

Charging System

General Description

Charging System Description

CENDK1111B01001

The battery charging system circuit is illustrated below. It is composed of the Battery Charge Coil, Rectifier / regulator and Battery. The AC current generated from the battery charge coil is converted by the rectifier / regulator into regulated DC current which is used to charge the battery.

Battery charge coil output

On the electric starter models:

Standard: 12 V 12 A (144 W) at 3 000 r/min

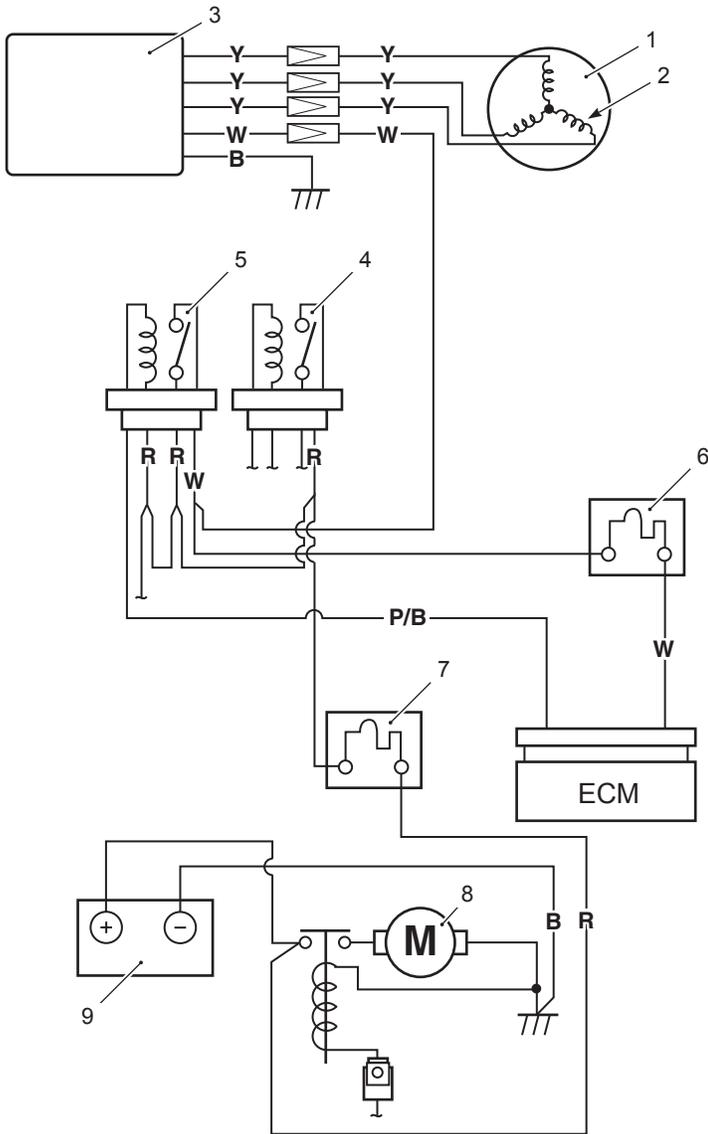
On the manual starter models:

Standard: 12 V 6 A (72 W) at 5 000 r/min

Regulated voltage

Standard: 13.5 – 14.4 Volts

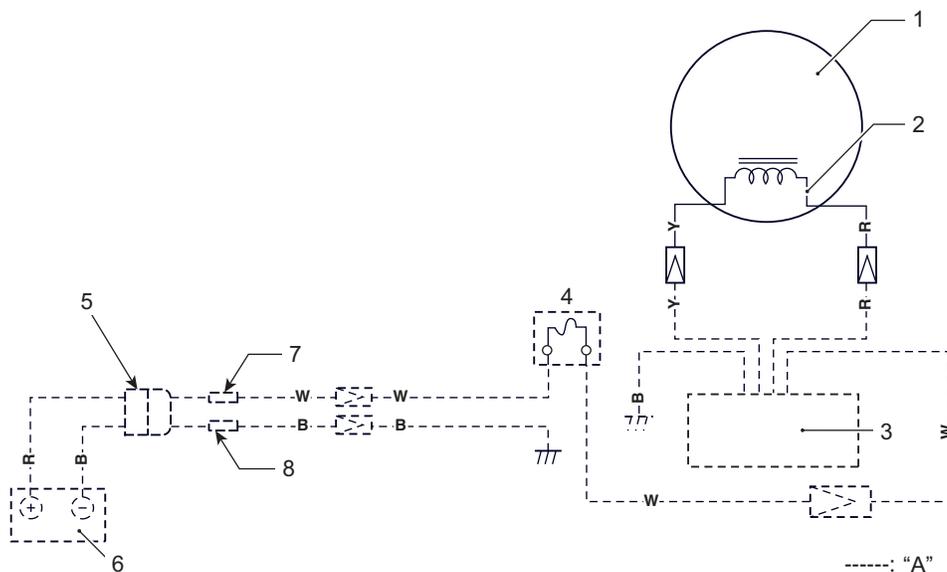
Electric Starter Model



IDK1111B0001-04

1. Magneto	4. Starter motor relay	7. Fuse 30 amp. (main)
2. Battery charge coil	5. Battery relay	8. Starter motor
3. Rectifier / Regulator	6. ECM Fuse 10 amp.	9. Battery

Manual Starter Model



IAJ3111B0002-01

1. Magneto	4. Fuse 20 amp.	7. Y-tube
2. Battery charge coil	5. Receptacle plug	8. R-tube
3. Rectifier / Regulator	6. Battery	"A": Option

Battery Requirement Description

Refer to "Battery Requirement" in Section 0A (Page 0A-6).

CENDK1111B01002

Component Location

Charging System Components Location

Refer to "Wiring Harness Routing Diagram" in Section 4A (Page 4A-3).

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Diagnostic Information and Procedures

