

SERVICE INSTRUCTION

Advanced Start System for ROTAX® Engine Type 912 Series

ATA System: 74-00-00 Ignition system

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® engines types:

Category A):

The following engines are already equipped with components for the Advanced Start Module (ASM) System like equipped with flywheel hub part no. 966872, ignition module part no. 965444 and "easy start unlock" cable assy. part no. 964090 / 964081 installed from factory.

Engine type	Serial number
912 A	from S/N 4 411 424
912 F	from S/N 4 413 109
912 S	from S/N 9 564 440
912 UL	from S/N 9 580 135
912 ULS	from S/N 9 569 261

NOTE: Easy start unlock cable is already attached to ignition modules in serial production but must be connected to airframe starter solenoid to fully enable "advanced start" feature. Without this cable connected, the ignition modules function the same way as on the well-proven previous modules.
See section 3.1 for more details.

Category B):

The following engines are already equipped with components for the Advanced Start Module (ASM) System like with flywheel hub part no. 966872 and ignition module part no. 966727 / 966729 / 965444 installed from factory and easy start unlock cable assy. part no. 964090 / 964081 provided from factory within engine crate.

Engine type	Serial number
912 A	from S/N 4 411 016
912 F	from S/N 4 413 041
912 S	from S/N 4 924 705
912 UL	from S/N 6 771 306
912 ULS	from S/N 6 783 234

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NOTE: Easy start unlock cable is provided as a separate part with the engine but must be attached to both of the ignition modules and the airframe starter solenoid to fully enable “advanced start” feature. Without this cable connected, the ignition modules function the same way as on the well-proven previous module. See section 3.2 for more details.

Category C):

Equipped with ignition module part no. 966726 (912 S/ULS) or 966726 / 966728 (912 A/F/UL) installed from factory.

Engine type	Serial number
912 A	from S/N 4 410 630
912 F	from S/N 4 412 874
912 S	from S/N 4 923 058
912 UL	from S/N 4 406 291
912 ULS	from S/N 5 643 680
912 ULSFR	from S/N 4 429 972

NOTE: Engines within these serial number ranges can be retrofitted to the “advanced start” system. Flywheel hub, ignition modules and easy start unlock cable must be installed as per section 3.3. Older engines (not having 6-pin connectors) can be upgraded with the new fly wheel hub. A complete retrofit requires the replacement of the trigger coils, double ignition coils, the addition of the connector bracket and further considerable changes.

1.2) Concurrent ASB/SB/SI and SL

The information in this Service Instruction was previously communicated in the:

SI-912-020, title „Running modification on ROTAX® engine type 912/914 (Series)”, which will be revised accordingly and will then refer to this Service Instruction.

1.3) Reason

In the course of further development and standardization an ignition module for delayed start up ignition timing has been introduced. This module can be activated by a 12 V signal. Without this optional 12 V activation the function works the same way as on the well-proven previous module.

Full integration of the new flywheel and advance start modules allow for a noticeably smoother engine start. By advancing the engine timing to after T.D.C. and having this advanced startup timing continue for several seconds after startup, the engine is allowed to start at reduced power.

1.4) Subject

Advanced Start System for ROTAX® Engine Type 912 (Series).

1.5) Compliance

NONE - For Information Only



Non-compliance with these instructions could result in engine damages, personal injuries or death

1.6) Approval

The technical content of this document is approved under the authority of 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 - - - none.

Moment of inertia - - - unaffected.

1.9) Electrical load data

No change.

1.10) Software modifications

No change.

1.11) References

In addition to this technical information refer to current issue of

- Illustrated Parts Catalog (IPC)
- Installation Manual (IM)
- Maintenance Manual (MM) Heavy

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 that 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

- All parts are interchangeable

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2) Material Information

2.1) General information

See Fig. 1 to Fig. 5.

To take full advantage of the new advance start system, the modules must be activated by a 12 V signal upon engine start. See section 3 for installation-related information for each of the 3 engine categories.

