



# SERVICE BULLETIN

## INSPECTION OR REPLACEMENT OF THE ROCKER ARMS AND VALVE PUSH-RODS FOR ROTAX® ENGINE TYPE 912 AND 914 (SERIES)

SB-912-035 R1

SB-914-021 R1

### **MANDATORY**

#### Repeating symbols:

Please, pay attention to the following symbols throughout this document emphasizing particular information.

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

##### Group A)

- 912 A from S/N 4,410.472 to S/N 4,410.553
- 912 F from S/N 4,412.817 to S/N 4,412.824
- 912 S from S/N 4,922.768 to S/N 4,922.866
- 914 F from S/N 4,420.314 to S/N 4,420.355

In addition, are also affected, all engines installed with valve push-rods part no. 854158, has installed from October 1<sup>st</sup> 2001 to July 5<sup>th</sup> 2002 at engine repair / general overhaul.

Following engines were already retrofitted and are not affected:

- 912 A: from S/N 4,410.546 to S/N 4,410.548
- 914 F: from S/N 4,420.342 to S/N 4,420.348
- 912 S: S/N 4,922.769

- ◆ **NOTE:** All engines which have already carried out an inspection, according to the initial issue are not affected by the Service Bulletin revision 1.

##### Group B)

Field experience indicates that an inspection of the following additional engine serial numbers is necessary:

- 912 A from S/N 4,410.462 to S/N 4,410.471
- 912 F S/N 4,412.816
- 912 S from S/N 4,922.742 to S/N 4,922.767
- 914 F from S/N 4,420.309 to S/N 4,420.313

In addition, are also affected, all engines installed with valve push-rods part no. 854158, has installed from July 1<sup>st</sup> 2001 to September 30<sup>st</sup> 2001 at engine repair / general overhaul.

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

Further to this service bulletin, the following additional service instructions must be observed and complied with:

- Service Instruction SI-912-009 / SI-914-010, "Introduction of a new rocker arm bushing" current issue.

##### 1.3) Reason

It has been established, that on the valve gear there may be wear and tear on the rocker arm ball joint (female) which in consequence may cause rocker arm cracking as a result of the production deviation ( that affects the engines listed section 1.1).

d01877

#### 1.4) Subject

Inspection or replacing the rocker arms and valve push-rods for ROTAX<sup>®</sup> engine type 912 (series) and 914 (series).

#### 1.5) Compliance

##### Group A)

- for engines that have not run yet and engines with up to 25 hours of operation, performing inspection of the rocker arms and push-rods according to the instructions below, at their first 25<sup>h</sup> check, but in any event no later than on December 1, 2002.
- for all engines with more than 25 hours of operation, perform inspection of the rocker arms and push-rods within the next 10 hours of operation according to the instructions below, but in any event no later than on December 1, 2002.

##### Group B)

- for all engines, which have been operated for not more than 50 hours, perform inspection of the rocker arms and pushrods within the next 10 hours of operation according to the instructions below, but in any event no later than on December 1, 2002.

#### 1.6) Approval

The technical content of this Service Bulletin has been approved by ACG.

#### 1.7) Manpower

Estimated man-hours:

engine installed in the aircraft - - - manpower time will depend on installation and therefore no estimate is available from the engine manufacturer.

#### 1.8) Mass data

change of weight - - - none.

moment of inertia - - - unaffected.

#### 1.9) Electrical load data

no change

#### 1.10) Software accomplishment summary

no change

#### 1.11) References

In addition to this technical information refer to current issue of

- all relevant Service Instructions (SI)
- Maintenance Manual (MM)

#### 1.12) Other publications affected

none

#### 1.13) Interchangeability of parts

- All old parts are stopped from further use and must be returned F.O.B. to authorized ROTAX<sup>®</sup> Authorized Distributors or their Service Center.
- Further sale, use or shipment of all valve push-rods part no. 854158 in stores (e.g. replacement parts) are prohibited and must be returned F.O.B. to authorized ROTAX<sup>®</sup> Authorized Distributors or their Service Center.