Charging System Diagnosis

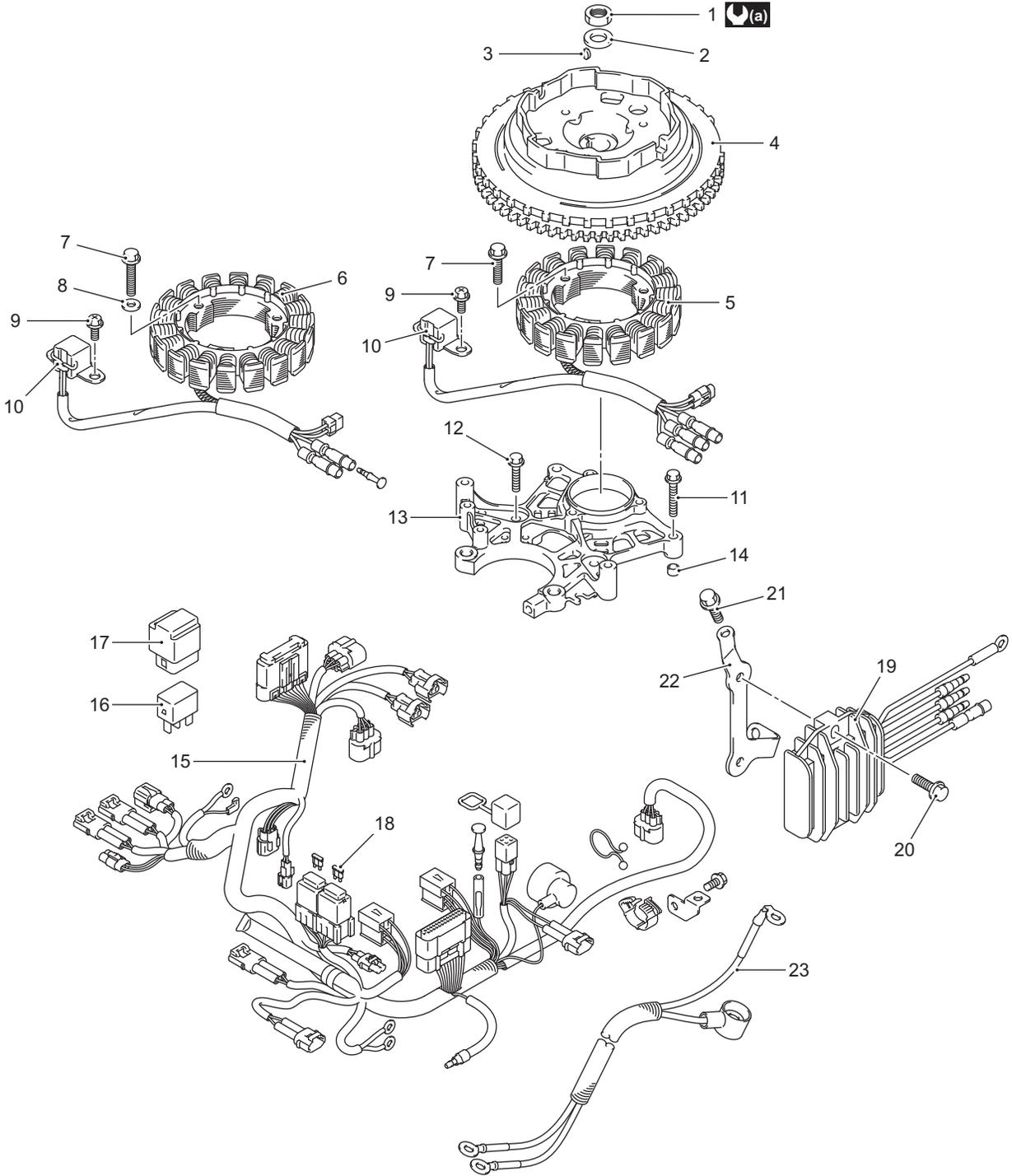
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Condition	Possible cause	Correction / Reference item
Alternator (Battery charge coil) does not charge.	Open or short circuit lead wires.	<i>Repair or replace.</i>
	Open or short circuit battery charge coil.	<i>Replace.</i>
	Rectifier / Regulator failure.	<i>Replace.</i>
	Fuse blown out.	<i>Replace.</i>
	Poor or broken battery connection.	<i>Repair or Replace.</i>
	Battery relay failure.	<i>Replace.</i>
	ECM failure.	<i>Replace.</i>
Alternator (Battery charge coil) overcharge.	Rectifier / Regulator failure.	<i>Replace.</i>
	Poorly grounded rectifier / regulator.	<i>Repair or Retighten.</i>
Unstable charging	Short circuit battery charge coil.	<i>Replace.</i>
	Loose lead wire connection.	<i>Repair or replace.</i>
	Rectifier / Regulator failure.	<i>Replace.</i>
	Poor or broken battery connection.	<i>Repair or replace.</i>

Service Instructions

Charging System Construction

CENDK1111B06001



IDK1111B0051-01

1. Nut	7. Bolt	13. Stator base	19. Rectifier/ Regulator
2. Washer	8. Washer	14. Dowel pin	20. Bolt
3. Key	9. Bolt	15. Wiring harness assembly	21. Bolt
4. Flywheel	10. CKP sensor	16. Battery relay	22. Bracket
5. Battery charge coil (Electric start model)	11. Bolt	17. Relay holder	23. Battery cable
6. Battery charge coil and ECM power source coil (Manual start model)	12. Bolt	18. Fuse	(a) : 90 N·m (9.0 kgf·m, 65 lbf·ft)

1K-4 Charging System:

Flywheel Removal and Installation

CENDK1111B06002

Removal

▲ CAUTION

Failure to take proper precaution when removing flywheel may result in personal injury and/or damage to electronic components.

Prior to removing flywheel, disconnect battery cables from battery.

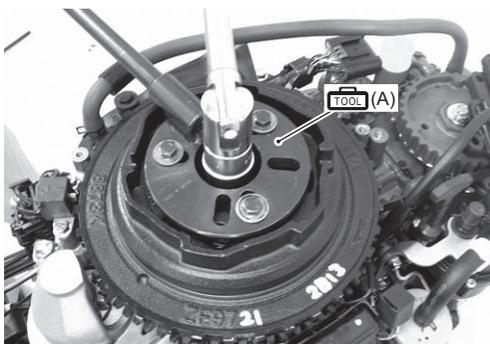
- 1) Remove the recoil starter.
Refer to "Recoil Starter Removal and Installation" in Section 1J (Page 1J-3).
- 2) Using special tool, loosen flywheel nut 2 – 3 turns.

NOTE

Do not remove flywheel nut at this time. This nut prevents damage to the crankshaft when using flywheel remover tools.

Special tool

TOOL (A): 09930-39520 (Flywheel holder)



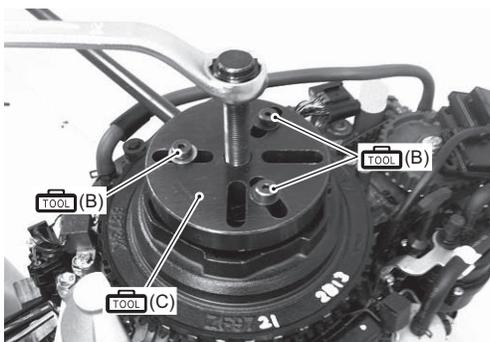
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- 3) Using special tools, loosen flywheel from crankshaft.

Special tool

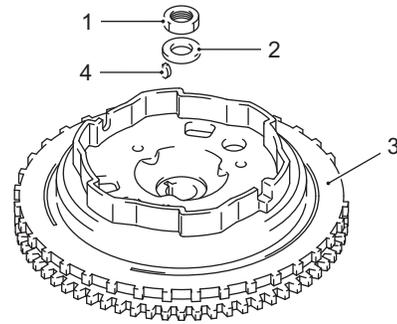
TOOL (B): 09930-39210 (Flywheel remover bolt)

TOOL (C): 09930-39411 (Flywheel remover)



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- 4) Remove the flywheel nut (1), washer (2), flywheel (3) and key (4).

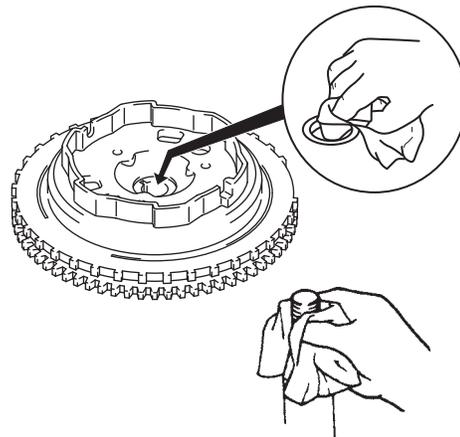


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Installation

Installation is reverse order of removal with special attention to the following steps.

