ROTAX®

This SI revises SI-915 i-007 Revision1 dated 18 November 2020

SERVICE INSTRUCTION

Introduction of a new turbocharger assy. with new ECU software and exhaust requirements for ROTAX® Engine Type 915 i A (Series)

ATA System: 78-20-00 Turbocharger

1) Planning information

To obtain satisfactory results, procedures specified in this publication must be accomplished with accepted methods in accordance with prevailing legal regulations.

BRP-Rotax GmbH & Co KG cannot accept any responsibility for the quality of work performed in accomplishing the requirements of this publication.

1.1) Applicability

All versions of ROTAX® engine types:

Engine type	Serial number
915 iS A	from S/N 9132575
915 iSc A	from S/N 9127353

NOTE: On engines with equal or higher S/N than those listed above, new style turbocharger, exhaust bracket, muffler and latest version of ECU software have already been fitted in serial production.

1.2) Concurrent ASB/SB/SI and SL

In addition to this Service Instruction the following Service Instructions must be observed and complied with:

- SB-915 i A-004/SI-912 i -018 - “List of approved Engine Control Unit (ECU) software and hardware configurations for ROTAX® Engine Type 912 i and 915 i (Series)”, current issue
- SI-915 i-002, “B.U.D.S. Aircraft Installation Instruction”, current issue

1.3) Reason

In the course of further development and standardization, a new turbocharger assy. has been introduced.

1.4) Subject

Introduction of a new turbocharger assy. with new ECU software and exhaust requirements for ROTAX® Engine Type 915 i A (Series).

1.5) Compliance

NONE - For Information Only.

1.6) Approval

The technical content of this document is approved under the authority of the DOA ref. EASA.21J.048.

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1.7) Labor time

Estimated labor hours:

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

1.8) Mass data

Change of weight - - - insignificant.

Moment of inertia - - - unaffected.

1.9) Electrical load data

No change.

1.10) Software modifications

Yes. See section 1.2 and 2.6.

1.11) References

In addition to this technical information refer to current issue of

- Illustrated Parts Catalog (IPC)
- Installation Manual (IM)
- Maintenance Manual Line (MML)
- Maintenance Manual Heavy (MMH)

NOTE: The status of the Manuals can be determined by checking the table of amendments. The 1st column of this table shows the revision status. Compare this number to the one listed on the ROTAX website:
www.flyrotax.com. Updates and current revisions can be downloaded for free.

1.12) Other Publications affected

None.

1.13) Interchangeability of parts

Old and new parts are (only as package) interchangeable individually as they have different fixation positions for the turbocharger assy.

NOTE: Interchangeability is only given as package. Means e.g. the relevant exhaust muffler needs to go with the relevant turbocharger assy. and turbocharger bracket.

2) Material Information

2.1) Material

Price and availability will be provided on request by ROTAX® Authorized Distributors or their independent Service Centers.

2.2) Company support information

None.

2.3) Material requirement per engine

New part number	Qty/ engine	Description	Old part number
893108	1	Turbocharger	893105/893106
851299	1	Turbocharger bracket Metric*	851296/851297
851283	1	Turbocharger bracket UNF*	851296/851297
979495	1	Muffler assy. brushed (new: 979478 being brushed + packaging old: 979475 being brushed + packaging)	979479
250313	12	Washer 8.4 stainless steel	-
242203	9	Hex. nut M8 stainless steel	-
940583	4	Hex. screw M8x16 stainless steel	-
626333	2	Washer 8.4 DIN 9021 A2	-
640601	2	Hex. screw M6x55 - 8.8 ISO 4014	-
840993	4	Allen screw M8x30	-
240073	1	Allen screw M8x20	-

* choose turbocharger bracket execution according to your installation situation and engine suspension fixation. In case of doubt contact your aircraft manufacturer and/or perform installation and maintenance according to the instructions of the aircraft manufacturer.

2.4) Material requirement per spare part

None.

2.5) Rework of parts

None.

2.6) Special tooling/lubricants- /adhesives- /sealing compounds

Price and availability will be supplied on request by ROTAX® Authorized Distributors or their independent Service Centers:

Description	Qty/ engine	Part number
B.U.D.S. set Level 3 - Maintenance (for OEM/Distributor)	1	864023
B.U.D.S. Aircraft Software (3.0.0. or higher)	1	864361
Service wiring harness assy. (Only required for the loading process if the ECU has been removed from aircraft / disconnected from harness)	1	864280
Y-cable (Only required if the aircraft has two separate D-Sub DB 9 Maintenance ports. Specification according to the latest Maintenance Manual Heavy of the respective engine type)	1	-
Software configuration ECU 915 i A Series (Program files to be loaded onto the relevant ECU)	1	864089

Description	Part no.	Application
LOCTITE 243 BLUE	897651	turbocharger
LOCTITE ANTI SEIZE 8151	297434	turbocharger

NOTICE If using these special tools observe the manufacturers specifications.

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3) Accomplishment/Instructions

- ROTAX® reserves the right to make any amendments to existing documents, which might become necessary due to this standardization, at the time of next revision or issue.

NOTE: Before accomplishment, review the entire documentation to make sure you have a complete understanding of the procedure and requirements.

Accomplishment

All measures must be implemented and confirmed by at least one of the following persons or organizations:

- ROTAX® - Authorized Distributors or their independent Service Centers
- Persons with approved qualifications for the corresponding engine types. Only authorized persons (iRMT, Level Heavy Maintenance) are entitled to carry out this work

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

NOTE: Indicates supplementary information which may be needed to fully complete or understand an instruction.

⚠WARNING Danger of severe burns and scalds!
Allow the engine and exhaust system to cool to ambient temperature before starting work

All work has to be performed in accordance with the relevant Maintenance Manuals of the respective engine type.

General

Further material on general inspection, maintenance and repair can be found also in relevant Advisory Circular AC 43.13 from FAA.

Advisory Circular

This Manual "Advisory Circular" AC describes maintenance methods, techniques and practice.

3.1) Spare Parts - related information

See current Illustrated Parts Catalog (IPC) for the respective engine type.

3.2) Installation - related information

See current Installation Manual (IM) for the respective engine type.

NOTICE Connection turbocharger bracket with engine suspension frame requires a Metric or UNF fixed connection.

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1 Connection turbocharger bracket with engine suspension frame

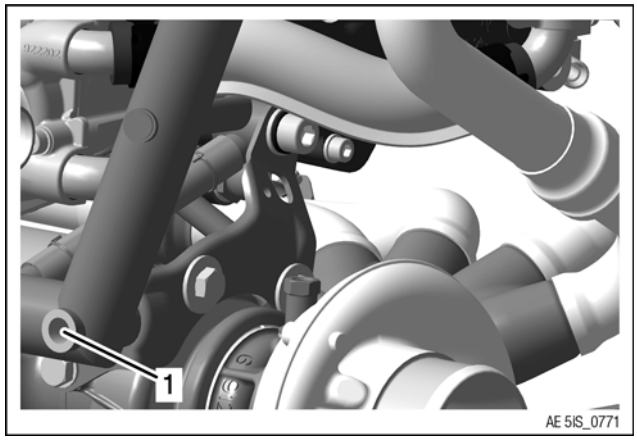

Fig. 1

3.3) Operation - related information

See current Operators Manual (OM) for the respective engine type.

3.4) Maintenance (Line) - related information

See current Maintenance Manual Line (MML) for the respective engine type and its periodical maintenance information

Points of inspection	Interval Operating hours	Chapter reference
	100 h	
Check the wastegate lever for free running and correct position.	x	12-20-00
Lubricate the wastegate lever.	x	12-20-00
Inspection of the GENUINE ROTAX® exhaust system included in the standard delivery.	x	05-20-00

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3.5) Maintenance (Heavy) - related information

3.5.1) Turbocharger assy. - removal

Preparation:

- Drain oil
- Disconnect air induction system
- Remove turbocharger / intercooler connection

Step	Procedure
1	Disconnect the turbo pressure oil line and the suction oil line.
2	Remove the cable clamp (Allen screw M5x20 and lock nut) for supporting the suction line on the turbocharger bracket.
3	Remove hose from wastegate actuator.

1 Turbo pressure oil line
2 Suction oil line
3 Wastegate actuator
4 Hose (wastegate actuator)
5 Cable clamp

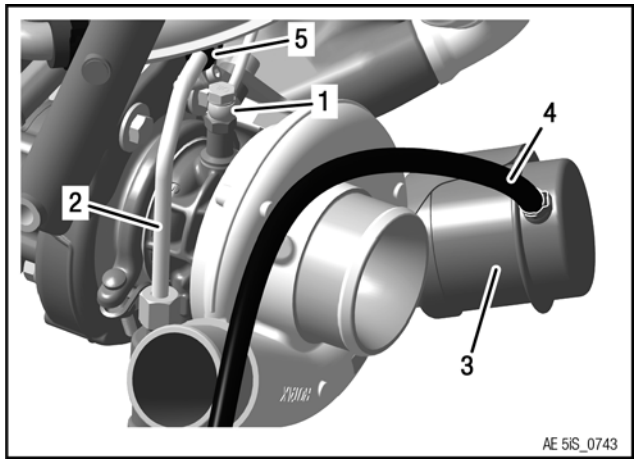

Fig. 2

Step	Procedure
4	Remove M8 hex. nuts and washers from turbocharger flange.
5	Remove M8x30 screws to disconnect turbocharger from exhaust manifold assy.

1 Turbocharger flange
2 Exhaust manifold assy.
3 Hex. nut M8
4 Washer
5 Screw M8x30

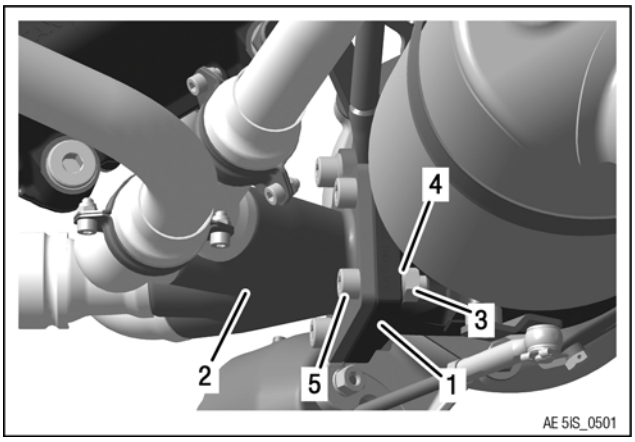

Fig. 3

Step	Procedure
6	Slacken tension clamp but do not detach or remove it from the exhaust bracket.

1 Muffler
2 Tension clamp
3 Exhaust bracket

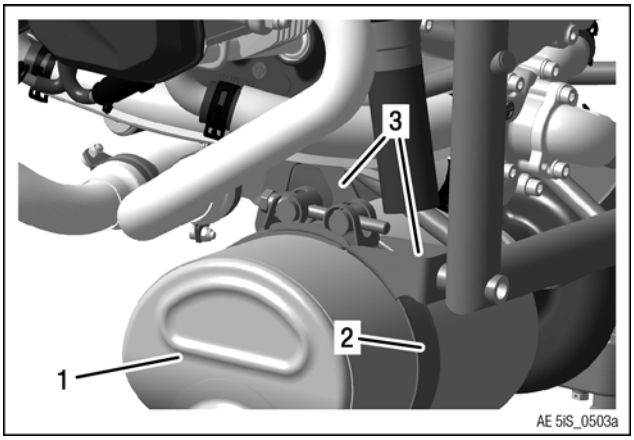

Fig. 4

Step	Procedure
7	Remove the Allen screw M10x50 (attachment of the turbocharger bracket) together with the lock washer and spacer. NOTE: The Allen screw M10x50 is secured with LOCTITE 243.
8	Loosen the engine suspension frame / exhaust bracket bolt (not supplied with the engine).See current Installation Manual (IM) for the respective engine type.

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1 Turbocharger bracket
2 Allen screw M10x50
3 Lock washer
4 Washer
5 Spacer 10.5/17/15
6 Connection turbocharger bracket with engine suspension frame

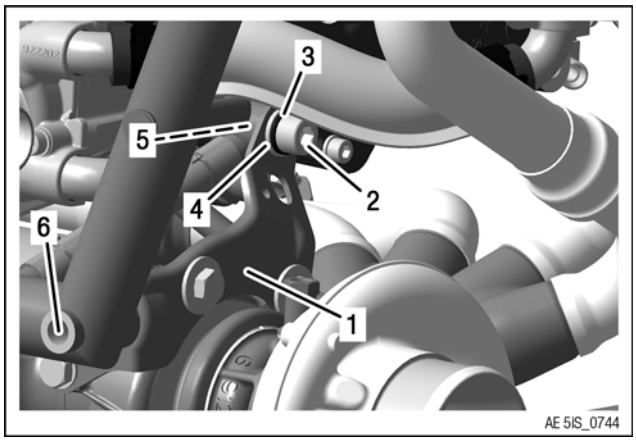

Fig. 5

Step	Procedure
9	Support the complete unit of muffler - turbocharger - bracket, remove the tension clamp and take off the complete unit.

1 Turbocharger
2 Muffler
3 Turbocharger bracket

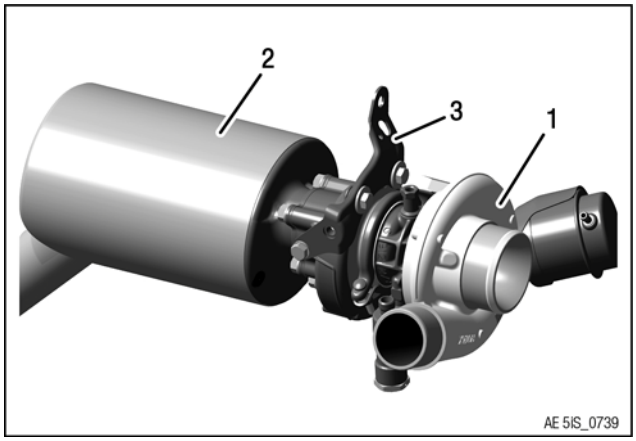

Fig. 6

3.5.2) Turbocharger bracket - removal

Step	Procedure
1	Remove 2 hex. screws M8x16 with washers B 8.4 (bigger outer diameter) from turbocharger.
2	Remove hex. screw M8x16 with washer 8.4 and remove bracket.

1 Hex. screws M8x16
2 Washers B 8.4
3 Washer 8.4

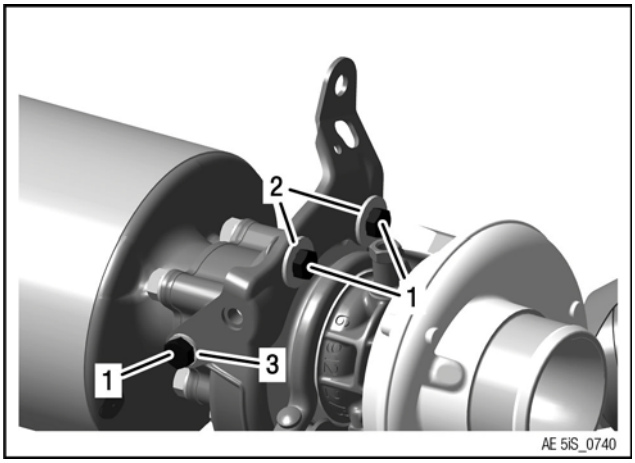

Fig. 7

3.5.3) Muffler assy. - removal

Step	Procedure
1	Remove hex. nuts with washers from the turbocharger studs.

1 Hex. nuts M8
2 Washers 8.4

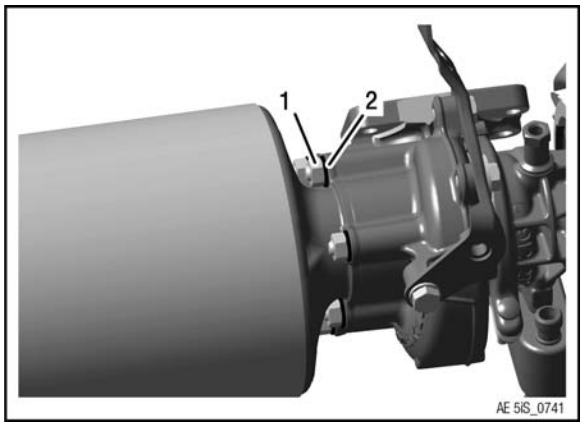

Fig. 8

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3.5.4) Muffler - inspection

Step	Procedure
1	Check the muffler assy. and exhaust flange for cracks, damage and wear.

1 Muffler assy.
2 Exhaust flange

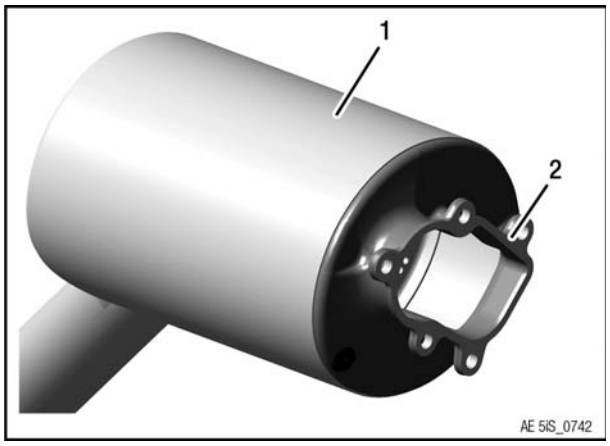

Fig. 9

3.5.5) Turbocharger - inspection

Preparation:

- Clean all parts carefully
- Record the readings in the Appendix

General visual inspection.
See Maintenance Manual Line (MML) for the engine type 915 i A Series Chapter 12-20-00

NOTE: The turbocharger is handled as a complete unit, i.e. no spare parts are available from BRP-Rotax. In the event of damage, the complete unit must be replaced.

Step	Procedure
1	Use a straight edge to test for distortion (see also section 4, Appendix). A distortion of max. 0.1 mm (0.004 inch) is permissible. If the maximal allowed distortion is exceeded, then it is possible to rework the surface up to 0.5 mm (0.02 inch). The amount of the rework must be recorded in the Appendix.

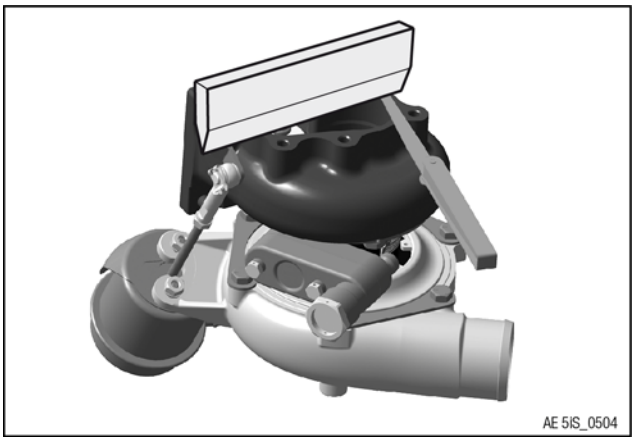

Fig. 10

Step	Procedure
2	Check the threaded holes for damage and wear.
3	Apply a slight radial pressure onto the turbine shaft to minimize the gap between the turbine casing and the turbine wheel. The gap must never be less than 0.1 mm (0.004 in.) (see also section 4, Appendix). Check the complete circumference of 360°.

NOTICE It is not allowed to repair any of the threads inside of the turbine housing with thread inserts.

1 Threaded hole
2 Gap

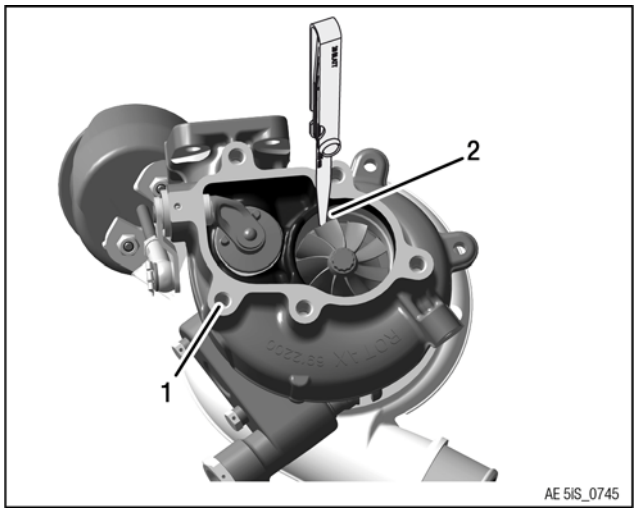

Fig. 11

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Step	Procedure
4	Apply a slight radial pressure onto the compressor shaft whereby it must not contact the compressor housing. Check the complete circumference of 360°.

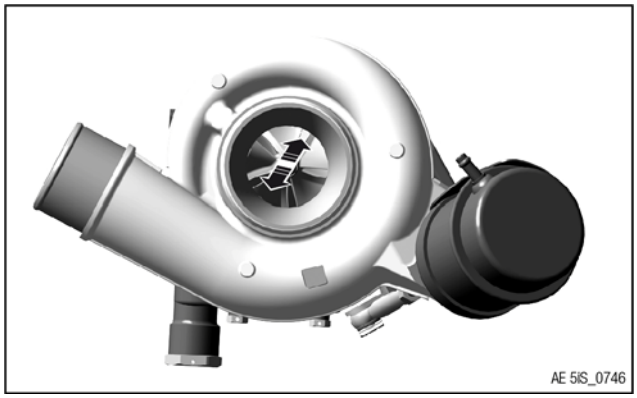

Fig. 12

Step	Procedure
5	Check the wastegate lever for free movement. If it does not move freely, lubricate the axle of the wastegate with LOCTITE ANTI SEIZE 8151.

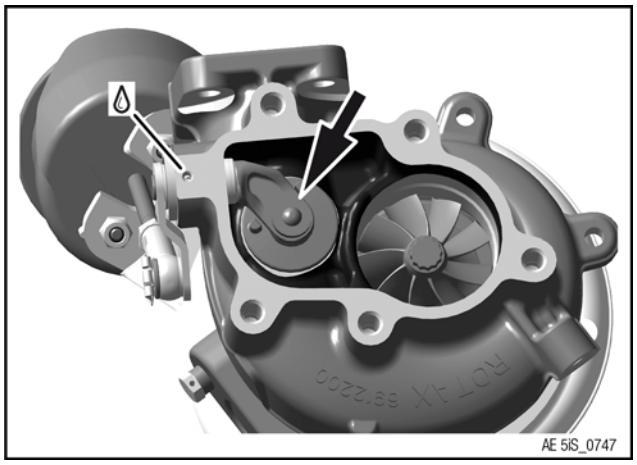

Fig. 13

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Step	Procedure
6	Apply slight in and out axial pressure onto the turbocharger shaft and check axial clearance TC01 (see also section 4, Appendix). The gap must exceed 0.084 mm (0.0033 in.)
7	Check the turbocharger shaft for radial clearance TC02 (see also section 4, Appendix). The gap must exceed 0.127 mm (0.0050 in.).

3.5.6) Pressure drop measuring method

Testing device consisting of:

- 2x pressure gauge
- 1x orifice jet (inner diameter = 1 mm (0.039 in.) / length = 3 mm (0.12 in.)
- 1x connecting nipple UNS 7/16” -24 for the thread in the middle section of the turbocharger
- 1x cover plate for the oil outlet connecting hoses (as required)

Step	Procedure
1	Screw in the connecting nipple and close the oil outlet with the cover plate.
2	Connect the pressure gauge together with the regulating valves.
3	Apply a constant pressure of 2 bar (29 psi) to the connection cable. The pressure drop must not exceed 50%. (From 2 bar (29 psi) to max. 1 bar (14.5 psi)). NOTE: For optimum results, the position of the shaft should always be changed slightly during the check, i.e. the shaft should be moved backwards and forwards in axial and radial directions.

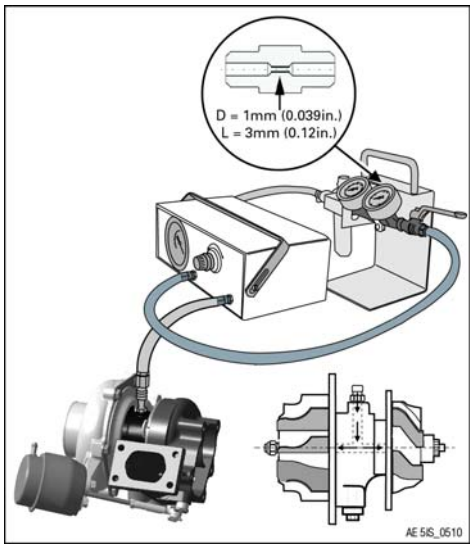

Fig. 14

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3.5.7) Muffler - installation

Step	Procedure
1	Apply LOCTITE ANTI SEIZE to the studs of the turbocharger. Tighten muffler with washers and nuts M8 to the turbocharger housing. Tightening torque 25 Nm (18 ft. lb.).

1 Hex. nuts M8
2 Washers 8.4

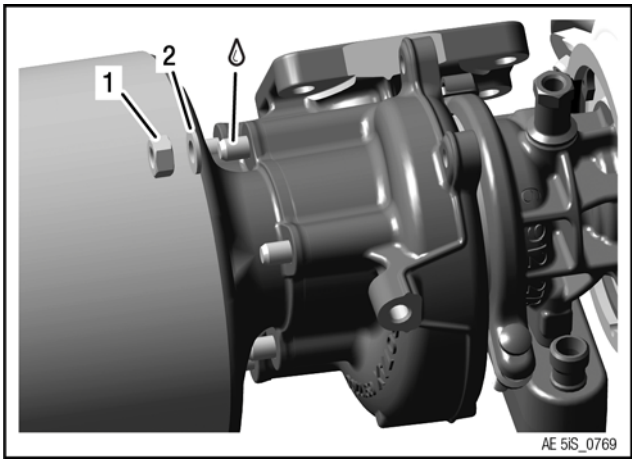

Fig. 15

3.5.8) Turbocharger bracket - installation

Turbocharger bracket integrates a captive nut used for engine ring mount and aircraft suspension frame attachment. It is available in Metric (M10) part no. 851298 or UNF (3/8-24) (AN6) part no. 851282.

Step	Procedure
1	Apply LOCTITE ANTI SEIZE to the hex. screws M8x16. Tighten the bracket to the turbocharger using 3 hex. screws M8x16 with 1x washer 8.4 and 2x washers B 8.4 (bigger outer diameter). Tightening torque 25 Nm (18 ft. lb.).

1 Hex. screws M8x16
2 Washers B 8.4
3 Washer 8.4

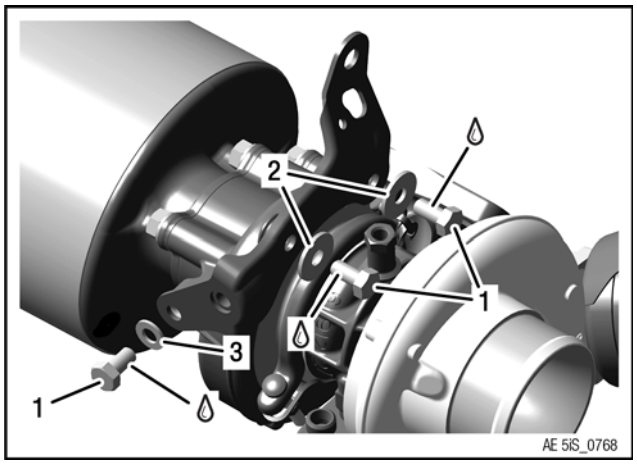

Fig. 16

3.5.9) Turbocharger assy. - installation

Step	Procedure
1	Place spacer 10.5/17/15 into the engine suspension frame.
2	Screw turbocharger assembly to the engine housing, complete with muffler and turbocharger bracket with washer, lock washer. Apply LOCTITE 243 to the Allen screw M10x50. Tightening torque 60 Nm (44 ft. lb).

1 Turbocharger bracket
2 Allen screw M10x50
3 Lock washer
4 Washer
5 Spacer 10.5/17/15
6 Connection turbocharger bracket with engine suspension frame

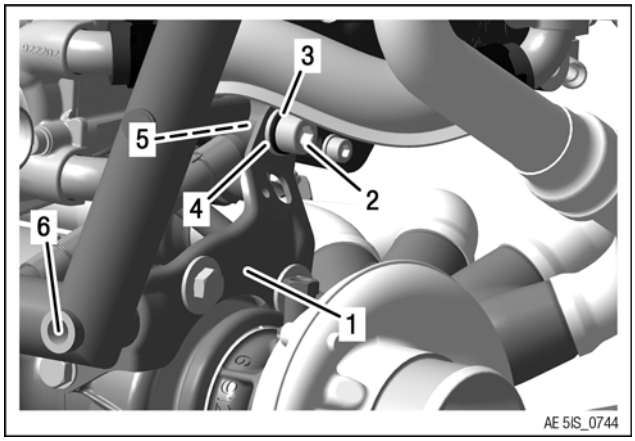

Fig. 17

Step	Procedure
3	The muffler is attached to the exhaust bracket with a tension clamp. Tightening torque 20 Nm (15 ft. lb).

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1 Muffler
2 Tension clamp
3 Exhaust bracket

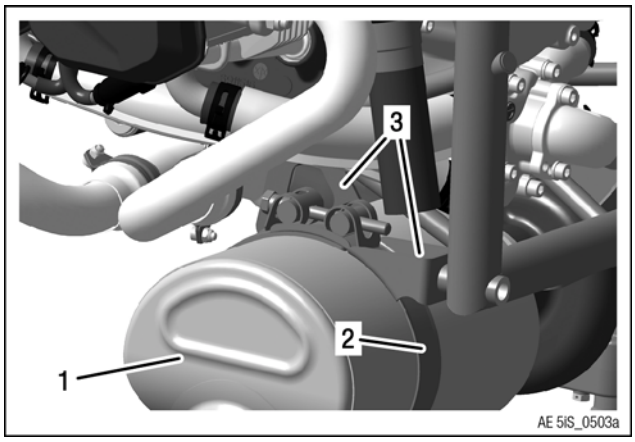

Fig. 18

Step	Procedure
4	Install turbo on exhaust manifold using Allen screws M8x30 with hex. nuts M8 and washers. Apply LOCTITE ANTI SEIZE to the screws. Tightening torque 25 Nm (18 ft. lb).

1 Allen screw M8x30
2 Washer 8.4
3 Hex. nut M8

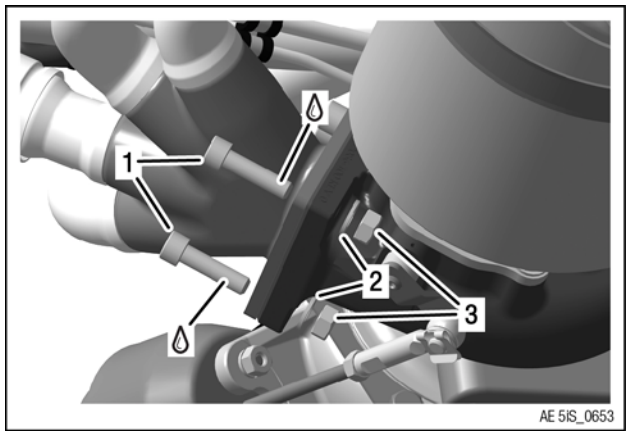

Fig. 19

Step	Procedure
5	Re-establish attachment of turbocharger bracket to engine suspension frame (not supplied with engine). Tightening torque as specified by the aircraft manufacturer. NOTE: Ensure correct attachment bolt is used for the turbocharger bracket.

NOTICE

Total blockage of oil supply may occur!
Do not install ball and spring for check valve in wrong order. Ball must be on the upper side, over the spring!

Step	Procedure
6	Install spring and ball of turbo pressure oil line, see applicable Maintenance Manual Heavy (MMH), Chapter 79-00-00 Oil line (steel line) installation. NOTE: Ball must be on the upper side, over the spring! NOTE: Valve housing part no. 956482 must be used in conjunction with turbocharger part no. 893108.
7	Connect the turbo pressure oil line with new sealing rings, see applicable Maintenance Manual Heavy (MMH), Chapter 79-00-00 Oil line (steel line) installation. Tightening torque 17 Nm (150 in. lb).
8	Install turbo suction oil line with clamp, M5x20 screw and new M5 lock nut on turbocharger bracket, see Chapter 79-00-00 Oil line (steel line) installation.
9	Install hose on wastegate actuator assy.

1 Turbo pressure oil line
2 Suction oil line
3 Wastegate actuator
4 Hose (wastegate actuator)
5 Cable clamp

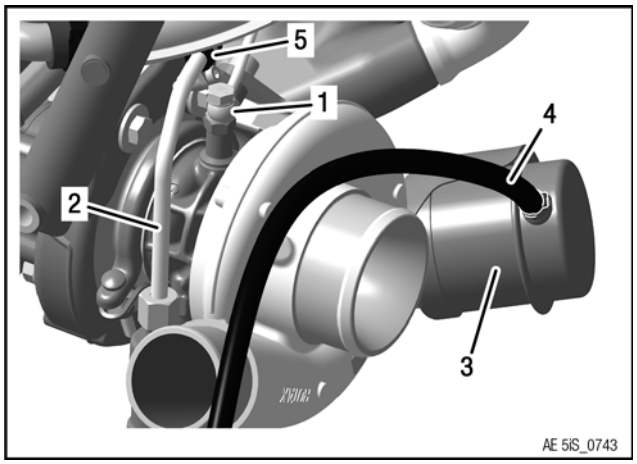

Fig. 20

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If the location of the oil line connection does not correspond with oil pump housing, correction can be achieved by slightly turning the turbocharger center section. After completion of installation as described, all the screw connections on the turbocharger bracket, exhaust manifold, exhaust bends and the tension clamp must be tightened to the specified torques:

Description	Application	Tightening torque
Allen screw	Turbo flange	25 Nm / 18 ft. lb
Allen screw	Turbocharger bracket	60 Nm / 44 ft. lb
Allen screw	Exhaust bracket	60 Nm / 44 ft. lb
Hex. screw	Tension clamp	20 Nm / 15 ft. lb

NOTICE In the high temperature zone of the turbocharger and exhaust system, use exclusively high grade, stainless steel screws

3.6) ECU software check/update

Engines equipped with following ECU part numbers are already programmed with the latest version of ECU software.

Engine type	ECU part no.
915 iSc A	864357

3.6.1) Identify current ECU configuration

Connect ECU to computer by using the Service Wiring Harness or, in case the ECU is installed in an aircraft, by connecting the ECU directly via the aircraft wiring harness. Refer to the instructions of the latest Maintenance Manual Heavy Chapter 76-10-00.

Step	Procedure
1	Launch B.U.D.S. Aircraft by double clicking the desktop icon. Alternatively, B.U.D.S. Aircraft can also be started through the start menu entry (e.g. Start – All Programs - B.U.D.S. - run B.U.D.S.).

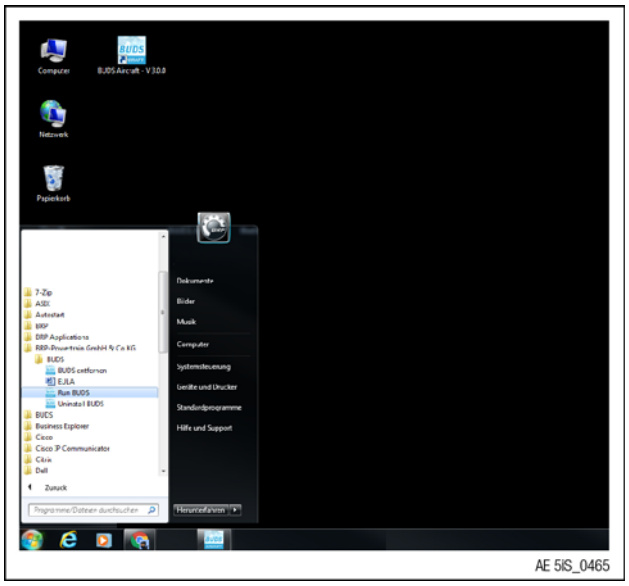

Fig. 21

Step	Procedure
2	Wait until the program has been started completely.
3	Check if both Lane Health Indicators (top left corner) turn **green**. If they are gray check connections and power supply and/or restart B.U.D.S. Aircraft.
4	Change to “ECU configuration” tab.

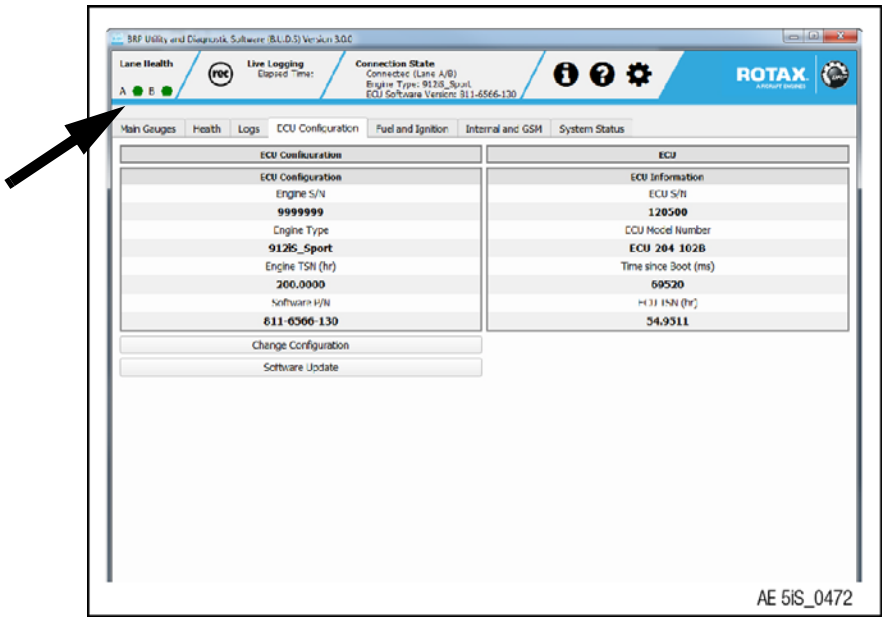

Fig. 22

Step	Procedure
5	Read and note the values of following field: - Software P/N: This value indicates the current software installed on the ECU. NOTE: Knowing the current “Software Config. Part Number” and “ECU part number” is crucial, when loading ECU software or verifying if ECU has the latest software installed.

3.6.2) Verify ECU Software

Verify if the installed ECU software version is up to date. If the software is not up to date continue with chapter 3.6.3. See also SI-915 i-004 - List of approved Engine Control Unit (ECU) software and hardware configurations for ROTAX® Engine Type 915 i (Series).

3.6.3) Update of ECU software

If there is a newer ECU software for the relevant engine configuration available perform software loading according to SB-915 i-002 - Software Update for Engine Control Unit (ECU) on ROTAX® Engine Type 915 i (Series).

3.7) Test run

In case of uninstalled engines test run can be skipped as this is covered by the mandatory test run after installation.

Conduct test run. See Chapter 12-20-00 of the latest Maintenance Manual Line (MML) for the respective engine type.

3.8) Summary

These instructions (section 3) have to be followed in accordance with the deadlines specified in section 1.5.

The execution of the Service Instruction must be confirmed in the logbook.

NOTE: Work on EASA certified parts might affect the EASA Form 1 and does require appropriate documentation by authorized persons. Repairs must be entered into the engine logbook and also do apply for the EASA Form 1.

A revision bar outside of the page margin indicates a change to text or graphic.

Translation into other languages might be performed in the course of language localization but does not lie within ROTAX® scope of responsibility.

In any case the original text in English language and the metric units are authoritative.

3.9) Inquiries

Inquiries regarding this Service Instruction should be sent to the ROTAX® Authorized Distributor of your area.

A list of all ROTAX® Authorized Distributors or their independent Service Centers is provided on www.flyrotax.com.

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4) Appendix

WEAR LIMITS

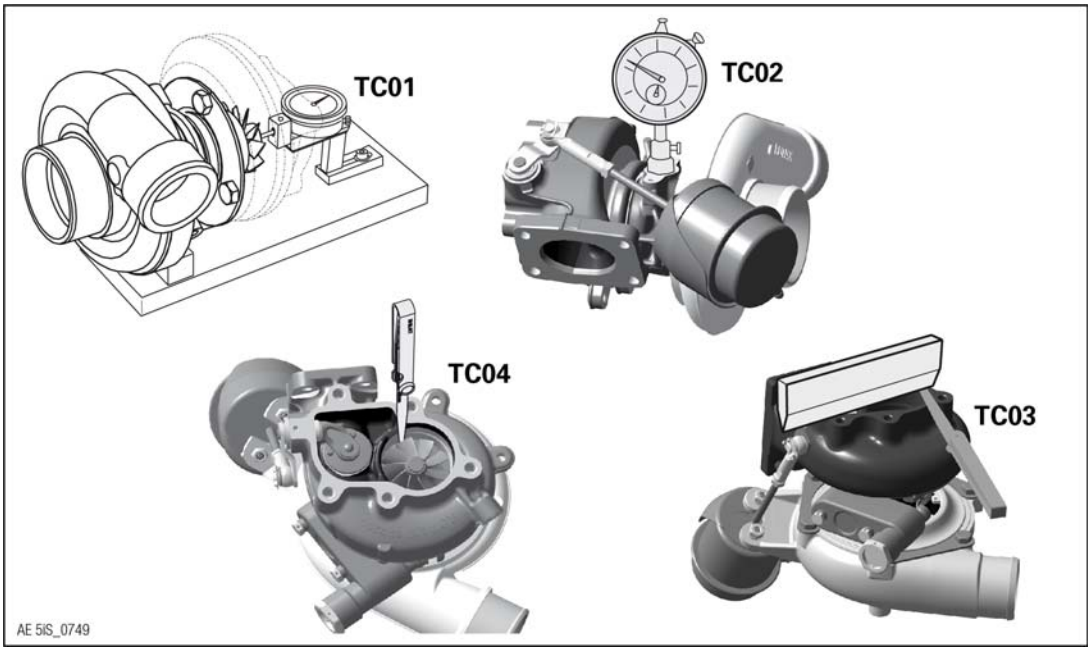

Fig. 23

Description	Code	Current measurement value		Tolerance limit	
		min	max	100%	50%
Turbocharger					
Axial clearance	TC01			0.025 mm (0.0010 in.) to 0.084 mm (0.0033 in.)	0.040 mm (0.0016 in.) to 0.070 mm (0.0028 in.)
Radial clearance	TC02			0.056 mm (0.0022 in.) to 0.127 mm (0.0050 in.)	0.074 mm (0.0029 in.) to 0.109 mm (0.0043 in.)
Rework turbine housing flange	TC03			0.5 mm (0.02 in.)	
Rotor turbine	TC04			min. 0.1 mm (0.004 in.)	

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.