

SERVICE INSTRUCTION

ENGINE START AT LOW TEMPERATURES AT ROTAX® ENGINE TYPE 912 AND 914 (SERIES) SI-03-1998 R1

RECOMMENDED

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 (Series) starting with serial production
- 914 (Series) starting with serial production

1.2) Concurrent ASB/SB/SI and SL

More to this Service Instruction the following additional Service Bulletins/Instructions/Letters must be observed and complied with:

- Service Bulletin SB-912-037/SB-914-023 „Installation of an electric starter with enhanced power“ current issue.
- Service Instruction SI-912-012/SI-914-014 „Routine modifications of the Bing constant depr. carburetor“ current issue.

1.3) Reason

Reports from the field have shown that more information and instructions about cold start in low temperature zones are necessary.

One or more of the following could cause the cold start behaviour to become worse:

- Unapproved and untested modifications
- Engine oil with a viscosity class that is too high
- Incorrect battery or bad charging state
- Worn or damaged electric starter
- Cable cross-section to the electric starter too small
- Grounding from the engine to the aircraft frame that is not sufficient
- Lack of maintenance (especially on the carburetor)
- Worn sprag clutch
- Improper carburetor-and/or chokesynchronization
- Incorrect, old or contaminated fuel (especially in the float chambers)
- Improper idle speed (to low)
- Friction torque in the backlash range of gearbox not within tolerance (should be adjusted to the max. allowed value).
- Electrode gap in the spark plugs too large
- Trigger-coil clearance to the fly wheel set incorrectly
- Incorrect propeller (moment of inertia too large)
- Unsuitable engine suspension / non-neutralized vibrations

- ▲ **WARNING:** Consequent damage because of possible kickback of the propeller if there is a false start cannot be ruled out. Immediately remedy these causes.

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1.4) Subject

Engine start at low temperatures at ROTAX[®] Engine Type 912 (SerieS) And 914 (Serie)

1.5) Compliance

The procedures and modifications described in section 3 can be done at the discretion of the owner.

1.6) Approval

Not required

1.7) Manpower

Estimated man-hours:

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

1.8) Mass data

Change of weight - - - none.

Moment of inertia - - - unaffected.

1.9) References

In addition to this technical information refer to current issue of

- Operator's Manual (OM)
- Illustrated Parts Catalog (IPC)
- all relevant Service Bulletins (SB)
- all relevant Service Instructions (SI)
- Maintenance Manual (MM line/heavy)

2) Material Information

2.1) Material - cost and availability

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

2.2) Company support information

ROTAX does not pay labor rates and charges for parts for rework or retrofitting.

2.3) Material requirement per engine

Fig.no.	New part no.	Qty/engine	Description	Old part no.	Application
()	888803	1	CD-carburetor assy. 1/3	888802	type 912 A/F/UL
()	888808	1	CD-carburetor assy. 2/4	888807	type 912 A/F/UL
()	888374	1	CD-carburetor assy. 1/3	888373	type 912 S/ULS/ULSFR
()	888379	1	CD-carburetor assy. 2/4	888378	type 912 S/ULS/ULSFR
()	887094	1	CD-carburetor assy. 1/3	887093	type 914 F/UL
()	887099	1	CD-carburetor assy. 2/4	887098	type 914 F/UL

◆ NOTE: The modified choke rotary disc valve is used starting from the following engine numbers:

- 914 F	from S/N 4,420.412	- 912 UL	from S/N 4,406.138
- 914 UL	from S/N 4,418.634	- 912 S	from S/N 4,923.038
- 912 A	from S/N 4,410.629	- 912 ULS	from S/N 5,643.465
- 912 F	from S/N 4,412.868	- 912 ULSFR	from S/N 4,429.962

◆ NOTE: This modification was introduced in serial production starting from carburetor S/N 04/0001.