## 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) Company support information

- The damages and costs incurred, namely with respect to shipping cost, down time, loss of income, telephone costs or costs of conversion to other engine versions or additional work, including simultaneous engine overhaul, are not covered in the scope and will not be borne or reimbursed by ROTAX<sup>®</sup>.

### 2.3) Material requirement per engine

Parts requirement: **Group: A**

<b>Fig.no.</b>	<b>New p/n</b>	<b>Qty/engine</b>	<b>Description</b>	<b>Old p/n</b>	<b>Application</b>
	881842	1	rocker arm set		cylinder head
consisting of:					
	-	4	rocker arm left	854381	cylinder head
	-	4	rocker arm right	854391	cylinder head
	854860	8	valve push-rod assy.	854158	cylinder head
	-	4	O-ring 105x2,5	250285	valve cover
	-	4	O-ring 6,4x1,8	430205	valve cover
	-	4	allen screw M6x30	840887	valve cover
	-	4	washer 6,0/12/1	927941	valve cover

Parts requirement: **Group: B**

Additional to Group A

<b>Fig.no.</b>	<b>New p/n</b>	<b>Qty/engine</b>	<b>Description</b>	<b>Old p/n</b>	<b>Application</b>
	933395	8	bushing	-	rocker arm

### 2.4) Material requirement per spare part

none

### 2.5) Rework of parts

none

### 2.6) Special tooling/lubricant-/adhesives-/sealing compound - Price and availability

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

Parts requirement:

<b>Fig.no.</b>	<b>p/n</b>	<b>Qty/engine</b>	<b>Description</b>	<b>Old p/n</b>	<b>Application</b>
	-	1	valve spring mounting device assy.	877387*	valve spring
	-	NB	slide paste MOLYKOTE <sup>®</sup> G-N	297433	rocker arm bearing

\* or equivalent e.g. valve spring mounting device assy. part no. 877385.

■ **CAUTION:** In using these special tools, observe the manufacturer's specifications.

### 3) Accomplishment / Instructions

#### Accomplishment

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

- ROTAX<sup>®</sup> -Airworthiness representative
- ROTAX<sup>®</sup> -Distributors or their Service Centers
- Persons approved by 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 a locking device be removed (namely lock tabs, self-locking fasteners) 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) Instructions

(see fig. 1, 2 and 3)

##### 3.1.1) Removing the rocker arms

◆ **NOTE:** On standard applications, the replacement of the rocker arms can be carried out with engine installed in aircraft.

- Remove the spark plug connector and the four top spark plugs.

■ **CAUTION:** Prevent entering of foreign substance through spark plug hole.

- Loosen Allen screw (1) M6x30 with washer (2) from valve cover (3), and remove it together with large and small O-rings (4) and (5).
- Turn crankshaft so that the respective piston is exactly on ignition top dead center. Loosen the external cap nut (6).

■ **CAUTION:** Do not loosen the other nuts. During the removal of the cylinder head nut, the head stud may come loose requiring re-installation as per current Maintenance Manual. In the event that in loosening head nut, the stud becomes loose, retighten it with 3 Nm (26 in.lb).

- Attach the support plate (12) to the valve spring loading jig (7) with 2 hex. screws (13) M6x16 at the attachment points (14) on the cylinders.
- Put adapters (15) on the valve spring loading jig.
- Attach the valve spring loading jig on cylinder head and support plate with 2 Allen screws (8) M6x70 and depress both valves with 3 turns.

▲ **WARNING:** When attaching the loading jig, take care to depress the valve with the valve spring simultaneously. Push close the valve if need be. Otherwise there is risk that the valve cotters are not in place or may drop out.

- This will relieve both hydraulic tappets. Now the rocker arm shaft (9) may be easily pulled out. Lift out both rocker arms (10) and (11).

◆ **NOTE:** If you cannot pull out the rocker arm shaft easily, you will need to contact an Authorized Distributor for further action.

