

SERVICE INSTRUCTION

AMENDMENT ON REDUCTION GEARBOX

TYPE „C“ AND TYPE “E“

FOR ROTAX® 2-STROKE UL AIRCRAFT ENGINES

SI-2ST-007 R2

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:

- 447 UL
- 503 UL
- 582 UL
- 532 UL
- 618 UL

◆ **NOTE:**

The following table gives an overview of the introduction to the amendment contained in this document as well as the respective serial number (SN) of the gearbox. Due to the different gearbox variants as well as use up of parts by ROTAX®, a change of all gearbox variants at the same time is not possible.

		cone 1:7.5		cone 1:10	
		1:	up to gearbox SN	1:	from gearbox SN
gearbox C	2.62	08.0047	2.62	08.0048	
	3.00	07.0230	3.00	07.0231	
	3.47	08.0049	3.47	08.0050	
	4.00	in preparation	4.00	in preparation	
gearbox E	2.62	08.0300	2.62	08.0301	
	3.00	07.0230	3.00	07.0231	
	3.47	07.0560	3.47	07.0561	
	4.00	08.0237	4.00	08.0238	

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For the affected part numbers of the gearbox variants see section 2 (Material Information)

1.2) Concurrent ASB/SB/SI and SL

- SI-06-1996 “Modifications on reduction gearbox ‘C’ and ‘E’”, current issue

1.3) Reason

Introduction of a new cone sleeve with lower cone angle.
Standardisation of tightening torque for old and new cone types.

1.4) Subject

Amendment on reduction gearbox type "C" and type "E" for ROTAX[®] 2-stroke UL aircraft engines.

1.5) Compliance

- In the course of a repair, whereby the replacement of the gear set and/or the cone sleeve with new parts is necessary. Where replacement of parts is not necessary the revised torque and LOCTITE application must be respected.

▲ **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) 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.

engine removed from the aircraft - - - e.g. 1h per unit.

Make sure of an adequate cure time for the adhesion areas before return to operation.

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

- Operators Manual (OM)
- Illustrated Parts Catalog (IPC)
- all relevant Service Bulletins (SB)
- all relevant Service Instructions (SI)
- Repair Manual (RM)
- Maintenance Manual (MM)

◆ **NOTE:** The status of Manuals can be determined by checking the table of amendments of the Manual. The 1st column of this table is the revision status. Compare this number to that listed on the ROTAX[®] WebSite: www.rotax-aircraft-engines.com. Updates and current revisions can be downloaded for free.

1.12) Other publications affected

The following documentations must be replaced as a consequence of this Service Instructions and will become invalid therefore.

<u>Description</u>	<u>p/n</u>	<u>Issue</u>	<u>Date</u>	<u>Rev.</u>	<u>Chapter</u>	<u>Page</u>
SI-06-1998			07 2001	1		

1.13) Interchangeability of parts

- at exchange take care of the following:

Interchangeability of gear sets only in combination with the correct cone sleeve. See section 2.2.

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

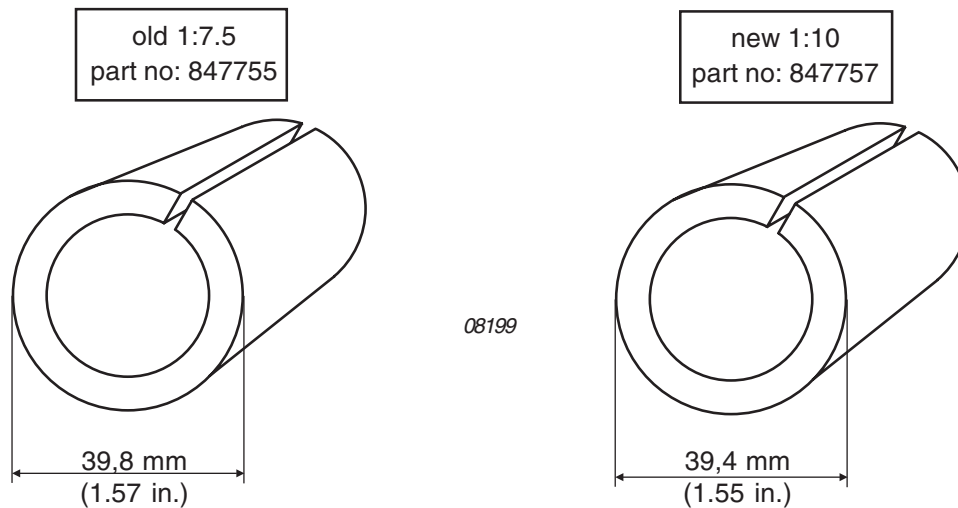
Price and availability will be supplied on request by ROTAX[®] Authorized Distributors or their Service Centers.
parts requirement:

Fig.no.	p/n	Qty/engine	Description	Old p/n	Application
	877810	1	Installation sleeve assy.	-	C and E gearbox
	877397	1	puller assy.	877375	C and E gearbox

■ CAUTION: In using these special tools observe the manufacturers specifications.

2.3) For distinguishing the cone sleeve

The cone sleeves can be distinguished according to following drawings. To prevent measurement mistakes the diameter has to be determined as follows:



Single parts of the gear set can be matched to the cone versions as follows:

gear ratio	C gearbox		E gearbox	
	old 1:7.5	new 1:10	old 1:7.5	new 1:10
	gear set part no.		gear set part no.	
2.62	886211	886280	886750	886751
3.00	886213	886282	886752	886753
3.47	886215	886284	886754	886755
4.00	886217	886286	886756	886757

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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 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:** Risk of scalds and burns! Allow engine to cool sufficiently and use appropriate safety gear while performing work.

▲ **WARNING:** Should removal of a locking device (e.g. lock tabs, self-locking fasteners, etc.) 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) Instructions

(see fig. 1, 2 and 3)

1. Disassemble the reduction gearbox in accordance with the current Repair Manual for engine type 462-532-582 to a state where the cone sleeve (1) can be removed.
2. Clean and degrease cone sleeve (1).
3. Degrease propeller shaft (2) and lay shaft gear (3).

3.1.1) Use of the installation sleeve assy

▲ **WARNING: Use of the new cone sleeve in combination with the old style main gear set and vice versa can lead to engine and personal injury!**

◆ **NOTE:** Use of a different tool (screw driver etc.) is inadequate and could result in damage of cone sleeve and propeller shaft. Use only installation sleeve assy (5) part no. 877810.

1. Place cone sleeve (1) into installation sleeve assy (5). Make sure that the rotating shaft (6) of the pressure screw (7) comes to rest in the slot of the cone sleeve (1).

■ **CAUTION:** Ensure that the shaft will not move beyond inside dia. of the sleeve. Otherwise you risk damage to the propeller shaft.

2. Using a spanner move shaft (6) into slot until the cone sleeve (1) expands enough.

▲ **WARNING:** Make absolutely sure that no LOCTITE will enter into the ball bearing (4).

3. Apply LOCTITE 648 on inside of cone sleeve (see fig. 1).

4. After placing cone sleeve (1) into position on propeller shaft unscrew the pressure screw (7) and remove the tool. Ensure the cone is correctly positioned tight against the bearing.

5. Apply LOCTITE 648 on outside of cone sleeve (1). Install layshaft gear, massive washer (earlier model may have been fitted with a serrated washer that must be replaced with the massive washer (see latest IPC)). Apply LOCTITE 648 to the thread on the hex nut (8).

6. The tightening torque of the hex. nut (8) has been standardized to **300 ±10 Nm (221 ±7 ft.lb)**.

7. Reassemble reduction gearbox in accordance with the current Repair Manual for engine type 462-532-582.

■ **CAUTION:** Allow at least 12 h for curing of the adhesive.