- Clean flywheel and crankshaft mating surfaces with cleaning solvent.



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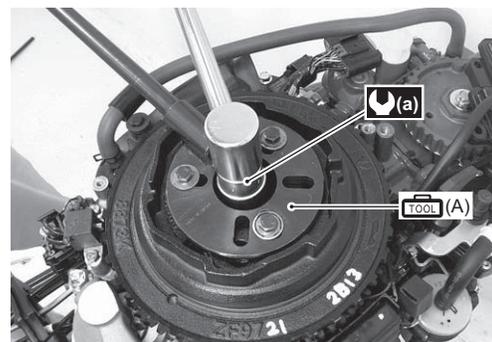
- Tighten flywheel nut to specified torque.

Special tool

TOOL (A): 09930-39520 (Flywheel holder)

Tightening torque

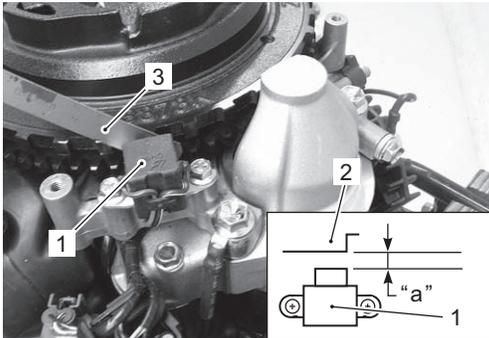
Flywheel nut (a): 90 N·m (9.0 kgf·m, 65 lbf·ft)



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- After installing flywheel and torquing nut to specification, check air gap between CKP sensor and flywheel reluctor bars.

CKP sensor air gap "a"
0.75 mm (0.030 in)



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1. CKP sensor	3. Thickness gauge
2. Flywheel reluctor bar	

Final Assembly Check

All Parts removed have been returned to their original position.

Battery Charge Coil / CKP Sensor / Stator Base Removal and Installation

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▲ CAUTION

Failure to take proper precaution when removing electrical parts may result in personal injury and/or damage to electronic components.

Prior to removing electrical parts, disconnect battery cables from battery.

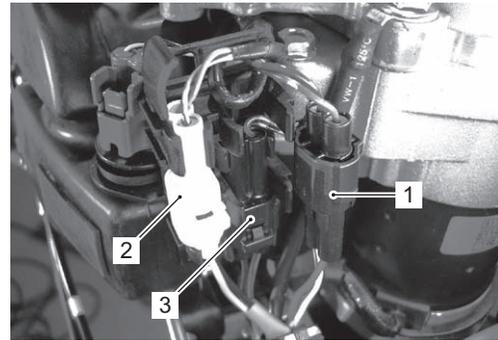
NOTE

Motor depicted is electric starter model.

Removal

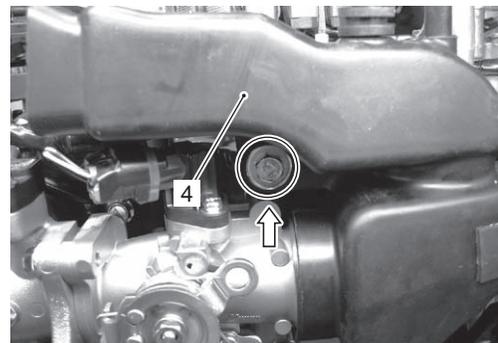
- 1) Remove flywheel.
Refer to "Flywheel Removal and Installation" (Page 1K-4).

- 2) Disconnect the starter switch lead wire connector (1), the caution lamp lead wire connector (2) and the engine stop switch lead wire connector (3).



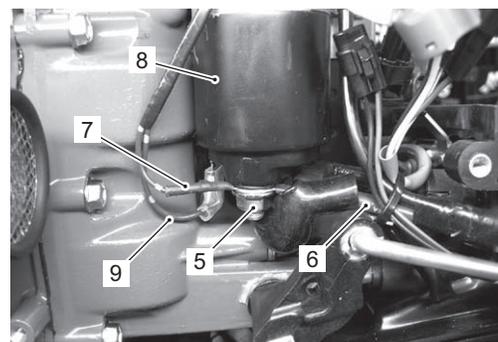
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- 3) Remove the air intake silencer case (4).
Refer to "Air Intake Silencer Case Removal and Installation" in Section 1D (Page 1D-3).



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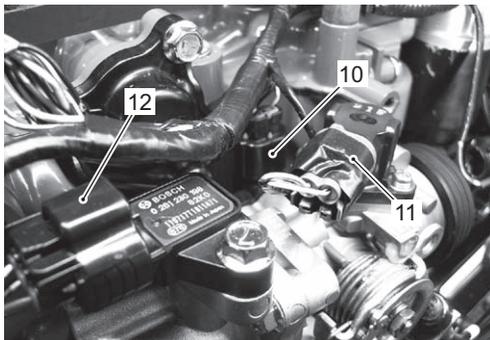
- 4) Remove nut (5) and positive (+) battery cable (6), positive (Red) cable (7) from the magnetic switch (8) of starter motor.
Disconnect the red lead wire (9) from "S" terminal of starter magnetic switch.



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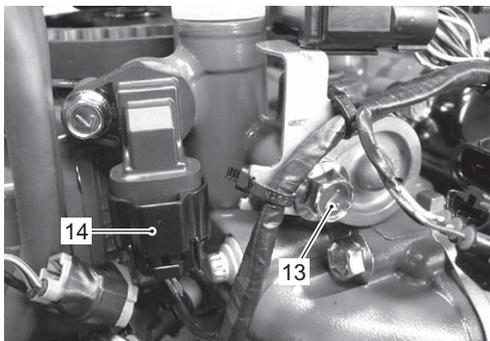
1K-6 Charging System:

- 5) Disconnect the TPS lead wire connector (10), the IAC valve lead wire connector (11) and the MAP sensor lead wire connector (12).



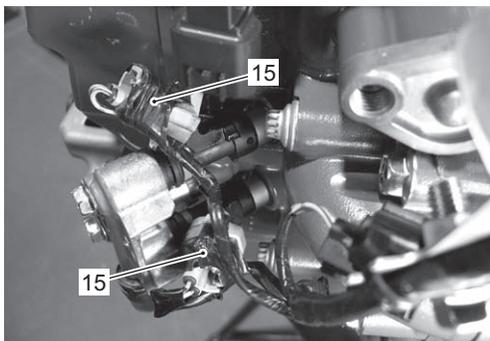
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- 6) Remove the bolt (13) securing anode cover. Disconnect the CMP sensor lead wire connector (14) at sensor.



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- 7) Disconnect the fuel injector lead wire connectors (15).