### 3.1.2) Inspection of the rocker arms and push-rods

(see fig. 3 and 4)

- Visually inspect all rocker arms and push-rods for damage or wear and tear. You may reuse the parts, provided that the accomplishment of the instructions of rocker arms and push-rod did not substantiate damages or traces of wear.

◆ **NOTE:** Detailed visual inspection particularly in the rocker arm ball joint (female) area.  
See fig. 4.

- Inspect both push-rod ball joints (male) for imperfections. Inspect it with a magnifying glass and carry out a fingernail test on the push-rod ball joints. To perform the fingernail test, move the fingernail gently over the ball joints. If any noticeable grooves are detected, parts are not any more reusable.

- Inspect rocker arm ball joint (female) (18). Traces of wear on the rocker arms are noticeable by geometric changes of the spherical form and smoothed areas in the ball joint shine brightly. Should the engine not have been running for more than one month, then the shining part may become dull again. The diameter of the smoothed running surface, measured by a sliding caliper (or equivalent) along the rocker arm axis, shall not exceed a value of  $d_1=6,0$  mm (0.24 in.). Inspect lubricating bore (19)  $d_2= 2,0$  mm (0.079 in.) for roundness. The roundness tolerance must lie within 0,2 mm (0.0079 in.). Any tendency towards an oblong hole is not permissible.

- Should one of these criteria be encountered, replace the appropriate rocker arm **and** its associated push-rod.

▲ **WARNING:** Should damages or traces of wear be discovered on the rocker arms or push-rods, you will need to replace them immediately.

### 3.1.3) Installing rocker arms and push-rod

(see fig. 1 to 3)

- Apply MOLYKOTE<sup>®</sup> G-N M(16) on both push-rod ball joints and contact areas of rocker arm and slide push-rod into the oil return tube (20).

- Install rocker arm bushing into inlet rocker arm (10) and outlet rocker arm (11). Put oil on the rocker arm bushing.

- Place inlet rocker arm (10) and outlet rocker arm (11) in cylinder head, apply MOLYKOTE<sup>®</sup> G-N (16) on rocker arm shaft (9) and insert it into its bearing support.

- Loosen valve spring loading jig and support plate.

- With the removal of the valve spring loading jig finished, inspect whether the adapter rings (15) do not jam on the valve spring retainer.

- Mount collar cap nut (6) (tightening torque 22 Nm (197 in.lb)).

- Lubricate all moving parts in the rocker arm space with engine oil or equivalent.

- Clean the sealing surface of cylinder head and valve cover with a suitable fabric or equivalent.

- Insert new O-ring (4) 105x2,5 and O-ring (5) 6,4x1,8 into the valve cover (3).

- Fit valve cover.

■ **CAUTION:** Between the valve covers a gap of min. 0,1 (.004 in.) must remain. The covers must not touch each other.

- Tighten the new Allen screw (1) M6x30 with washer (2) to 10 Nm (88 in.lb).

▲ **WARNING:** Carefully inspect the length of the valve cover screw. Inspect whether thread is damaged. If the screw is loose or the valve cover leaking, the oil will not return into the oil tank by "blow-by gas" and the oil system will not properly function. Improper installation of the valve cover could lead to loss of crankcase pressure.

- Refit the wiring and top spark plug (17) and tighten to 20 Nm (177 in.lb). Install spark plug connector according to a marking sleeve.

- Repeat the procedure on the remaining 3 cylinders.

- Restore aircraft to original operating configuration.

- Connect negative terminal of aircraft battery.

### 3.2) Test run

Conduct test run including ignition inspect and leakage test.

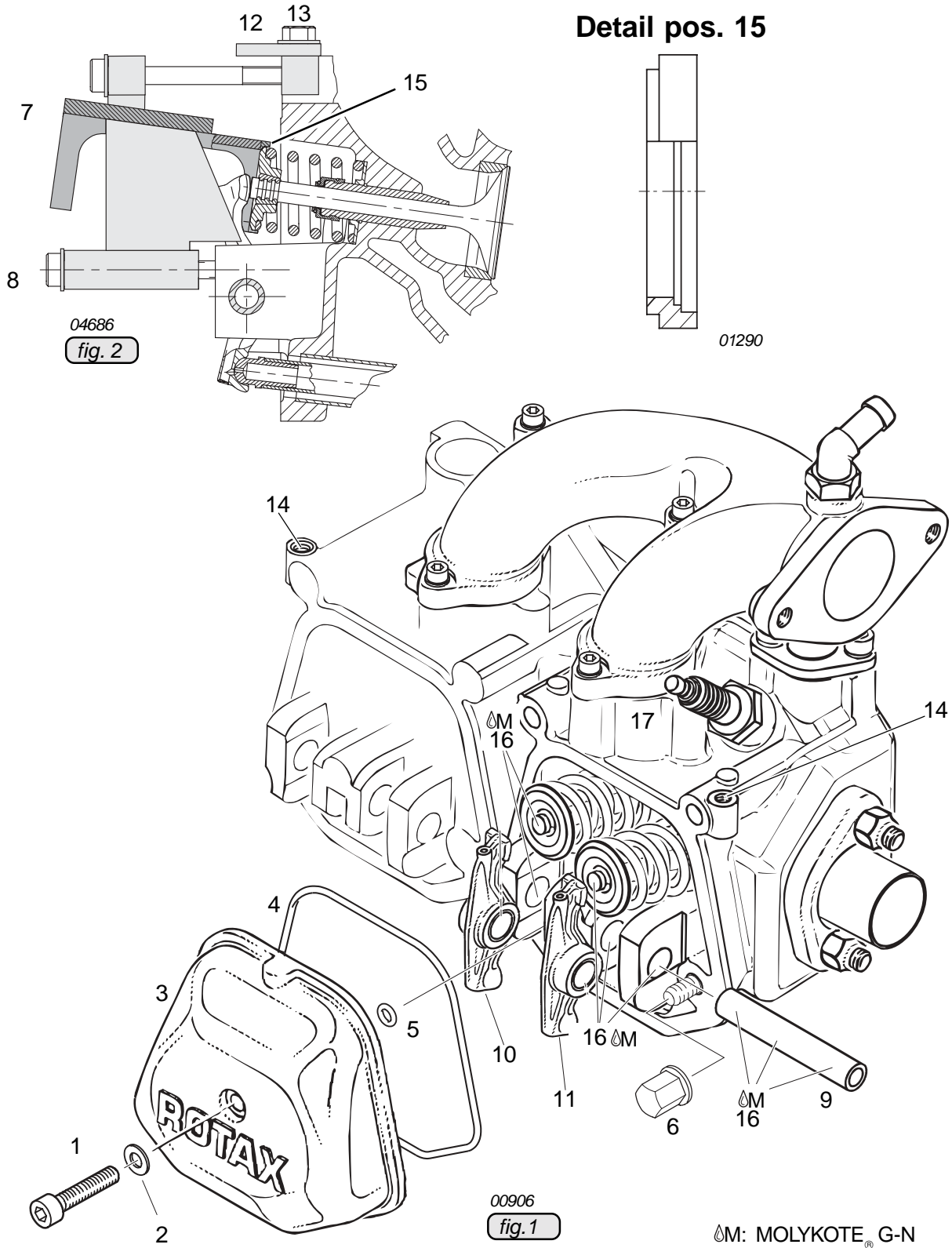
### 3.3) Summary

These instructions (section 3) have to be conducted in compliance with section 1.5.

