

SERVICE BULLETIN

REPLACEMENT OF VALVE SPRING RETAINER ON SINGLE VALVE SPRING CONFIGURATION OF ROTAX® ENGINE TYPE 912 AND 914 (SERIES)

MANDATORY

SB-912-022
SB-914-011

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:

- 912 A from S/N 4,410.204 to S/N 4,410.421
- 912 F from S/N 4,412.757 to S/N 4,412.807
- 912 S from S/N 4,922.501 to S/N 4,922.636
- 914 F from S/N 4,420.039 to S/N 4,420.253

In addition, all engines that have been converted to a single valve spring arrangement at engine repair / general overhaul are affected. See the current Service Instruction SI-14-1997.

Following engines were already retrofitted at engine repair / general overhaul and are not affected:

4,412.795 / 4,420.049 / 4,420.068 / 4,420.083 / 4,420.098 / 4,420.115 / 4,420.156 / 4,922.535 / 4,922.553 / 4,922.578

1.2) Concurrent ASB/SB/SI and SL

Further to this Service Bulletin the following additional service instructions / service bulletins must be observed and complied with:

- Service Instruction SI-04-1997 venting of lubrication system current issue
- Service Instruction SI-14-1997 introduction of the single valve spring arrangement current issue
- Service Instruction SI-18-1997 selection of motor oil and general operating tips current issue
- Service Bulletin SB-912-015 replacement of rocker arms current issue

1.3) Reason

It has been discovered that during the starting procedure a delayed purging of the lubrication system could occur, which may result in cracking of the valve spring retainer. This condition can occur, if the hydraulic valve tappet has been emptied and filled with air. This is possible at first engine run or at oil change.

Following reasons favour this condition and have to be avoided:

- improper purging of lubrication system (see Service Instruction SI-04-1997 venting of lubrication system current issue)
- non-compliance of starting and warming up instructions (see current Operator´s Manual of the respective engine type)
- unsuitable motor oil , especially its viscosity (see Service Instruction SI-18-1997 selection of motor oil and general operating tips current issue and current Operator´s Manual of the respective engine type)
- lack of maintenance

A detailed crack detection of the valve spring retainers is very difficult and would have to be performed repeatedly. Due to this fact all affected engines have to be equipped with reinforced valve spring retainers, which are much more resistant.

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1.4) Subject

Replacement of valve spring retainer on single valve spring configuration of ROTAX[®] engine type 912 and 914 (Series)

1.5) Compliance

- 1)for new engines, which have not been operated yet, the replacement has to be performed before first engine run, at the latest August 1st 2001.
- 2)for engines, which have not exceeded a time of operation of 10 h, the replacement has to be performed within the first 10 operating hours, at the latest August 1st 2001.
- 3)for engines, which have not exceeded a time of operation of 25 h, the replacement has to be performed at next 25^h-check, at the latest August 1st 2001.
- 4)for engines, which have had opened the oil system during repair / maintenance, the replacement has to be performed within the next 10 operating hours, at the latest August 1st 2001.
- 5)for engines, which have already exceeded a time of operation of 25 h, the replacement has to be performed at next 100^h-check, at the latest December 31st 2001.

1.6) Approval

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

1.7) Manpower

Estimated man-hours:

- with engine removed from the aircraft - - - 2 h per unit.

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 the Operator's Manual (OM)
- all relevant Service Bulletins (SB)
- all relevant Service Instructions (SI)
- Maintenance Manual (MM)

1.12) Other publications affected

none

1.13) Interchangeability of parts

All old parts are stopped for further use and must be returned F.O.B. to authorized ROTAX[®] Authorized Distributors or their Service Center.

Further all valve spring retainers part no. 854.182 in the replacement parts store are stopped for further use and must be returned F.O.B. to authorized ROTAX[®] 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[®] Authorized Distributors or their Service Center.

2.2) Company support information

- This exchange program and cost sharing is valid until March 1st 2002. Up to this date, application for limited reimbursement of costs can be made.
- Shipping cost, down time, loss of income, telephone costs etc. or cost of conversion to other engine versions or additional work, as for instance simultaneous engine overhaul is not covered in this scope and will not be borne or reimbursed by ROTAX[®].

2.3) Material requirement per engine

parts requirement:

item no	New part no	Qty	Description	Old part no	application
	881.900	1	valve spring retainer set		ROTAX [®] 912 and 914 Series
consisting of:					
1	250.285	4	O-ring 105x2,5		valve cover
2	430.205	4	O-ring 6,4x1,8		valve cover
3	854.184	8	valve spring retainer		valve
4	253.090	16	valve cotter		valve
8	840.887	4	allen screw M6x30		valve cover
9	927.941	4	washer 6,0/12/1		valve cover

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:

- Price and availability will be supplied on request by ROTAX[®] Authorized Distributors or their Service Center.

Parts requirement:

item no	New part no	Qty	Description	Old part no	remarks
5	877.387*	1	valve spring loading jig assy		valve spring
	297.433	NB	slide paste MOLYKOTE G-N		rocker arm bearing
7	276.855*	1	screw nipple		spark plug tapping

* or equivalent

■ 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[®] -Airworthiness representative
- ROTAX[®] -Distributors or their Service Center
- 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.

3.1) Instructions

3.1.1) Removal of the valve spring retainer

See pict. 1, 2, 3, 4 and 5.