2.2) Technical background information

After starting the engine, and as soon as the starter/relay is not powered anymore (starter switch off), the engine continues to further run for 3-8 seconds with delayed ignition.

NOTE: Do not connect the signal wire directly to the electric starter motor - as the circuit does not have voltage protection.

Do not power the advanced start terminal permanently with 12 V. The delay timer function would be bypassed and charging speed might vary (depending on internal tolerances, trigger gap etc.).

Flywheel hub part number	Start ignition timing	Normal operation ignition timing
966871 old	4° Before T.D.C.	26° Before T.D.C
966872 new	3° After T.D.C.	26° Before T.D.C

Ignition module part number	Time delay for ignition at start	Switching to normal ignition timing
966726 old	None	From 650 to 1000 RPM
966727 / 966729 / 965444 new	3 - 8 seconds	After expiration of time delay (3-8 seconds)

2.3) Material- cost and availability

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

2.4) Company support information

None.

2.5) Material requirement per engine

parts requirement:

New p/n	Qty/ engine	Description	Old p/n	Application
966872	1	Flywheel hub	966871	Engine type 912 S/912 ULS/ 912 ULSFR
966727/966729 / 965444	2	Ignition module	966726	Engine type 912 S/912 ULS/ 912 ULSFR
964090 / 964081	1	Easy start unlock cable assy.	-	Engine type 912 S/912 ULS/ 912 ULSFR
260135	2	Dummy plug		
945768	1	Lock washer 16		

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881280	1	Soft start set	-	Engine type 912 S / 912 ULS / 912 ULSFR
consists of:				
827800	1	Washer A 5.5	-	
240186	2	Allen screw M5x25	-	
945750	1	Lock washer A5	-	
260130	2	Cable grommet	-	
265275	2	Faston connector	-	

2.6) Material requirement per spare part

None.

2.7) Rework of parts

None.

2.8) Special tooling/lubricant-/adhesives-/sealing compound/price and availability

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

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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 maintenance, 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® - 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.
- Persons with type-specific training

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

Safety notice



Identifies an instruction which, if not followed, may cause serious injury or even fatal injury.



Identifies an instruction which, if not followed, may cause minor or moderate injury.



Denotes an instruction which, if not followed, may severely damage the engine or could lead to suspension of warranty.

ENVIRONMENTAL NOTE
Environmental notes give you tips on environmental protection.

3.1) Installation-related information

3.1.1) Category A

Pay attention to the specifications of the latest version of the Installation Manual (IM) for the respective engine type.

Easy start unlock cable assy. part no. 964090 / 964081 has already been connected in serial production on the engines listed in Category A. The single wire of this harness (see fig. 1) must be connected to the momentary 12V start power signal at the starter solenoid (see fig. 3 and 4). For this purpose the engines listed in Category A are also supplied with a bag consisting of one protective tube NW 4.5 (1000 mm / 3.28 ft.) (1), 1 flat crimp (2), 2 smaller heat sleeves (3) and 1 bigger heat sleeve (4), see fig. 2. Install these parts according to the instructions supplied by your aircraft manufacturer and the relevant acceptable methods, techniques, and practices AC 43.13-1.

NOTE: If the ASM feature is not desired, or the aircraft is not suitable for this feature, the "Easy Start Unlock" part no. 964090 / 964081 cable assy. can be removed from the 6-pin connector (see fig. 3). The empty pin terminals must have dummy plugs part no. 260135 installed to prevent corrosion!

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3.1.2) Category B

Pay attention to the specifications of the latest version of the Installation Manual (IM) for the respective engine type.

Easy start unlock cable assy. part no. 964090 / 964081 is provided as a spare part with engines listed in Category B and must be connected to both of the ignition modules and to momentary 12 V start power signal at the starter solenoid (see fig. 3 and fig. 4), to ensure full functionality of the advanced start system. For this purpose within the set of the easy start unlock cable assy. a bag consisting of one protective tube NW 4.5 (1000 mm / 3.28 ft.) (1), 1 flat crimp (2), 2 smaller heat sleeves (3) and 1 bigger heat sleeve (4) is also supplied, see fig. 2.