2.4) Material requirement per carburetor

Fig.no.	New part no.	Qty/engine	Description	Old part no.	Application
(2)	261271	1	choke rotary disc valve. 1/3	261270	carburetor
(2)	261276	1	choke rotary disc valve. 2/4	261275	carburetor
(1)	268762	2	jet 105	n.a.	carburetor
(1)	268857	2	jet 120	n.a.	carburetor
(1)	268763	2	jet 130	n.a.	carburetor
(1)	268765	2	jet 140	n.a.	carburetor

2.5) Rework of parts

The choke rotary disc valve (2) before serial production introduction (see chapter 2.3) can be reworked as described in the instructions chapter 3.2.3.

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

Price and availability will be supplied on request by ROTAX[®] Authorized Distributors or their Service Centers.
Parts requirement:

Fig.no.	part no.	Qty/engine	Description	Old part no.	Application
(2)		N.B.	LOCTITE 221	899785	choke housing

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

3) Accomplishment

Instructions

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

- ROTAX[®] -Airworthiness representative
- ROTAX[®] -Distributors or their Service Centers
- Persons approved by the respective Aviation Authority
- *Persons with type-specific training (applicable only for non-certified engines)*

▲ 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: Perform 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) Occasional low temperature operation

When starting an engine at low temperature proceed in accordance with the current Operator's Manual, Section "operation in winter time".

◆ NOTE: The turbo engine 914 needs a bit longer warming-up period.
Therefore this engine has to be run warm with fully open choke at approx. 2000 r.p.m.
After a few minutes warming up close the choke approx. half and try to increase engine speed slowly. If the engine does not respond to the throttle, go back to idle and open choke fully. Repeat this procedure until engine reacts willingly to throttle acceleration. Continue warming up according to the current Operator's Manual until the oil temperature has reached 50 °C (122 °F).

3.2) Permanent operation at low temperatures

For engine start at low temperatures a different start jet and modified choke rotary disc valve (2) is recommended on both carburetors. Therefore the fuel-air mixture is highly enriched at the starting phase and throttled down by the additional middle setting at the warm up phase to get smooth engine operation.

3.2.1) Exchange of start jet

(see fig. 2)

The start jet (1) (jet 85 standard jet system) in the float chamber (3) must be exchanged for an applicable larger jet (1). Jets of the following sizes can be selected depending on the usual atmospheric conditions and the cold start behaviour of the engine:

Jet 105, 120, 130 or 140 (see chapter 2.4).

◆ NOTE: The jets (1) are selected by trial and error, but it must be noted that the fuel-air mixture can be highly enriched and can lead to a fuel over-enrichment in very bad cases.

3.2.2) New choke rotary disc valve

(see fig. 1 and 3)

When using a larger start jet (1), the new choke rotary disc valve (2) with changed ventilation bores (5) must also be used. This makes it possible to operate the engine at a middle setting of the cold-start system during the warm-up phase and thus get a smooth engine operation (start of serial production, see chapter 2.3).

3.2.3) Rework of old choke rotary disc valve

(see fig. 3)

After removing the choke rotary disc valve (2), the ventilation hole (5) of \varnothing 0.65 mm must be redrilled to \varnothing 1 mm.

■ CAUTION: The rotary disc valve channel (6) must be fully cleaned of chips after the machining!

■ CAUTION: Only authorized distributors and qualified technicians are permitted to carry out the carburetor calibration. Always use carburetors of identical jetting only. Never calibrate the two carburetors differently.

■ CAUTION: If returning to flight operation at warmer conditions the carburetor has to be converted back again to the standard jetting. Otherwise the mixture would get too rich at engine start, possibly causing vibrations which could lead to engine stop.

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

- Restore aircraft to original operating configuration.
- Connect negative terminal of aircraft battery.

