



## SUPPLEMENT NO.1 TO DOC.NO. CR-MM-1-0-00

### INSPECTION AND / OR REPLACEMENT OF THE VALVE PUSH-ROD-ASSY., ROCKER ARM FOR ROTAX® ENGINE TYPE 912 S2 and 912 ULS2

#### LIST OF AIRPLANES COVERED BY THIS SUPPLEMENT

Airplane model	Serial No.	Note
PS-28 Cruiser, SportCruiser / PiperSport – operating under EASA PFC	C0589, C0590, C0601, C0602, C0603, C0604, C0605, C0606, C0607 and all further aircraft the engine of which have been equipped with valve push-rod assy. part no.854861 during engine repair, maintenance or general overhaul as of May 01 to 30 November 2017, inclusive.	



**RECORD OF REVISIONS**

Rev. No.	Revision name	Changed pages	Issue date	Date and signature



**CHAPTER 1 GENERAL**

No Change

**CHAPTER 2 LIMITATIONS / MAINTENANCE CHECKS**

No Change

**CHAPTER 3 FUSELAGE**

No Change

**CHAPTER 4 WING**

No Change

**CHAPTER 5 TAIL UNIT**

No Change

**CHAPTER 6 CONTROL SYSTEM**

No Change

**CHAPTER 7 EQUIPMENT**

No Change

**CHAPTER 8 LANDING GEAR**

No Change

**CHAPTER 9 FUEL SYSTEM**

No Change

**CHAPTER 10 POWER UNIT****10.1 Introduction**

The ROTAX Company issued Service Bulletin SB-912-070UL, SB-912-070 R1 for ROTAX® Engine Type 912 (Series) with requirement to inspect and / or replace the valve push-rod-assy., rocker arm left/right. Power loss and engine RPM drop have been reported on Rotax 912 engines in service. It has been determined that, due to a quality control deficiency in the manufacturing process of certain push-rod assemblies, manufactured between 01 May 2016 and 2 October 2017 inclusive, partial wear on the rocker arm ball socket may occur, which may lead to malfunction of the valve train.

The Supplement No.1 contains instructions for corrective action requested for Rotax engines type 912 S2 and 912 ULS2, which are installed in the PS-28 Cruiser airplane.

**10.2 Compliance**

- Carry out this inspection on the engines listed in the Section "LIST OF AIRPLANES COVERED BY THIS SUPPLEMENT" above, according to the instructions in the point 10.9 at the next scheduled maintenance event or within the next 25 hours of operation, whatever occurs earlier, but in any case till 30 April 2018, at the latest.
- At rough engine running, or unusual engine operating behaviour carry out this inspection before the next flight.

**10.3 References:**

ROTAX SB-912-070 / SB-912-070UL, SB-912-070 R1

ROTAX SI-912-009, latest revision

PS-28 Cruiser Maintenance Manual CR-MM-1-0-00, Rev.19, dated 06 June 2017

In addition to this technical information refer to current issue of all relevant ROTAX Service Instructions (IS)

ROTAX Maintenance Manual Heavy (MMH)



#### 10.4 Type of Maintenance

Heavy

#### 10.5 Authorization to perform:

EASA Part M or Part 145 Maintenance organization

ROTAX® – Airworthiness representatives

ROTAX® – Authorized Distributors or their independent Service Centres

Persons approved by the respective Aviation Authority

Persons with approved qualifications for the corresponding engine types. Only authorized persons (iRMT, Level Heavy Maintenance) are entitled to carry out this work.

**NOTE:** A list of all ROTAX® Authorized Distributors or their independent Service Centres is provided on [www.FLYROTAX.com](http://www.FLYROTAX.com).

All work has to be performed in accordance with the relevant Maintenance Manual.

#### 10.6 Tools needed:

Common tools for maintenance + see the point 10.8 below.

#### 10.7 Material

##### 10.7.1 Material - availability

Material is provided on request by ROTAX® Authorised distributors or their independent Service Centres.

##### 10.7.2 Material requirement per engine

Parts requirement: Order parts as required for the relevant job task to be determined in section 10.9.

Fig. no.		part no.	Qty/engine	Description	Application
2	required	840887	4	Allen screw M6x30 10.9	valve cover
2	parts for inspection	927941	4	Washer 6.0/12/1	valve cover
2		881920	1 Set	O-Ring set	valve cover
1	required	854861*	as required	Valve push-rod assy.	cylinder head
2	parts for replacement	854383	as required	Rocker arm left	cylinder head
2		854393	as required	Rocker arm right	cylinder head

\* or relevant part as per supersedure history

##### 10.7.3 Interchangeability of parts

- all affected parts cannot further be used and must be returned F.O.B to ROTAX® Authorized distributors or their independent Service Centres.
- further sale, use or shipment of all valve push-rods no. 854861 produced in the affected time period (from 01 May 2016 until 02 October 2017), in stores (e.g. replacement parts) are also affected, must undergo a visual inspection of valve push-rods as per the point 10.9.5 and if found not OK must be returned F.O.B. to ROTAX® Authorized distributors or their independent Service Centres.