Remove the 6-pin connector from the stainless steel bracket by gently lifting the locking tab. Disconnect the male and female 6-pin connectors by gently lifting the center latch and gently pulling the housings apart (the rubber seals may stick; wiggling the connectors while pulling them apart will help to separate the two connectors). Do not remove the inner sealing piece (held in with two latches).

Remove the rubber dummy plugs from the male 6-pin connectors (violet wires) on each ignition module (see fig. 3). Insert the easy start unlock cable pin terminals (with grommets) to the now empty terminal of each ignition module (see fig. 3).

The single wire of this harness (see fig. 1) must be connected to the momentary 12 V start power signal at the starter solenoid (see fig. 3 and fig. 4). Also use the protective tube NW 4.5 (1000 mm / 3.28 ft.) (1), 1 flat crimp (2), 2 smaller heat sleeves (3) and 1 bigger heat sleeve (4) see fig. 2 according to the instructions supplied by your aircraft manufacturer and the relevant acceptable methods, techniques and practices AC 43.13-1.

3.1.3) Category C

Pay attention to the specifications of the latest version of the Installation Manual (IM) and Maintenance Manual (MM) Heavy for the respective engine type.

Older engines having an ignition system which is equipped with 6-pin connector modules (part no. 966724 / 966726 / 966728) can be upgraded to the new advance start system with the installation of new modules, easy start unlock cable and the new flywheel hub.

NOTE: Older engines (not having 6-pin connectors) can only be upgraded with the new flywheel hub. A complete retrofit requires the replacement of the trigger coils, double ignition coils, the addition of the connector bracket and further considerable change. This work may not be economically feasible.

Installation of flywheel hub:

Replace the old flywheel hub with new part no. 966872, using a new lock washer part no. 945768 and adhere to designated torque procedure provided in the Maintenance Manual Heavy.

NOTE: Check trigger coil gaps before rotating the engine / flywheel.

3.2) Maintenance-related information

When checking ignition "mag drops", the engine should be at normal operating temperature and at an engine speed of 4000 RPM.

3.3) Test run

Conduct test run including ignition check and leakage test. See chapter 12-20-00 of the latest Maintenance Manual Line for the respective engine type.

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3.4) Verification of proper operation

With the advance start modules correctly installed and the actuation wire correctly connected to the momentary start switch side of the starter solenoid (see fig. 3 and fig. 4), normal starting activity should be as follows:

- Start the engine as normal
- Set the engine idle between 1800 to 2000 rpm
- The engine will run at the selected idle speed for approximately 3 to 8 seconds. (During this time, the engine timing is automatically set to 3° after T.D.C.)
- With no further pilot input, after 3 to 8 seconds, the engine will automatically switch engine timing to 26° before T.D.C. and remain so until next engine startup. Engine rpm at this point will noticeably rise by approx. 200 to 300 rpm. This is normal due to the change in engine timing.

3.5) Summary

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

| 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.

3.6) Enquiries

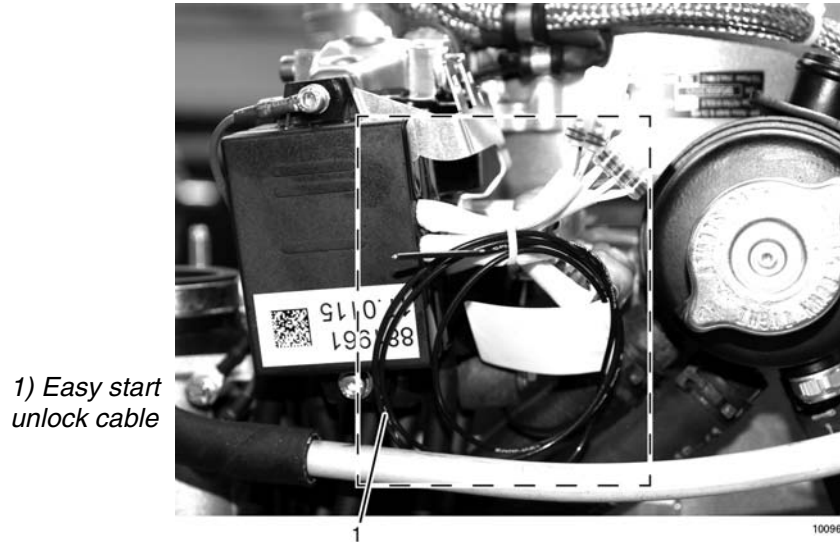
Enquiries regarding this Service Instruction should be sent to the ROTAX® Authorized Distributor of your area.

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

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4) Appendix

The following drawings should convey additional information:



1) Easy start unlock cable

ATTENTION:
Picture does show delivery situation of series production engines. Engine may not be operated with easy start unlock cable mounted in this way.

Fig. 1

- 1) protective tube
- 2) flat crimp
- 3) smaller heat sleeve
- 4) bigger heat sleeve
- 5) easy start unlock cable
- 6) tag (only production relevant)

NOTE:
If necessary, tag can be removed.

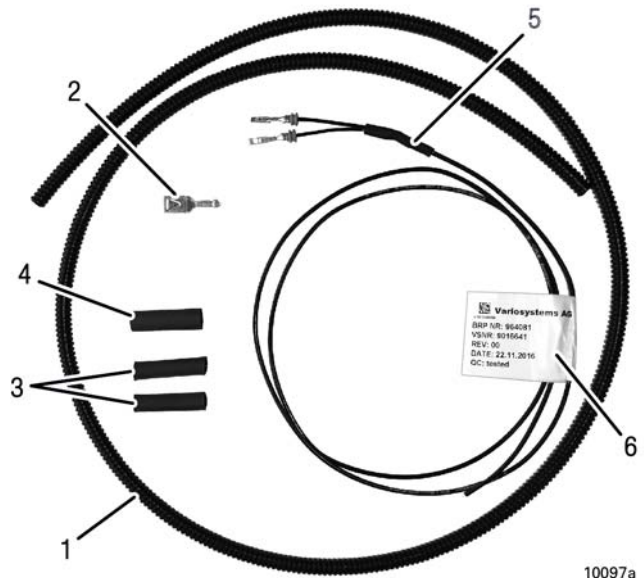


Fig. 2

Easy start unlock cable assy.

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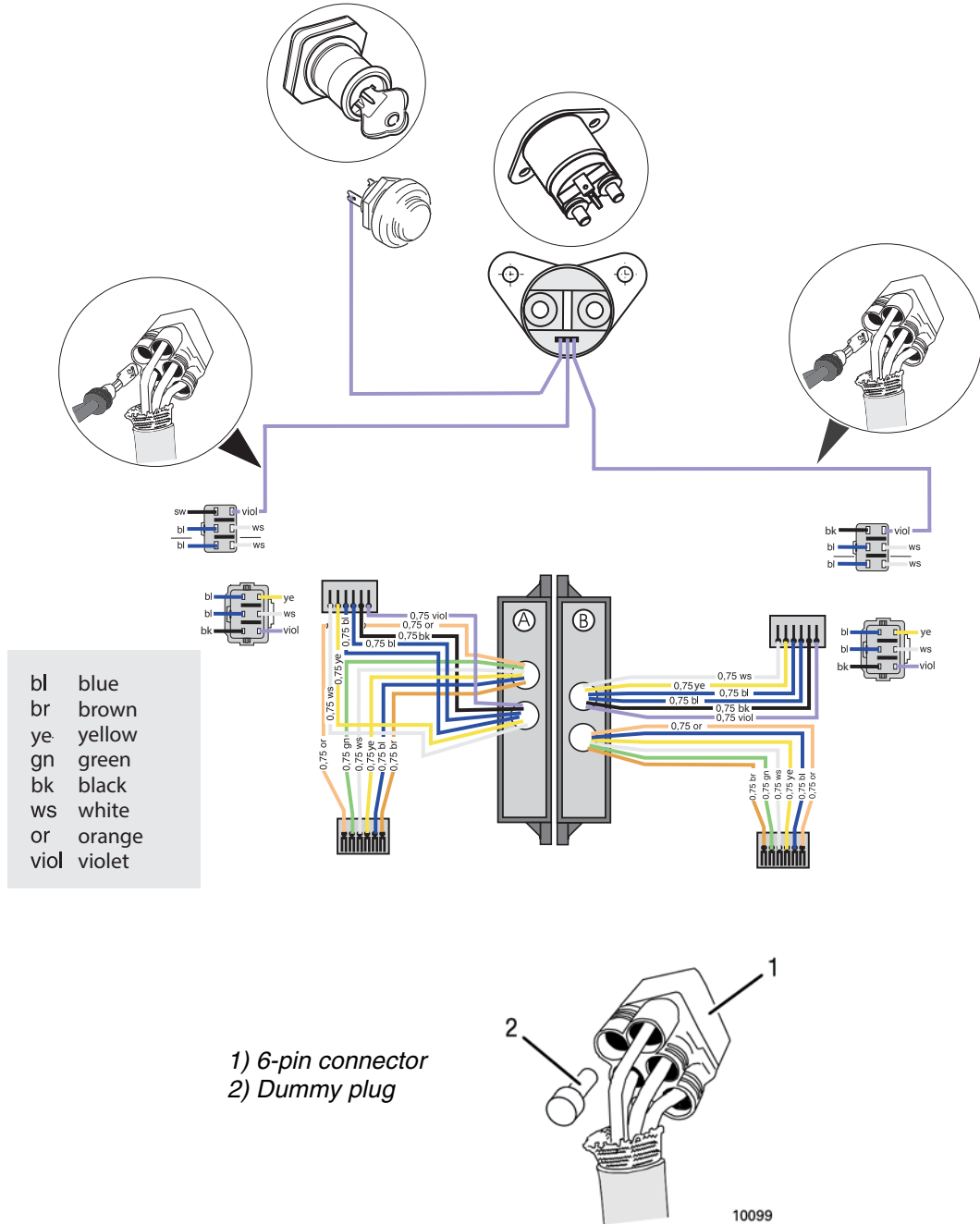
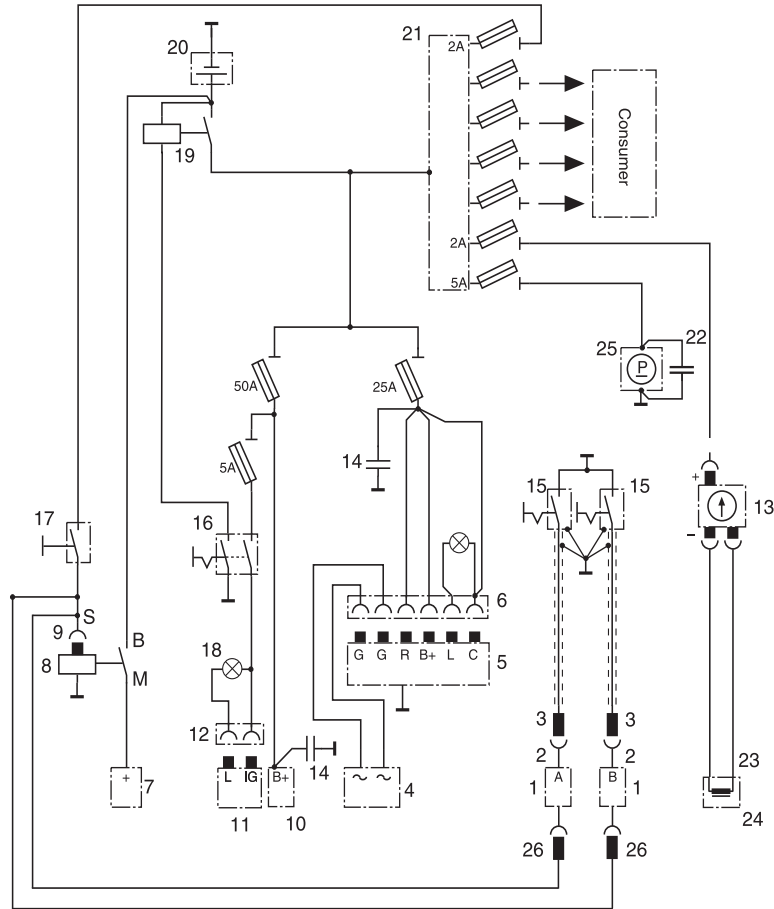