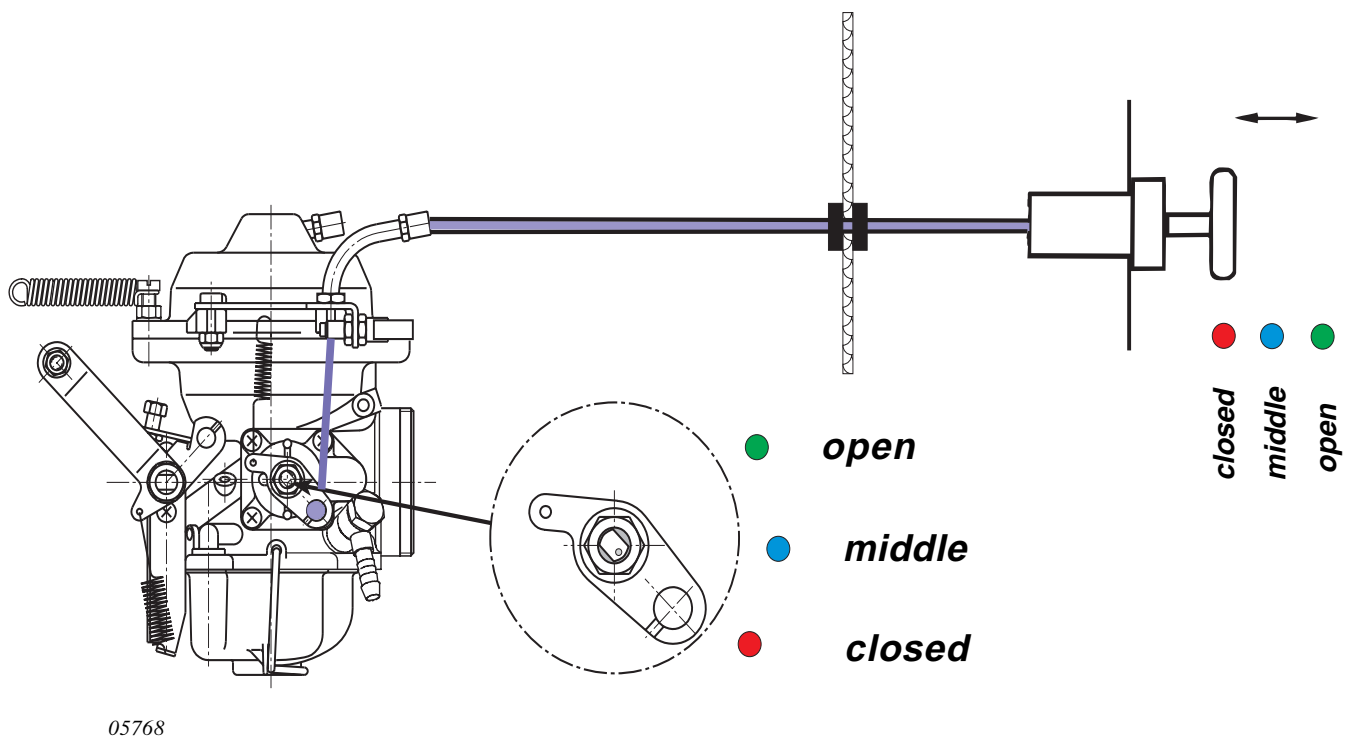
3.3) Test run

Conduct test run including ignition check and leakage test.