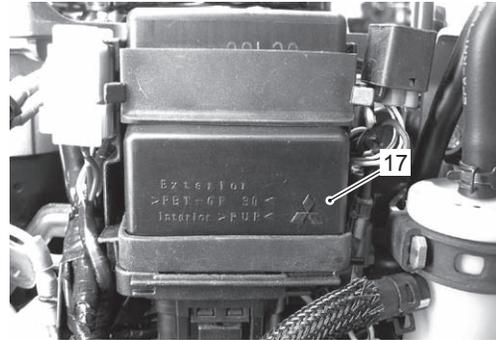
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- 8) Remove the bolt (16) securing rectifier / regulator bracket.



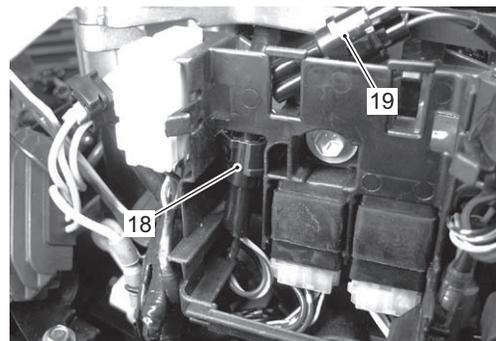
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- 9) Disconnect lead wire connector from ECM (17), then remove ECM.

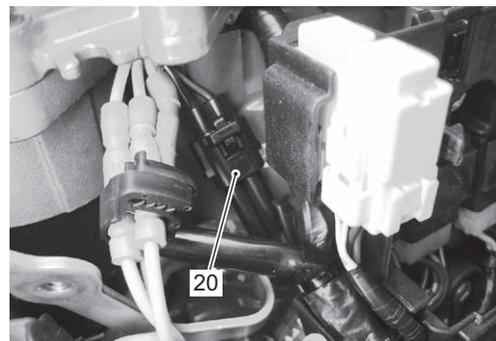


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- 10) Disconnect the neutral switch lead wire connector (18). Disconnect the cylinder temp. sensor lead wire connector (19). Disconnect the CKP sensor lead wire connector (20).

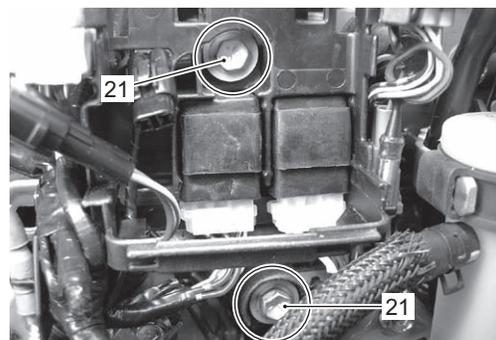


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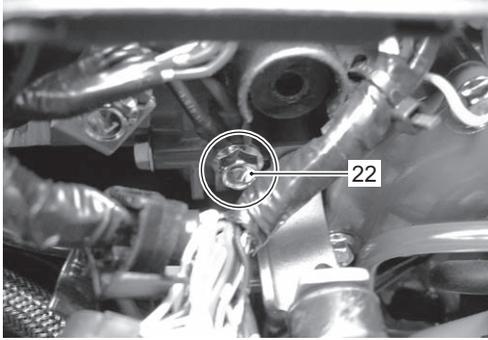
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- 11) Remove the bolts (21) securing electric parts holder.



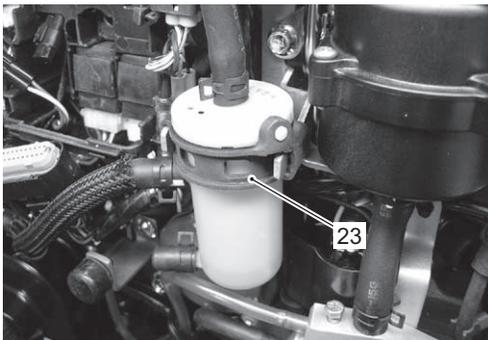
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- 12) Remove the bolt (22) securing harness GND lead wire.



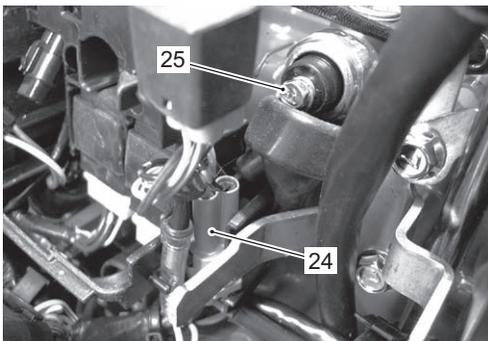
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- 13) Remove the fuel filter (23) from filter bracket.



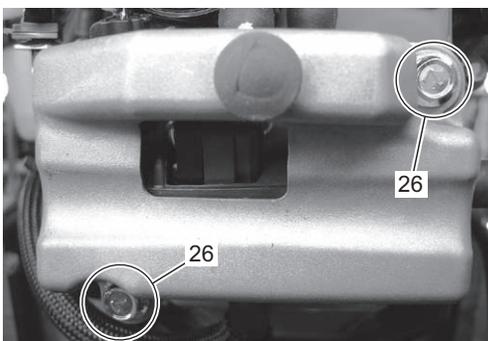
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- 14) Disconnect the ignition coil lead wire connector (24). Loosen screw (25) and disconnect lead wire from oil pressure switch.



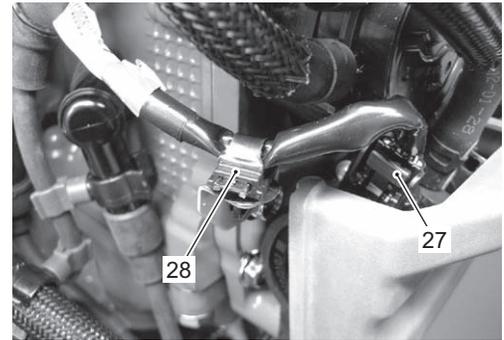
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- 15) Loosen the bolts (26) securing high pressure fuel pump cover.



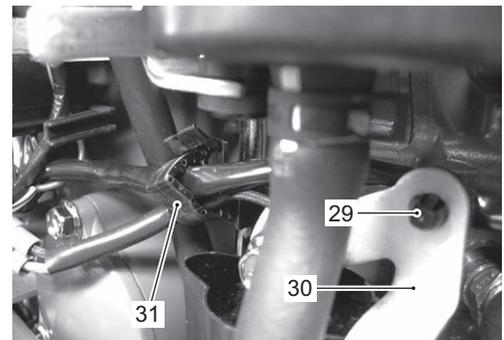
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- 16) Disconnect the lead wire connector (27) at high pressure fuel pump. Remove harness clamp (28) from harness clamp bracket by releasing clamps' lock.



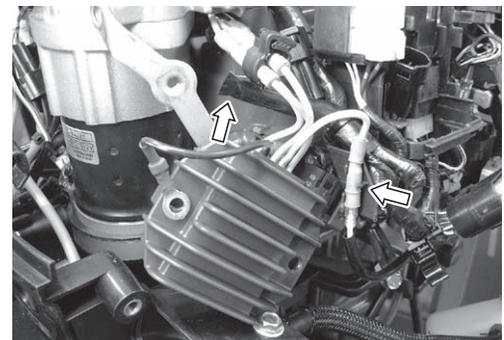
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- 17) Remove harness clamp (29) from bracket (30) by releasing clamps' lock. Remove the harness clamp (31).