◆ **NOTE:** On standard applications the replacement of the valve spring retainer can be carried out with engine installed in aircraft.

- Remove the spark plug connector and the 4 top spark plugs (18).

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

- Remove Allen screw (8) M6x30 with washer (9) from valve cover (10).
- Remove large and small O-ring (1) and (2).
- Tap valve spring retainers slightly with a soft mallet to loosen valve spring retainers from the valve cotters.
- Turn crankshaft so that the respective piston is exactly on ignition top dead centre (compression stroke).
- Remove the external cap nut (11) (exhaust side of cylinder).

■ **CAUTION:** Do not remove the other cylinder head nuts. During removal of the cylinder head nut, the head stud may come loose requiring re-installation as per current Maintenance Manual. Tightening torque of the stud 3 Nm (26 in.lb.)

- Attach the support plate (14) for the valve spring loading jig (5) with 2 hex. screws (13) M6x16 at the attachment points (19) on the cylinders.
- Put adapters (6) on the valve spring loading jig.
- Attach the valve spring loading jig on cylinder head and support plate with 2 Allen screws (12) M6x70.
- Fit the screw nipple (7) into the spark plug hole.

■ **CAUTION:** At fitting of the screw nipple take care not to damage the spark plug threads.

- Securely hold crankshaft in top dead centre position for respective cylinder by utilizing a socket wrench on magneto side.
- Admit approximately 2 bar (30 psi) air pressure into cylinder.

▲ **WARNING:** Risk of injury due to rotating socket wrench. Failure to adequately secure the crankshaft in a fully stable position could lead to un-intentional rotation of the crankshaft resulting in serious injury. Remove socket wrench after positioning.

- Depress the 2 valve spring evenly by the valve spring loading jig (5) until the valve cotters are easily accessible. Simultaneously both hydraulic tappets will be relieved.

- Remove rocker arm shaft (15).

■ **CAUTION:** At removal take care not to damage the rocker arm shaft bearings in the cylinder head.

◆ **NOTE:** Any stuck rocker arm shaft (15) not moving easily has to be removed as per the current Service Bulletin SB-912-015.

- Remove both rocker arms (16) and (17).
- Remove the valve cotters (4).

◆ **NOTE:** To facilitate the removal of valve cotters use grease or magnet.

- Remove the valve spring loading jig (5).
- Remove the valve spring retainers (3).

◆ **NOTE:** The valve springs may remain in position.

3.1.2) Fitting of the valve spring retainers

- Place new reinforced valve spring retainer part no. 854.184 on the valve springs (see fig. 5).
 - ◆ NOTE: To facilitate installation apply a bit of grease so that the valve spring retainer (3) will remain on the valve spring.
 - Re-fit the valve spring loading jig assy (5) analogous to procedure for removal of the valve spring retainers.
 - Depress the 2 valve springs evenly by screwing in the 2 Allen screws (12) until the valve cotters can be inserted.
 - ◆ NOTE: If the valve spring loading jig (5) does not press down the valve spring retainer correctly it could touch the valve system, possibly resulting in pressure loss in the cylinder.
 - Insert 2 new valve cotters (4) per valve.
 - ◆ NOTE: To facilitate the fitting apply a bit of grease so that the valve cotters will remain in position.
 - Relieve pressure in the cylinder.
 - Push valve inwards so that the valve cotters will stay in position.
 - Apply MOLYKOTE G-N to the bore in the rocker arm, to the push rod tip and the valve contact surface.
 - Make sure that the piston of the respective cylinders remains in compression top dead centre.
 - ◆ NOTE: Loss of top dead centre positioning of respective cylinder could result in difficulty of rocker arm installation. If necessary reposition to top dead centre.
 - Place inlet rocker arm (16) and outlet rocker arm (17) into position, apply MOLYKOTE G-N on both ends of rocker arm shaft (15) and insert it into its bore in cylinder head.
 - CAUTION: The rocker arm bearing is a slide fit. Do not apply force.
 - Remove the valve spring loading jig (5) and the support plate (14).
 - Re-install cylinder head nut as per current Maintenance Manual.
 - Verify proper fit of the valve cotters and secure fit in valve spring retainer by tapping with a soft mallet.
 - Lubricate all moving parts in the rocker arm space.
 - Clean the sealing surface of cylinder head and valve cover.
 - Insert new O-ring (1) 105x2,5 and O-ring (2) 6,4x1,8 into the valve cover (10).
 - Fit valve cover.
 - ◆ NOTE: Between the 2 valve covers a gap of min. 0,2 (.008 in.) must remain. The covers must not touch each other.
 - Tighten the new Allen screw (8) M6x30 with washer (9) to 10 Nm (90 in.lb.).
 - CAUTION: Carefully inspect the length of the valve cover screw. Check whether thread is damaged. If the screw is loose or the valve cover leaking, the oil return into the oil tank by "blow-by gas" will not properly function. Improper installation of the valve cover could lead to loss of crankcase pressure.
 - Remove the screw nipple (7) from the top spark plug hole.
 - Refit the wiring and top spark plug (18) and tighten to 20 Nm. Fit spark plug connector according to marking.
 - Repeat the procedure on the remaining 3 cylinders.
- Connect negative terminal of aircraft battery.

3.2) Test run

Start engine. Conduct test run including ignition check and leakage test in accordance with the current Maintenance Manual of the respective engine type.

3.3) Summary

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

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

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:

