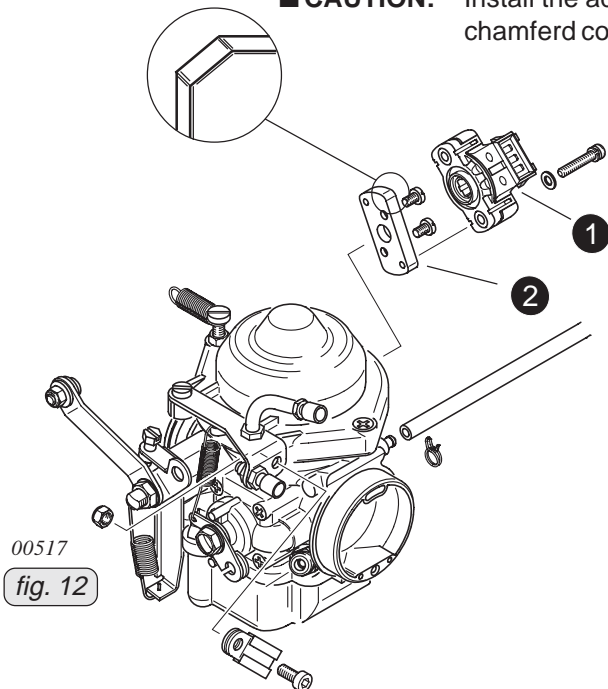


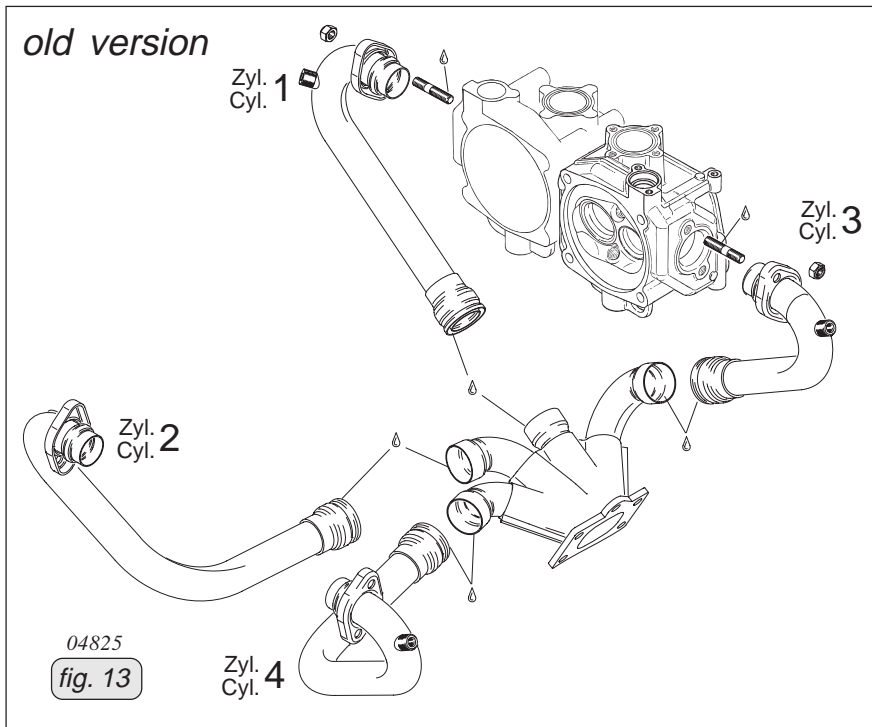
- 5 = minus
- 6 = slider connection
- 7 = plus