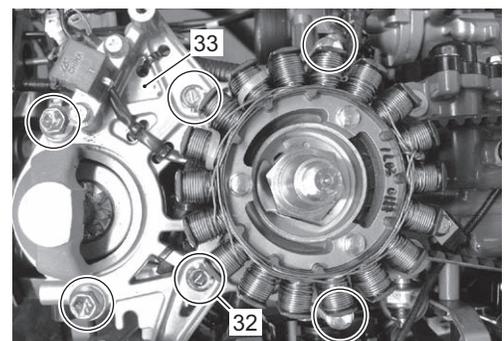
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- 18) Disconnect all lead wire connectors from rectifier and regulator.



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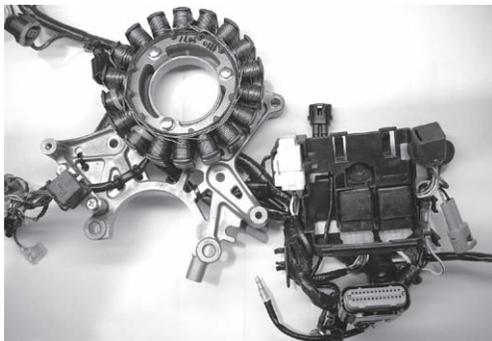
- 19) Remove the six bolts (32) securing stator base (33).



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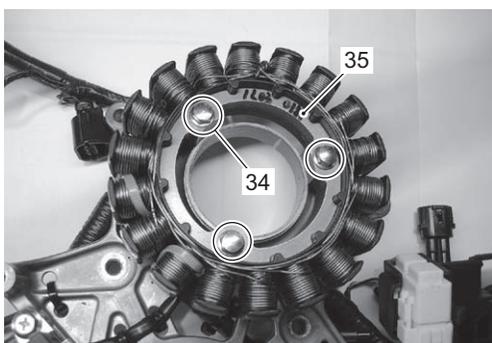
1K-8 Charging System:

- 20) Remove the stator base (with battery charge coil / CKP sensor, electric parts holder and main harness).



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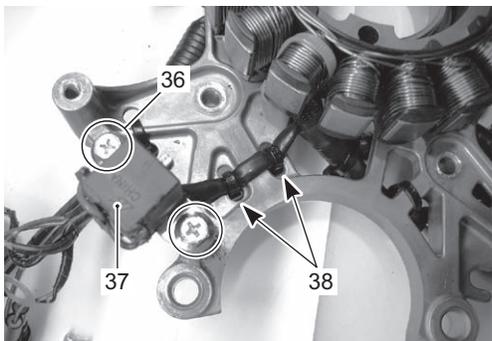
- 21) Remove the three screws (34) securing the battery charge coil (35).



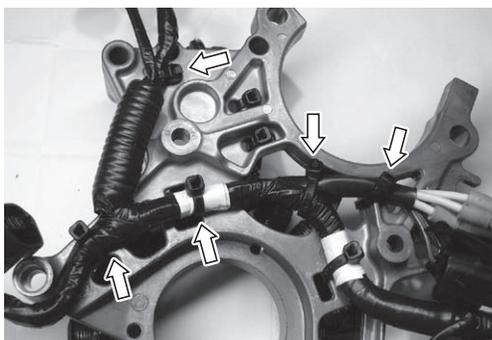
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- 22) Remove two screws (36) securing the CKP sensor (37), then cut the all cable tie (38) securing harness to stator base.

- 23) Remove the battery charge coil and CKP sensor (with wiring harness) from stator base.



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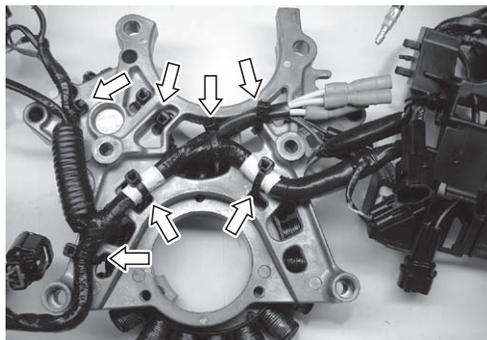
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Installation

Installation is reverse order of removal with special attention to the following steps.

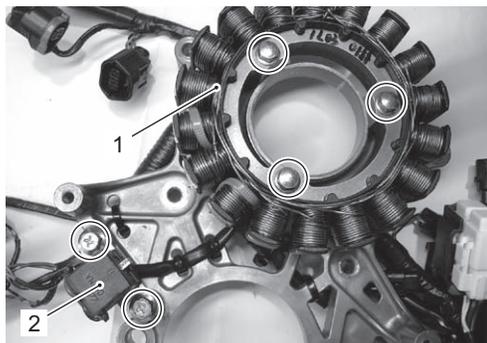
Battery charge coil / CKP sensor

- Secure the lead wire and wiring harness to the stator base with cable tie, then check that coil lead wire is routed properly and away from hot or rotating parts. For wire routing, refer to "Wiring Harness Routing Diagram" in Section 4A (Page 4A-3).



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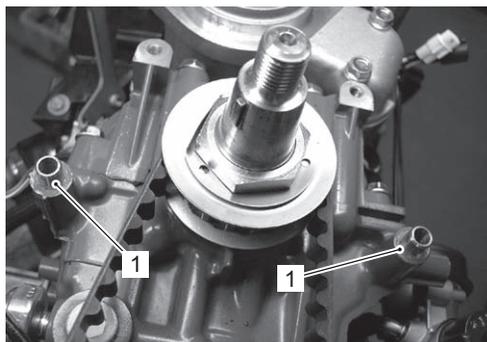
- Install battery charge coil (1), then tighten coil mounting screws securely.
- Install CKP sensor (2), then tighten sensor mounting screws securely.



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Stator base

- Install two dowel pins (1) in position.



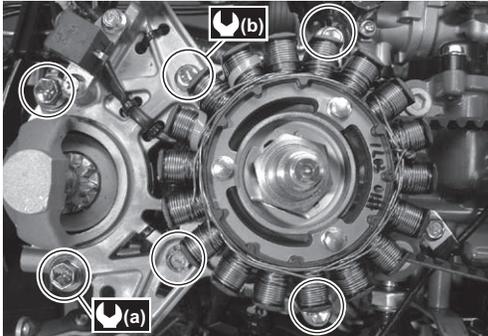
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- Install stator base, then tighten stator base mounting bolts securely.

Tightening torque

Stator base bolt [8 mm] (a): 23 N·m (2.3 kgf·m, 16.5 lbf·ft)

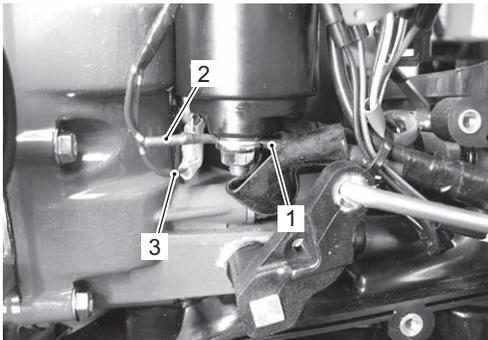
Stator base bolt [6 mm] (b): 10 N·m (1.0 kgf·m, 7.2 lbf·ft)



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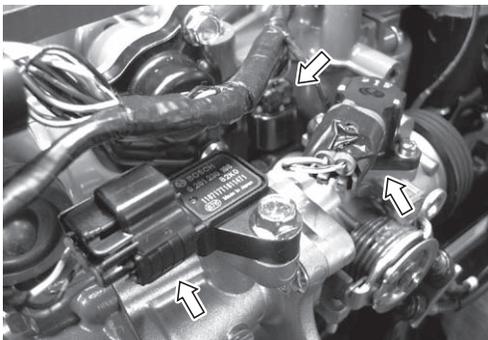
Wiring

- Install the positive battery cable (1) and positive cable (2) to starter motor, then tighten nut securely. Connect the lead wire (3) to "S" terminal of starter magnetic switch.