4) Appendix

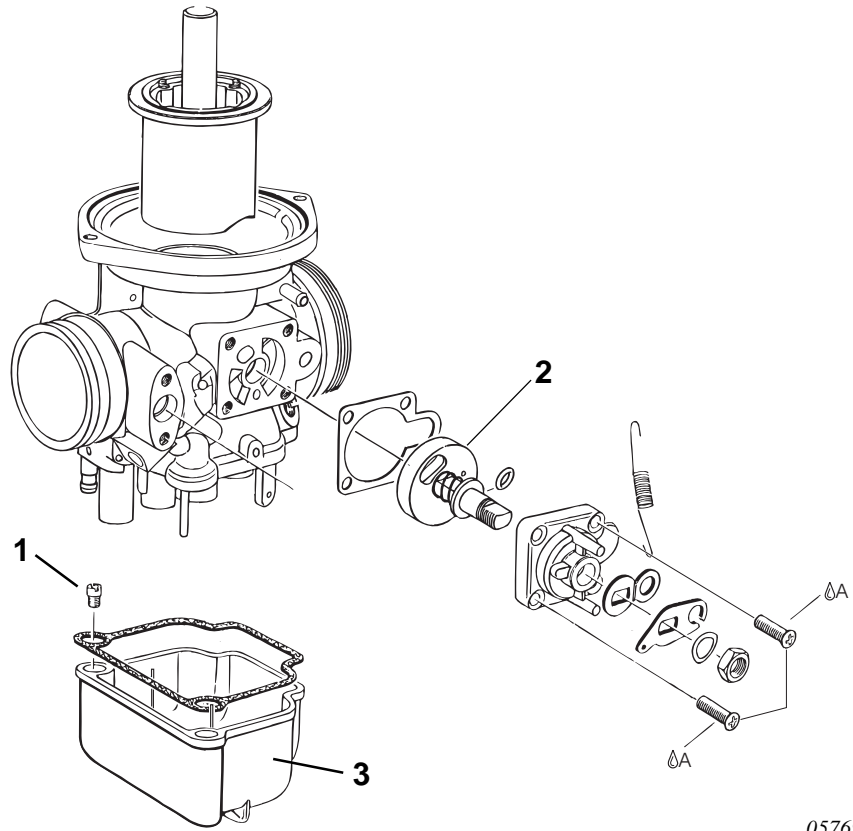
The following drawings should provide additional information:

fig. 1



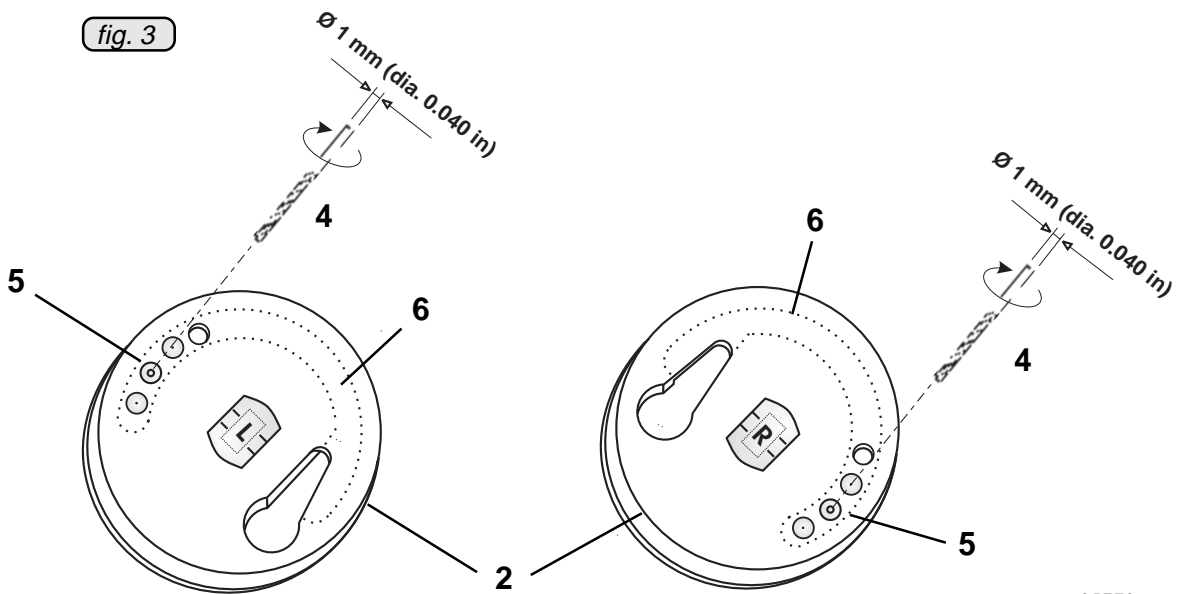
Approval of translation to best knowledge and judgment - in any case the original text in the German language and the metric units (SI-system) are authoritative.

fig. 2



05769

fig. 3



05773

carburetor 1/3

carburetor 2/4

◆ 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.