3.1.2) Disassembly procedure, with taper sleeve glued in position

(see fig. 4 and 5)

The new tool is fashioned with a chamfering at the base of the puller (9), thus achieving the best stability at pulling-off procedure.

Furthermore the other end of the puller is now flat sided 36 A/F to tighten the puller (9) into position.

3.2.1) Procedure to pull-off the layshaft gear

1. Disassemble the reduction gearbox in accordance with the current Repair Manual for engine type 462-532-582 to the stage where the nut is loosened.
2. Preheat the nut and layshaft gear to 150-180 °C (302 to 356 °F) to reverse the glue effect. Unscrew the nut (8).
 - ◆ NOTE: Nut (8) is a left handed thread.
3. Place the mushroom-shaped protection piece (10) part no. 877415 into the centering of the propeller shaft (2).
 - CAUTION: Depending on the quality of adhering removal of the drive gear can be difficult-nevertheless disassembly has to be done with appropriate care.
 - ▲ WARNING: Risk of scalds and burns! Observe the appropriate safety precautions.
4. Fit the puller assy. (9) part no. 877379 on layshaft gear and tighten with wrench 36 A/F.
5. Screw-in and tighten the puller screw. If necessary separate the layshaft gear by a blow of the hammer on the tightened puller screw.
 - CAUTION: Use a suitable mat for not damaging the removed parts.
 - ◆ NOTE: When refitting the cone sleeve again clean propeller shaft from residues of LOCTITE first.

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

3.2) Test run

Conduct test run including ignition check and leakage test.

3.3) Summary

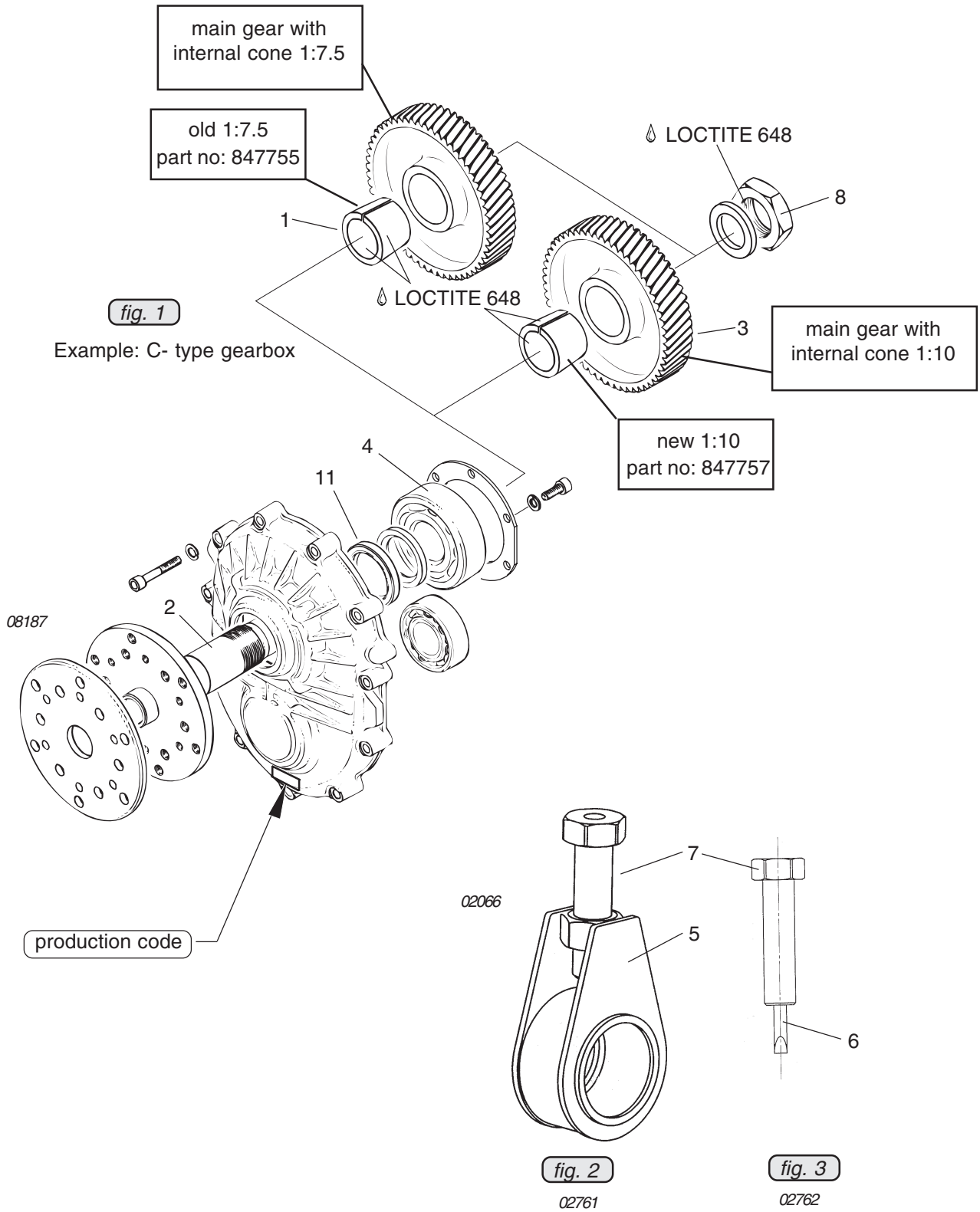
These instructions (section 3) have to be conducted in accordance with compliance in section 1.5.