#### 10.8 Special tooling / lubricant adhesives / sealing compound / availability

Availability is provided on request by ROTAX® Authorised distributors or their independent Service Centres.



Description	Qty/engine	Part no.	Application
Valve spring loading jig	1*	877387**	valve spring
KLÜBER ISOFLEX TOPAS NB 5051	as required	898351***	rocker arm bearing

\*) Only needed if replacement task is required.

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

\*\*\*) or equivalent.

**NOTE:** If using these special tools observe the manufacturers specifications.

### 10.9 Accomplishment instructions

**NOTE:** These instructions have to be followed in accordance with deadlines specified in the point 10.2 - Compliance.

#### 10.9.1 Move the aircraft to a suitable place to perform the work.

**10.9.2 Remove the upper and bottom engine cowling, see the CR-MM-1-0-00, the latest revision.**

**10.9.3 Disconnect the battery terminals.**

#### 10.9.4 Removing valve covers

See Fig.2.

Step	Procedure
1	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).

#### 10.9.5 Visual inspection of valve push-rods

Perform visual inspection of all push-rod ball sockets on all cylinder.

Check for colour. See Fig.1.

Color	Evaluation
Silver surface	Valve push-rod is OK. No further action required for this valve push-rod.
Black surface	Valve push-rod is NOT OK. See section. <a href="#">10.9.6) Replacement of affected parts...</a>

#### 10.9.6 Replacement of affected parts on affected cylinder positions (only in case visual inspection is NOT passed OK)

See Fig.2 and Fig.3.

On valve trains with valve push-rods found NOT OK the following steps need to be performed:

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

Step	Procedure
1	Remove the spark plug connector and the four top spark plugs.

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



Step	Procedure
2	Turn crankshaft so that the respective piston is exactly on ignition top dead center. <b>NOTE:</b> Only when you have an Criterion B) Spare parts affected engine and only if engine is equipped with collar cap nuts M8 wrench size 13: Loosen the external collar cap nut (6) for easier disassembling the rocker arm shaft.

**NOTE:** Do not loosen the collar nuts M8. There is no reason to remove or losing the M8 collar nuts the head stud may come loose requiring re-installation as per current ROTAX® Maintenance Manual. In the event that in loosening collar nuts M8, the stud becomes loose, retighten the stud to 3 Nm (26 in.lb).

Step	Procedure
3	Attach the support plate (12) to the valve spring loading jig part no. 877387 (7) with 2 hex. screws (13) M6x16 at the attachment points (14) on the cylinder heads.
4	Put adapters (15) on the valve spring loading jig.
5	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 the valve stem if need be, otherwise there is risk that the valve cotteners will displace or may drop out.

Step	Procedure
6	This will relieve the pressure from both hydraulic tappets. Now the rocker arm shaft (9) may be easily pulled out. Lift out both rocker arms (10) and (11).
7	Replace only affected parts as per <a href="#">section 10.7.2</a> ). See also <a href="#">Fig. 3</a> .
8	Apply KLÜBER ISOFLEX TOPAS NB 5051 (16) on both push-rod ball sockets and contact areas of rocker arm and slide push-rod into the oil return tube (20).
9	Check bushing and rocker arm shaft according to latest Maintenance Manual Heavy.
10	Put oil on the rocker arm bushing.
11	Place rocker arm left (10) and rocker arm right (11) in cylinder head, apply KLÜBER ISOFLEX TOPAS NB 5051 (16) on rocker arm shaft (9) and insert it into its bearing support.
12	Loosen valve spring loading jig and support plate.
13	When removing the valve spring loading jig , make sure the adapter rings (15) do not jam on the valve spring retainer.
14	<b>NOTE:</b> Only when you have an Criterion B) Spare parts affected engine and only if engine is equipped with collar cap nuts M8 wrench size 13: Mount collar cap nut (6) according to latest Maintenance Manual Heavy or SI-912-025/SI-914-026/SI-912 i-010.
15	Lubricate all moving parts in the rocker arm space with engine oil or equivalent.



### 10.9.7 Install valve cover

See Fig.2.