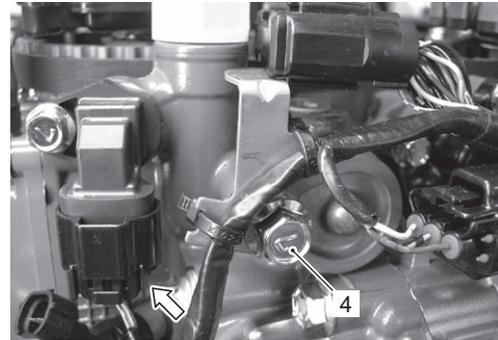
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- Connect the lead wire connectors to each sensor and actuator.



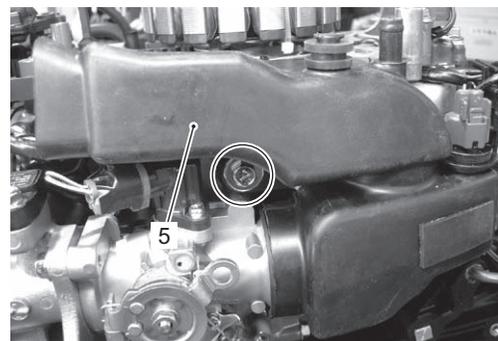
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- Tighten the anode cover bolt (4) securely.



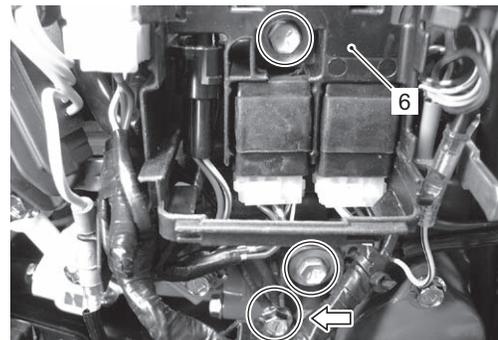
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- Install the air intake silencer case (5). Refer to "Air Intake Silencer Case Removal and Installation" in Section 1D (Page 1D-3).



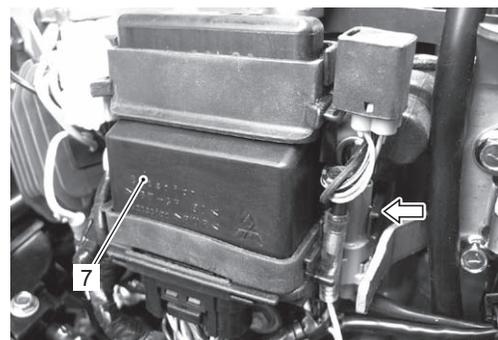
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- Install the electric parts holder (6), then tighten it with bolts. Tighten the harness GND lead wire with bolt.

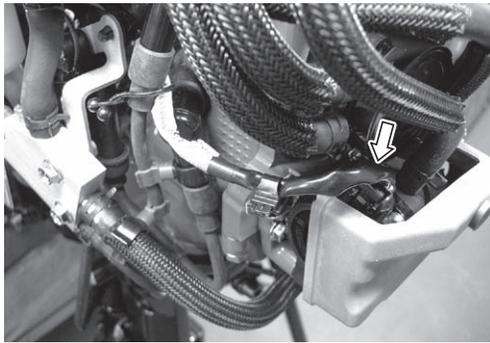


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- Connect the lead wire connectors to the Ignition coil and the high pressure fuel pump.
- Install ECM (7) in position.



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Flywheel

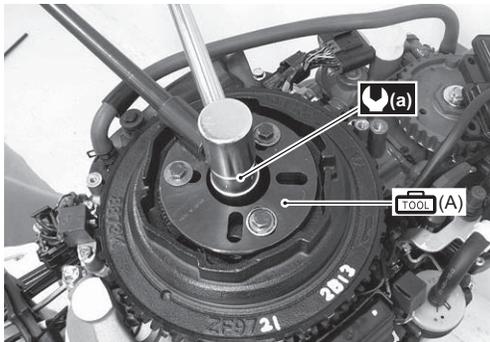
- Install flywheel and tighten flywheel nut to specified torque. Refer to “Flywheel Removal and Installation” (Page 1K-4).

Special tool

 (A): 09930-39520 (Flywheel holder)

Tightening torque

Flywheel nut (a): 90 N·m (9.0 kgf-m, 65 lbf-ft)



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Final assembly check

Perform the following checks to ensure proper and safe operation.

- All parts removed have been returned to their original positions.
- Wire routing match's service manual illustration. For wire routing, refer to “Wiring Harness Routing Diagram” in Section 4A (Page 4A-3).
- Check that wiring harness / lead wire are routed properly and away from hot or rotating parts.

ECM Power Source Coil / Battery Charge Coil / CKP Sensor / Stator Base Removal and Installation

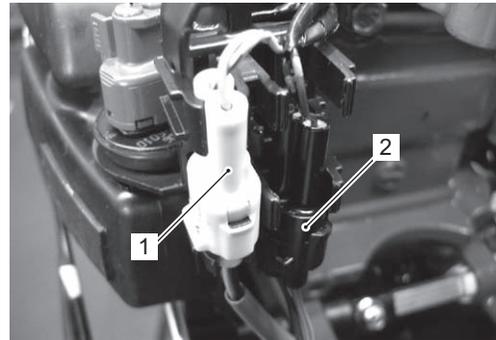
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NOTE

Motor depicted is manual starter model.

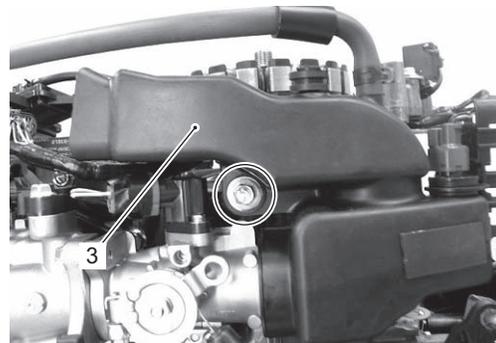
Removal

- 1) Remove flywheel. Refer to “Flywheel Removal and Installation” (Page 1K-4).
- 2) Disconnect the caution lamp lead wire connector (1) and the engine stop switch lead wire connector (2).



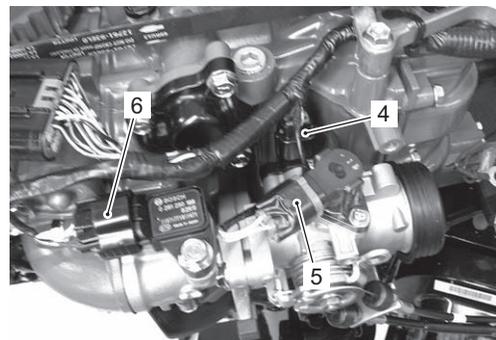
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- 3) Remove the air intake silencer case (3). Refer to “Air Intake Silencer Case Removal and Installation” in Section 1D (Page 1D-3).



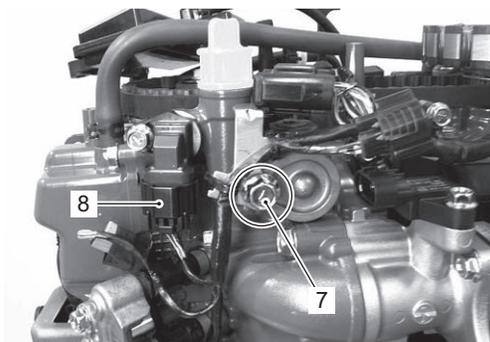
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- 4) Disconnect the TPS lead wire connector (4), the IAC valve lead wire connector (5) and the MAP sensor lead wire connector (6).



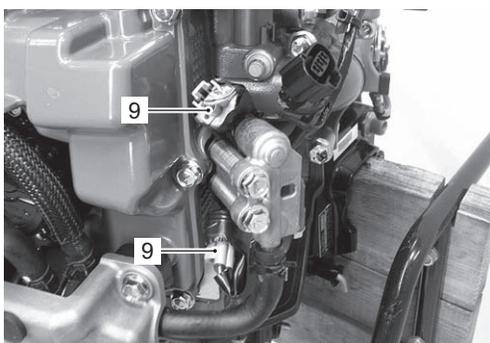
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- 5) Remove the bolt (7) securing anode cover.
Disconnect the CMP sensor lead wire connector (8) at sensor.



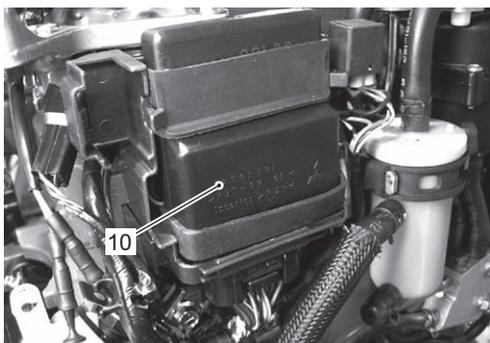
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- 6) Disconnect the fuel injector lead wire connectors (9).



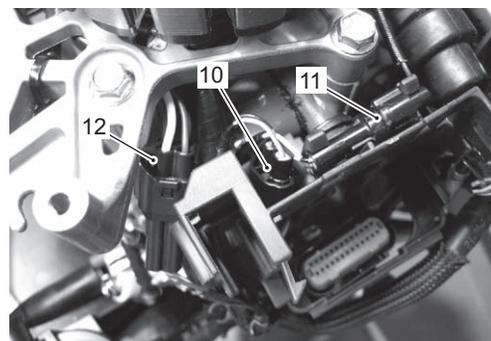
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- 7) Disconnect lead wire connector from ECM (10), then remove ECM.



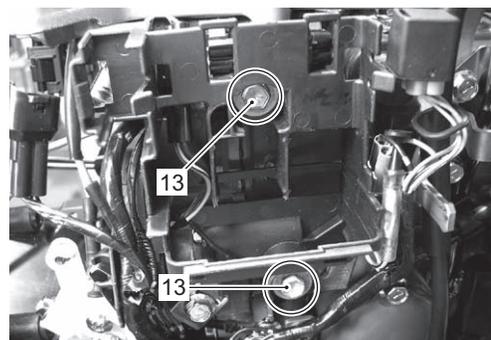
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- 8) Disconnect the neutral switch lead wire connector (10).
Disconnect the cylinder temp. sensor lead wire connector (11).
Disconnect the power source / CKP sensor lead wire connector (12).



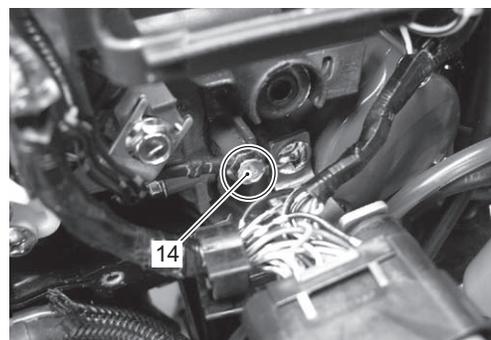
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- 9) Remove the bolts (13) securing electric parts holder.



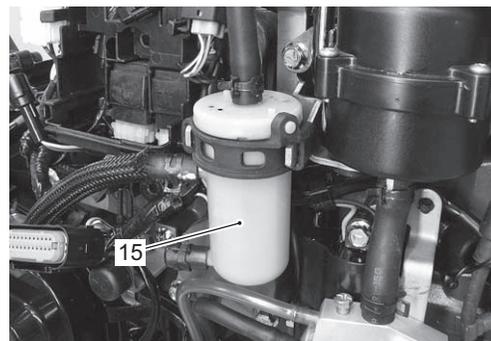
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- 10) Remove the bolt (14) securing harness GND lead wire.



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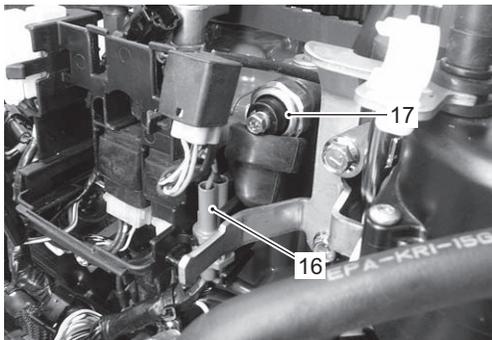
- 11) Remove the fuel filter (15) from filter bracket.



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1K-12 Charging System:

- 12) Disconnect the ignition coil lead wire connector (16). Loosen screw and disconnect lead wire from oil pressure switch (17).



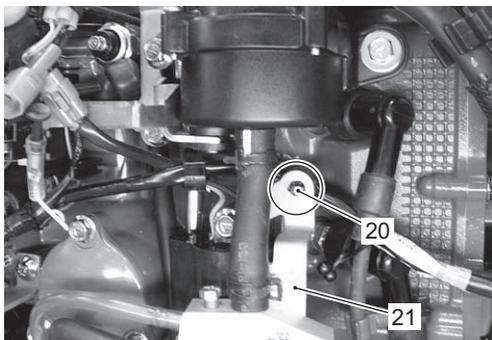
IDK1111B0067-01

- 13) Disconnect the lead wire connector (18) at high pressure fuel pump. Remove harness clamp (19) from harness clamp bracket by releasing clamps' lock.