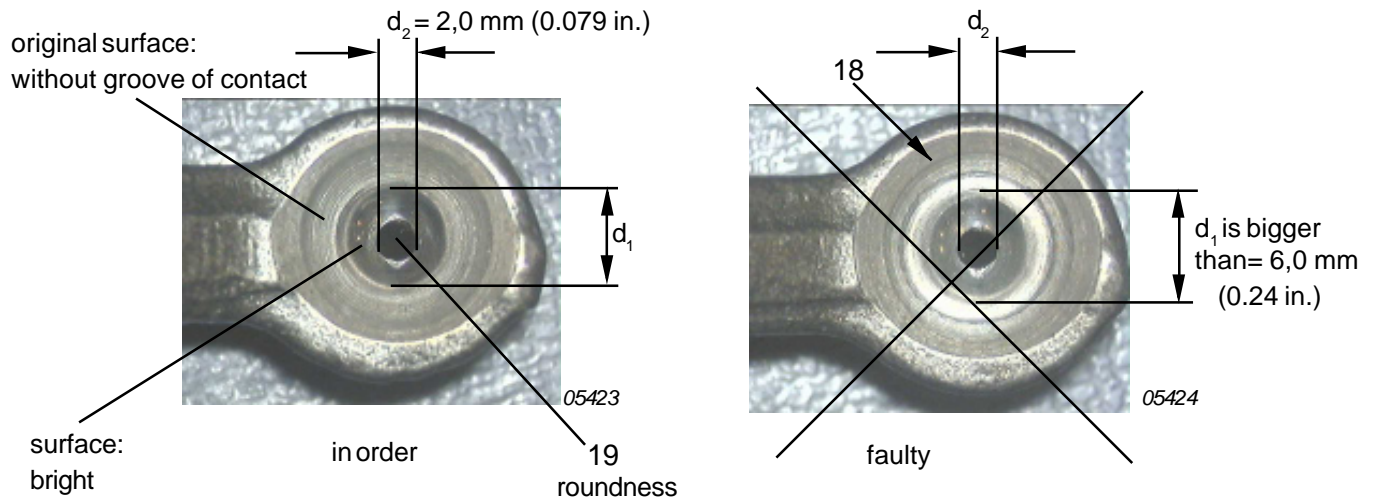
Approval of translation to best knowledge and judgement - in any case the original text in German language and the metric units (SI-system) are authoritative.

#### 4) Appendix

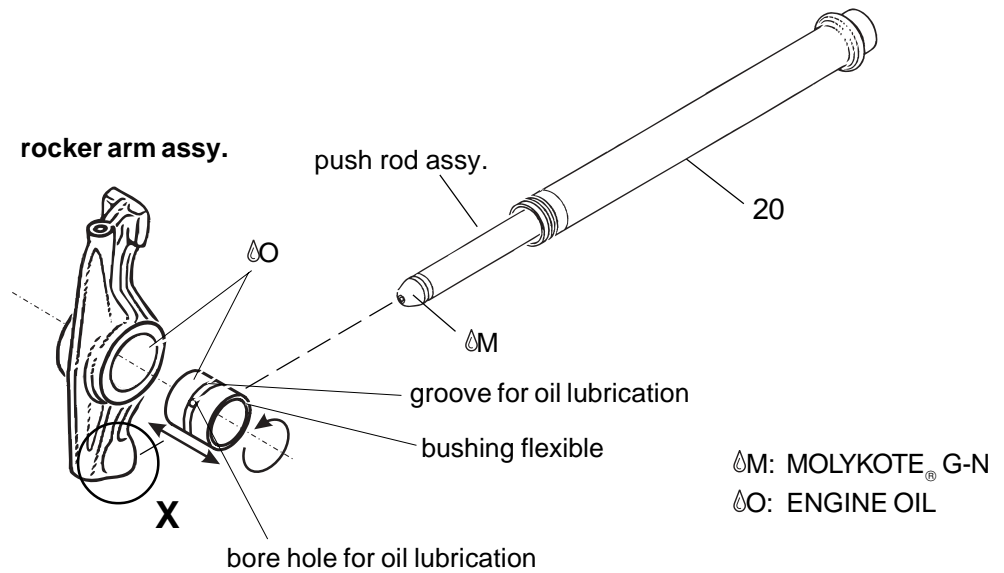
The following drawings should convey additional information:



**fig. 4** **Detail X**



**fig. 3**  
05122



◆ **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 **no technical** drawings and are for reference use only. For specific detail, refer to the current documents of the respective engine type.