00052  
fig. 10

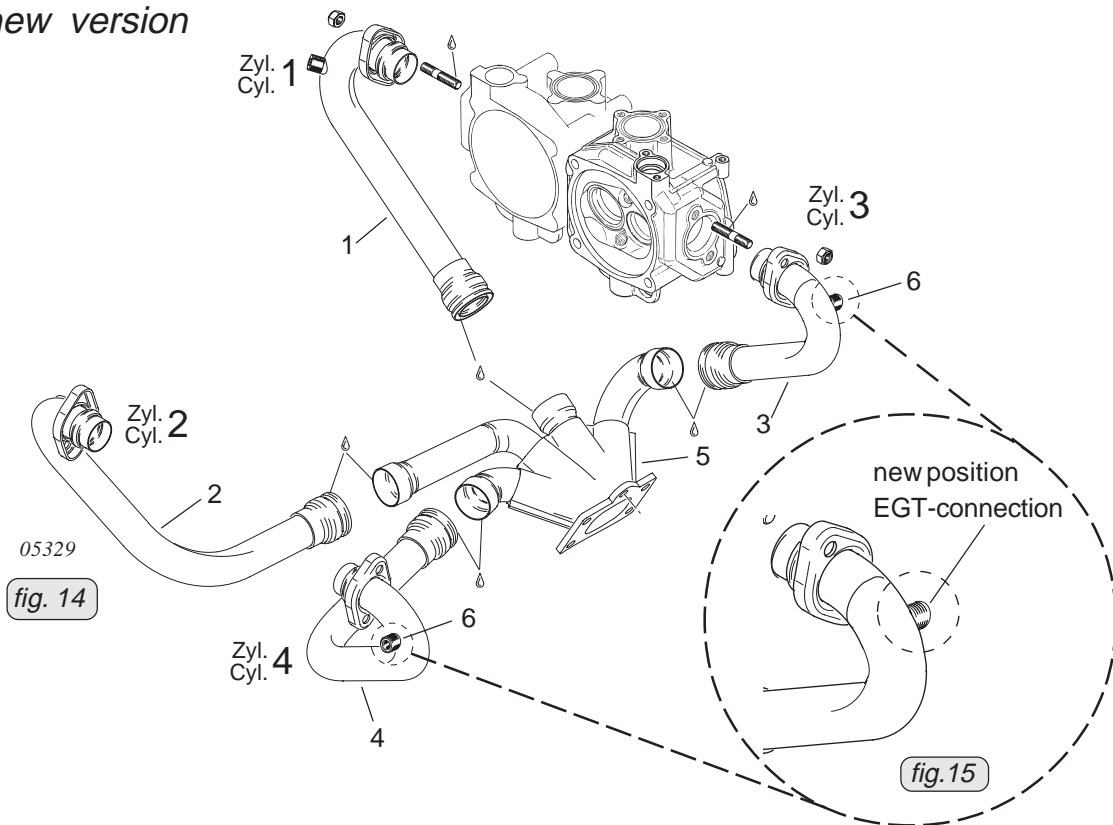


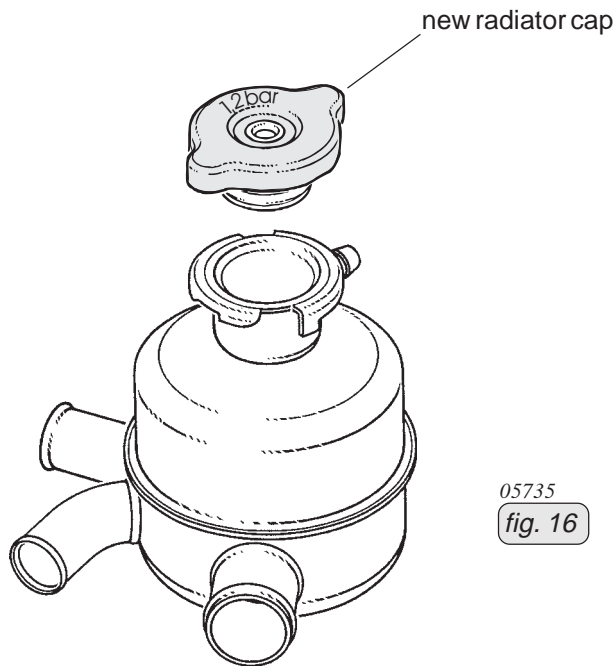
**CAUTION:** Install the adapter flange with the position chamferd corner up side.