Step	Procedure
1	Clean the sealing surface of cylinder head and valve cover with a suitable lint-free cloth or equivalent.
2	Insert new O-ring (4) 105x2.5 and O-ring (5) 6.4x1.8 into the valve cover (3).
3	Fit valve cover.

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

Step	Procedure
4	Tighten the new Allen screw (1) M6x30 with washer (2) to 10 Nm (89 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.

Step	Procedure
5	Refit the wiring and top spark plugs (17) and tighten. - If genuine ROTAX® spark plugs installed. Tighten the spark plugs to 16 Nm (142 in. lb.) on a cold engine. - If still old spark plug version NGK used tighten to 20 Nm (177 in.lb) or change all spark plugs to genuine ROTAX® spark plugs according to SI-912 i-013/SI-912-027/SI-914-028. Install spark plug connector according to a marking sleeve.
6	Repeat the procedure on the remaining 3 cylinder heads.
7	Tighten the new Allen screw (1) M6x30 with washer (2) to 10 Nm (89 in.lb).

### 10.9.8 Connect the battery terminals.

**10.9.9 Install the bottom and upper engine cowling on the airplane - see the CR-MM-1-0-00, the latest revision, and restore the airplane to original operating configuration.**

### 10.9.10 Test run

**General Note:** Danger of life threatening injuries caused by the propeller, rotating and stressed parts of the engine! Always observe the engine from a safe place while it is running. Check that the cockpit is occupied by a competent operator.

#### 10.9.10.1 Preparation of the engine for test run:

- Ensure that all the operating fluids (engine oil, coolant, fuel) are replenish to the specified level.
- Make sure that no lose objects (e.g. tools) are left in the engine compartment.
- Inspect tight fit of the propeller.
- Anchor the aircraft suitably to the ground and fix wheel chocks. Ensure that the propeller zone is clear and safe before starting the engine.





## 10.9.10.2 Test run procedure

Step	Procedure
1	Establish fuel supply (open fuel cock).
2	Activate choke.
3	Throttle lever to idle position.
4	Master switch "ON".
5	Ignition for both ignition circuits "ON".
6	Press starter switch for max. 10 sec. (followed by a cooling period of 2 min.).
7	After engine start, observe oil pressure. Oil pressure has to be built up within 10 sec.
8	Let engine run for approx. 2 min. at 2000 rpm. Then first use the throttle lever to bring the engine to approx. 2500 rpm and then run through warming up period, until the oil temperature reaches 50 °C (122 °F).
9	Check temperatures and oil pressure: At a steady oil temperature above 50 °C (122 °F) and oil pressure above 2 bar (29 psi) engine speed may be increased.
10	Ignition check as per the current Operators Manual.
11	Conduct a short full throttle run and check that the engine reaches the max. full power speed. Consult the pilot's operating handbook for maximum speed, as it depends on the propeller used.
12	After full-load run, conduct a short cooling run to prevent formation of vapour lock in cylinder heads. This is necessary to prevent steam locks in the cooling and fuel system after shut-down.
13	Shut engine down. NOTE: On switching off the engine switch off ignition and withdraw the ignition key.
14	Inspect rotary seal for leakage. NOTE: Due to the design of the rotary seal, the manufacturer tolerates a certain amount of leakage. If the leakage is in excess of the limit rotary seal must be renewed.  Tolerated leakage: For this check the engine must be operated until all temperatures have stabilized for a period of 5 minutes. At that point shut down engine and ensure the ignition is switched off and engine secured against unintentional operation. Coolant must not drip through leakage bore, located at the base of the ignition housing, for a period of 1 minute after the engine has been stopped. In case this leakage test can not be passed, the rotary seal must be renewed.



**10.9.11 Engine oil and coolant**

**Warning:** Risk of severe burns and scalds!  
 Never open the radiator cap when the cooling system is hot. For safety's sake, cover cap with a rag and open slowly. Sudden opening of the cap could provoke the escape of boiling coolant and result in scalding.  
 Replenish engine oil and coolant as required once engine has cooled down.