Fig. 3
Wiring diagram / airframe starter solenoid connection

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Wiring symbols to DIN 40712, 40713, 40716 and 40719

- | | | | |
|-------|------------------------------------------------------|----|-----------------------------------------------------|
| B | battery | 15 | 2 ignition switches |
| M | engine | 16 | master switch |
| S | signal | 17 | starter button |
| 1 | 2 ignition modules (A and B) | 18 | control lamp |
| 2-3 | plug connection for ignition switch | 19 | battery relay |
| 4 | integrated generator | 20 | battery |
| 5-6 | external regulator - rectifier with plug connections | 21 | bus bar |
| 7 | electric starter | 22 | capacitor |
| 8-9 | starter relay with plug connection | 23 | plug connection for trigger coil assy. |
| 10-12 | external alternator with connections | 24 | trigger coil assy. (tachometer) |
| 13 | electric rev counter | 25 | electric fuel pump |
| 14 | capacitor | 26 | starting equipment at the ignition modules from ASM |

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Fig. 4
Wiring diagram

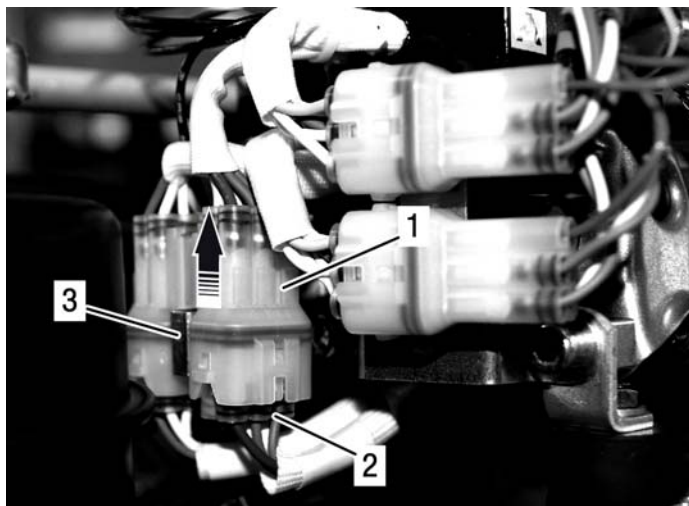
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Plug in 6-pin connector

- 1) 6-pin connector housing
- 2) 6-pin connector
- 3) Connector bracket

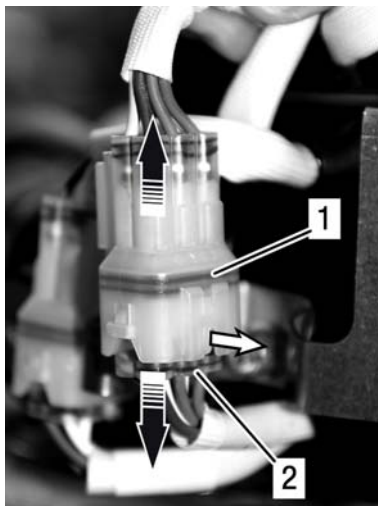


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Fig. 5

Unplug 6-pin connector

- 1) 6-pin connector housing
- 2) 6-pin connector



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Fig. 6

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.

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