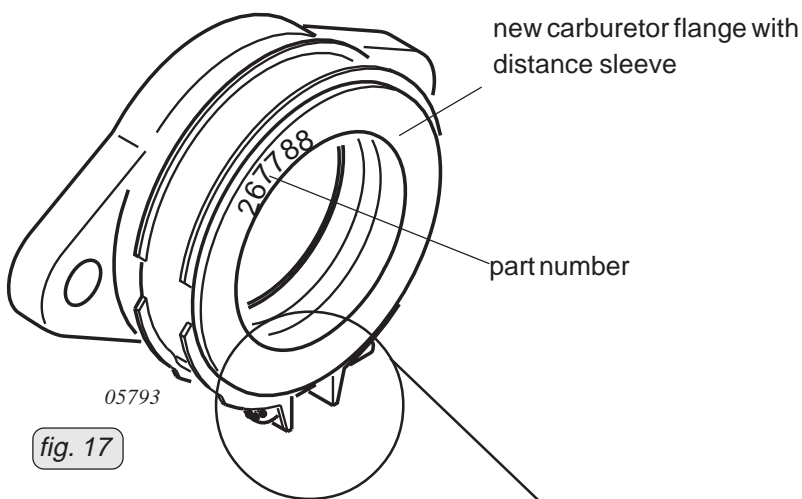


*new version*





05735  
fig. 16



05793  
fig. 17

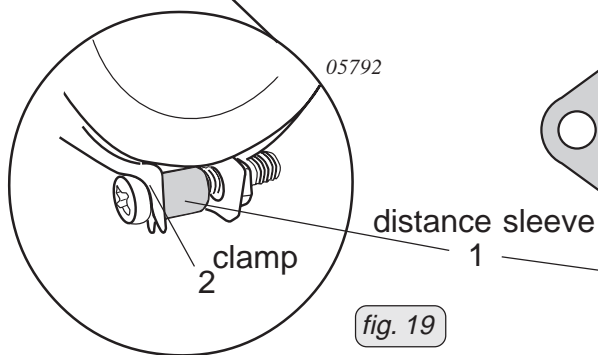


fig. 19

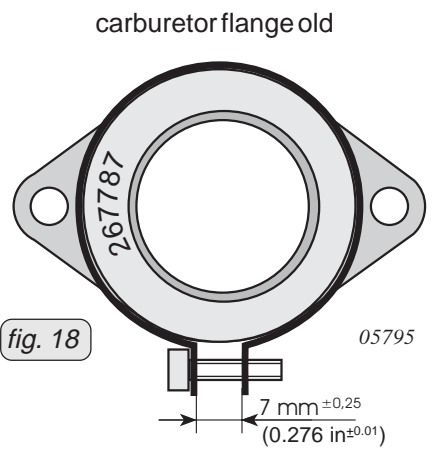
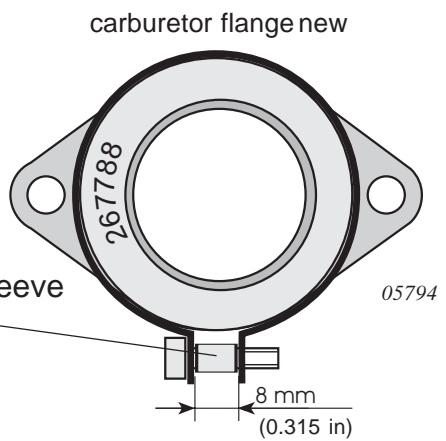