**10.9.12 Oil filter**

**NOTE:** If the oil filter has been replaced, re-tighten by hand after the trial run on a cold engine.

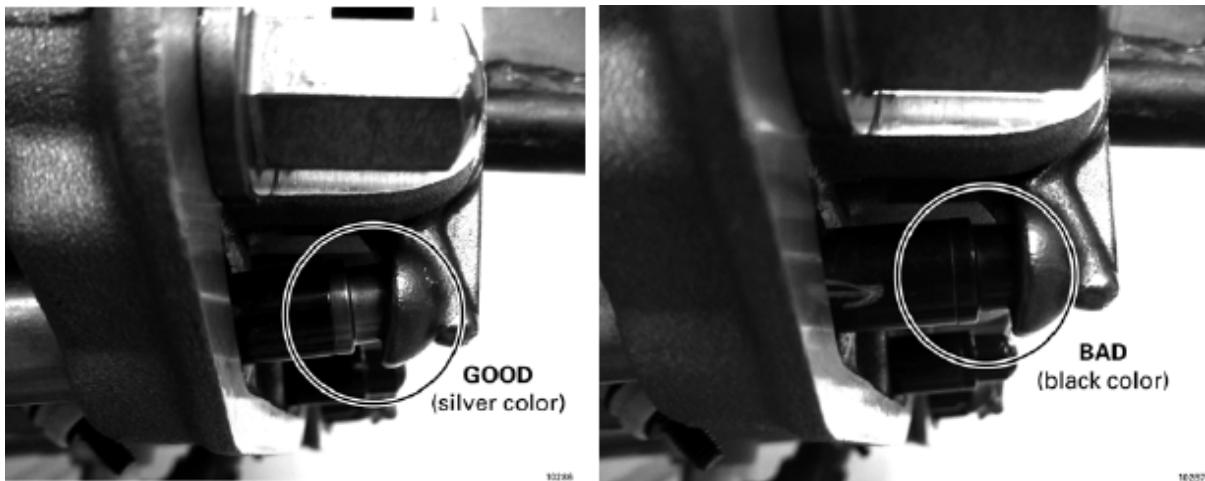
**10.9.13 Check of leaks**

Inspect the engine for oil, fuel or coolant leaks and repair as necessary.

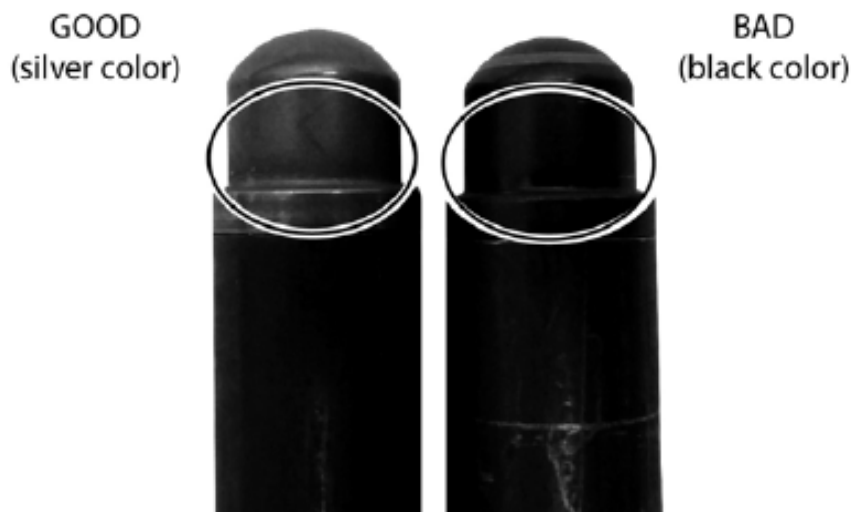
**10.9.14 Complete aircraft records to reflect compliance with this Supplement.**

**10.10 Supporting pictures**

The following drawings should convey additional information:



Comparison of spare parts:



**Fig.1 – Visual inspection**



Supporting pictures – continue

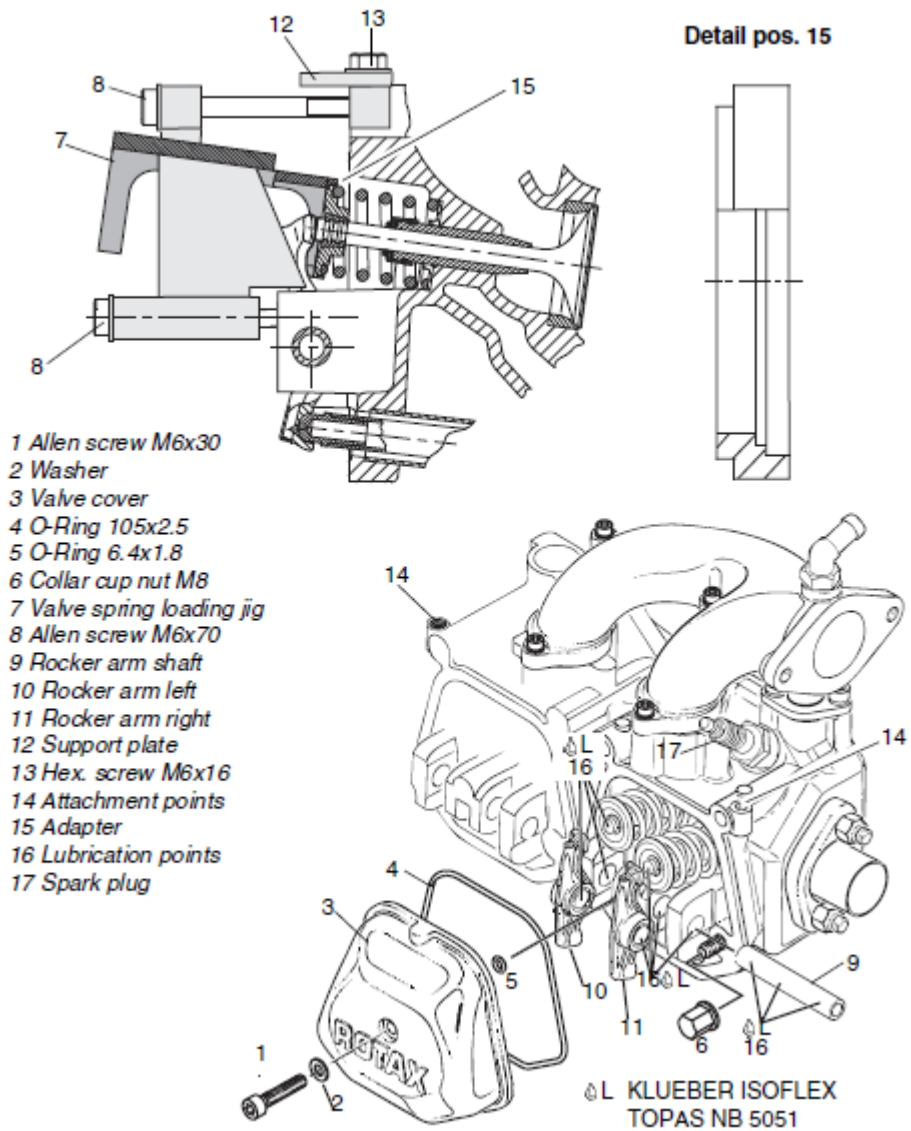


Fig. 2



## Supporting pictures – continue

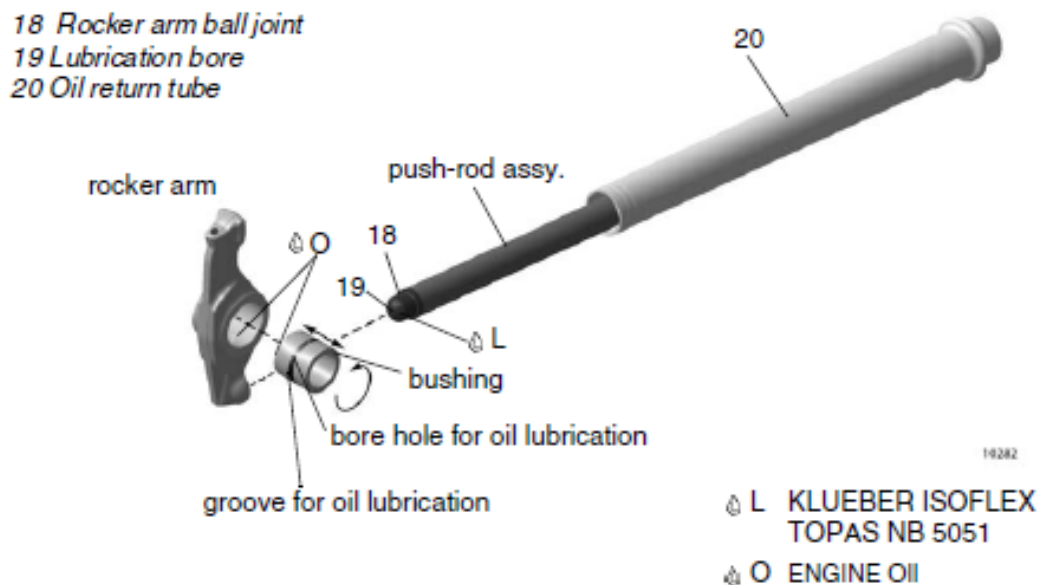


Fig. 3

**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.

**CHAPTER 11 ELECTRICAL SYSTEM**

No Change

**CHAPTER 12 INSTRUMENTS AND AVIONICS**

No Change

**CHAPTER 13 VENTING / HEATING**

No Change

**CHAPTER 14 AIRPLANE HANDLING**

No Change

**CHAPTER 15 AIRPLANE REPAIRS**

No Change

**CHAPTER 16 WIRING DIAGRAMS**

No Change

**CHAPTER 17 APPENDICES**

No Change