- ▲ 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:



■ CAUTION: Use correct gear set to the respective cone sleeve variants (see section. 2.3).

fig. 4
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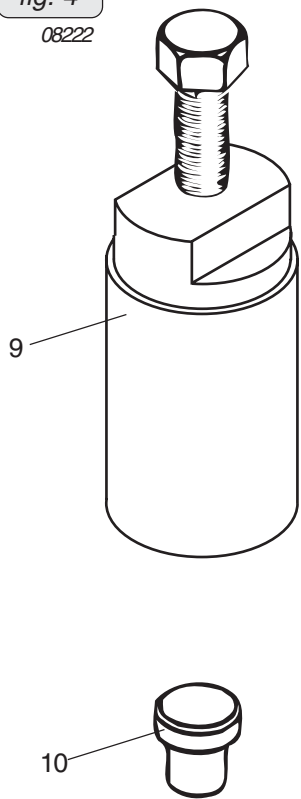
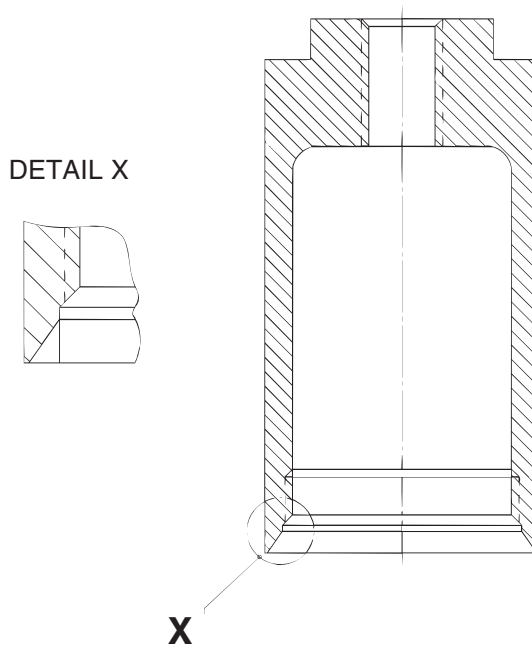


fig. 5
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puller assy for lay shaft gear



◆ 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 only. For specific detail, refer to the current documents of the respective engine type.