fig. 18

05795



05794

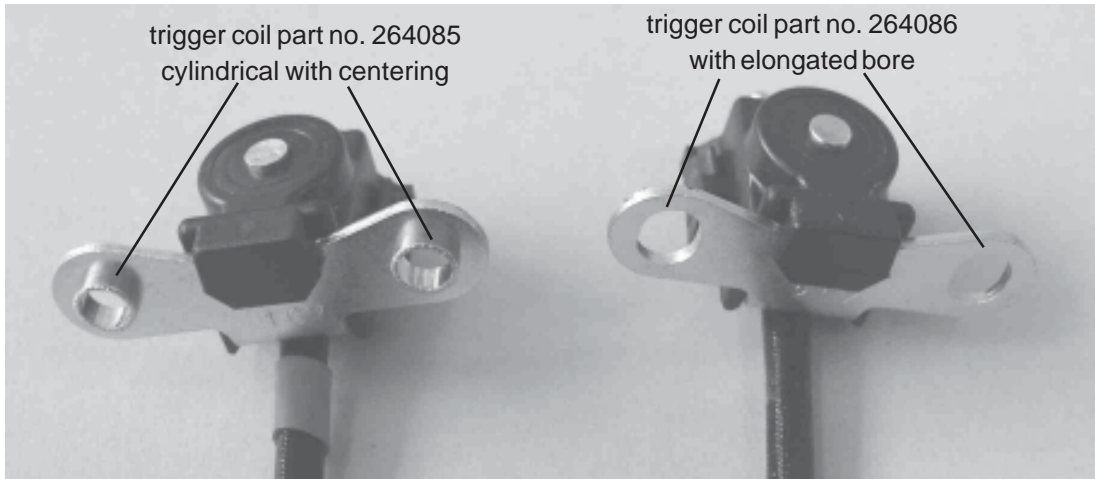


fig. 20 07138

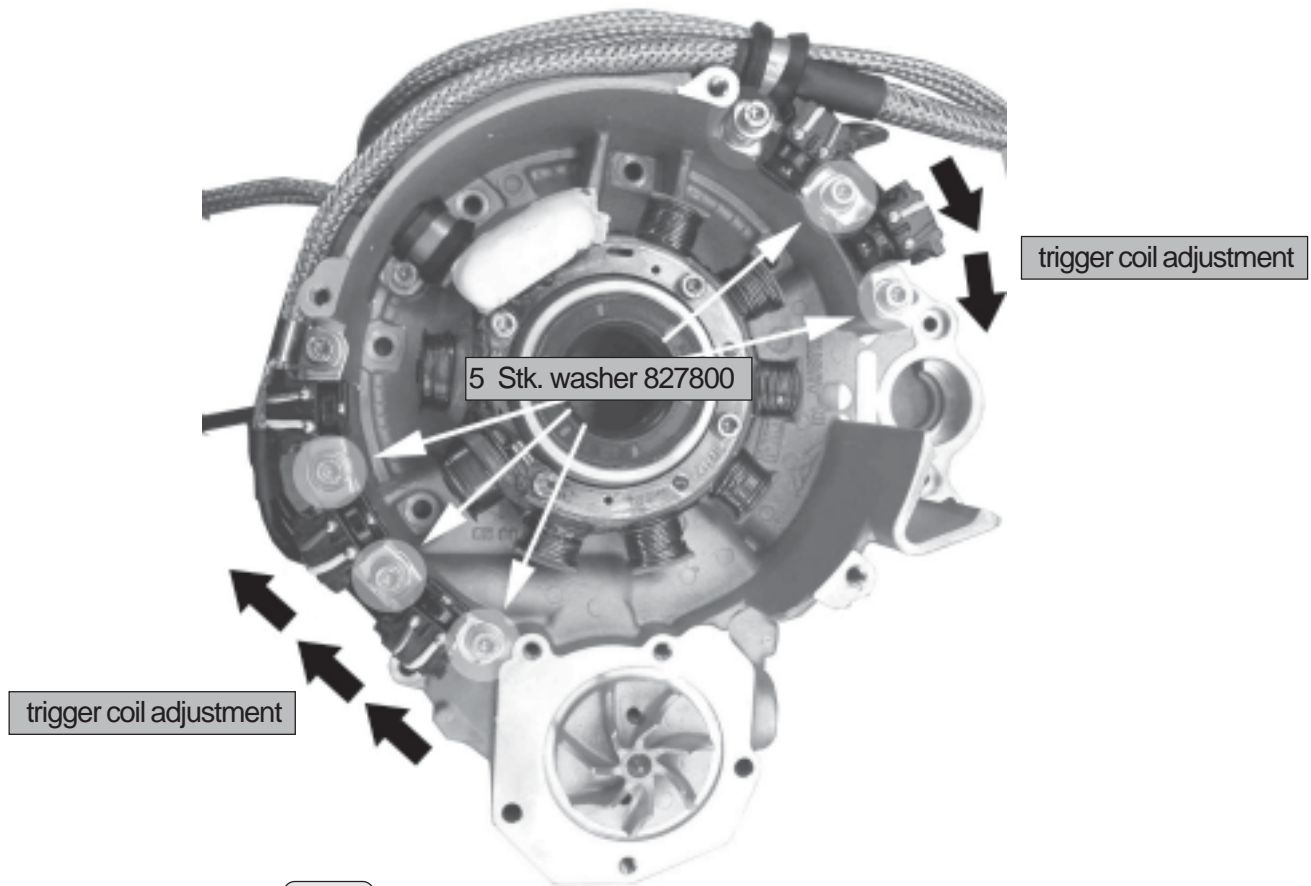


fig. 21

07139

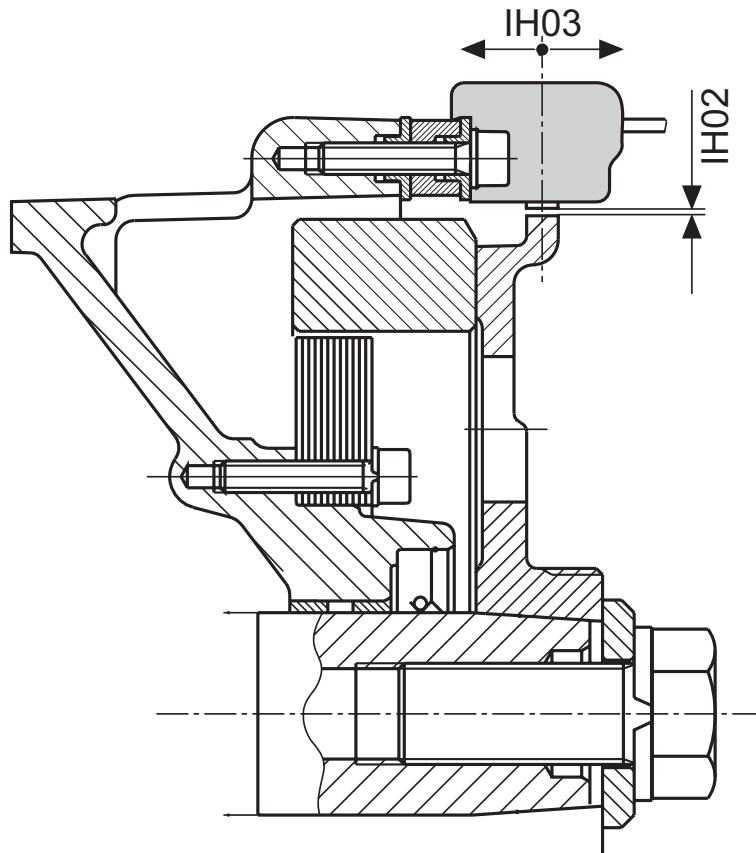


fig. 22 06710

◆ NOTE: The illustrations in this document show the typical construction. They may not represent full detail or the exact shape of the parts which have the same or similar function.  
Exploded views are **not technical** drawings and are for reference only. For specific detail, refer to the current documents of the respective engine type.