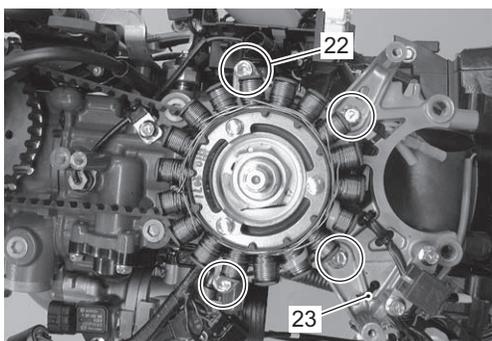
IDK1111B0068-01

- 14) Remove harness clamp (20) from bracket (21) by releasing clamps' lock.



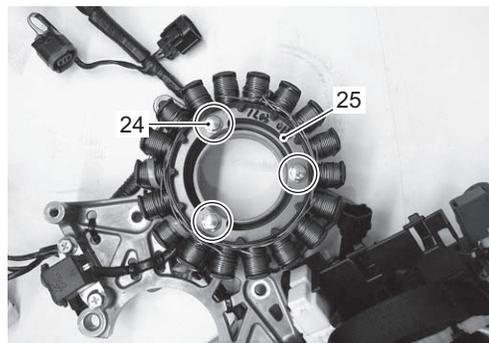
IDK1111B0069-01

- 15) Remove the four bolts (22) securing stator base (23).



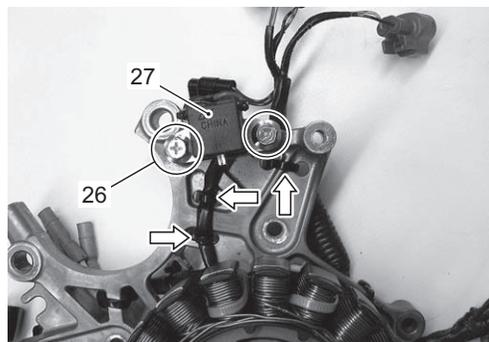
IDK1111B0070-01

- 16) Remove the stator base (with ECM power source coil / battery charge coil / CKP sensor and main harness).
- 17) Remove the three screws (24) securing the ECM power source coil / battery charge coil (25).

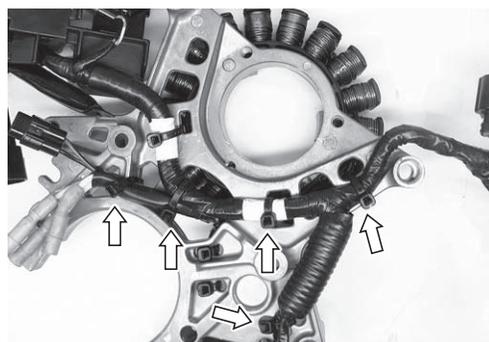


IDK1111B0071-01

- 18) Remove two screws (26) securing the CKP sensor (27). Cut the all cable tie securing harness to stator base.
- 19) Remove the ECM Power source coil / battery charge coil and CKP sensor (with wiring harness) from stator base.



IDK1111B0072-01



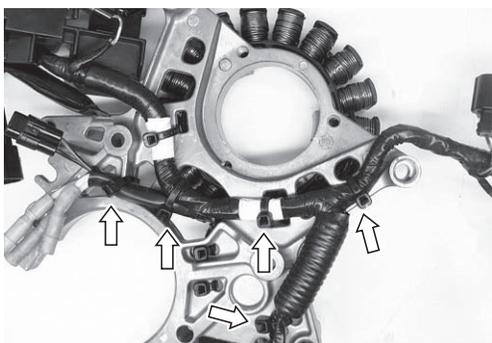
IDK1111B0073-01

Installation

Installation is reverse order of removal with special attention to the following steps.

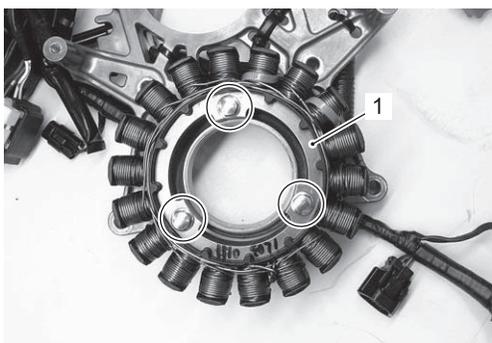
ECM power source coil / Battery charge coil / CKP sensor

- Secure the lead wire and wiring harness to the stator base with cable tie, then check that coil lead wire is routed properly and away from hot or rotating parts. For wire routing, refer to "Wiring Harness Routing Diagram" in Section 4A (Page 4A-3).



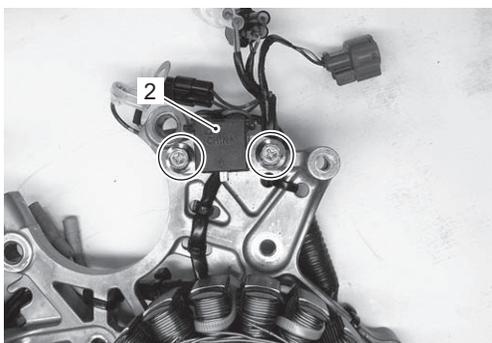
IDK1111B0073-01

- Install battery charge coil (1), then tighten coil mounting screws securely.



IDK1111B0074-01

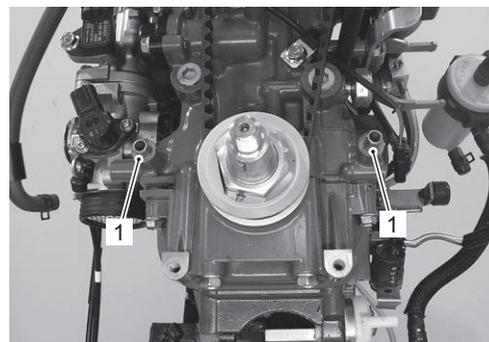
- Install CKP sensor (2), then tighten sensor mounting screws securely.



IDK1111B0075-01

Stator base

- Install two dowel pins (1) in position.

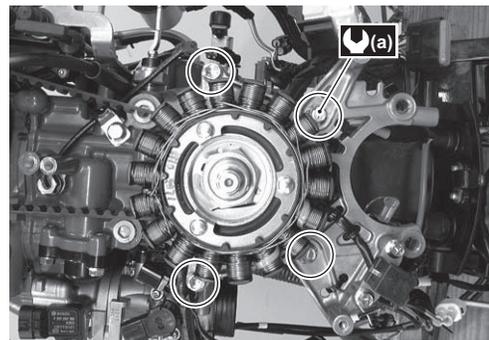


IDK1111B0076-01

- Install stator base, then tighten stator base mounting bolts securely.

Tightening torque

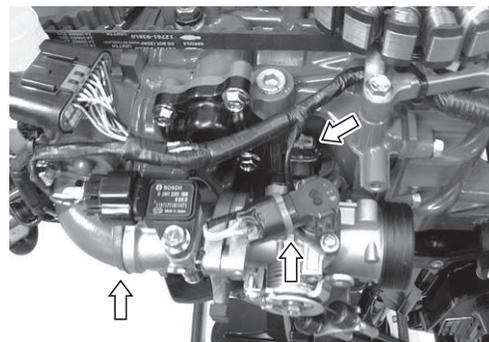
Stator base bolt [6 mm] (a): 10 N·m (1.0 kgf·m, 7.2 lbf·ft)



IDK1111B0077-01

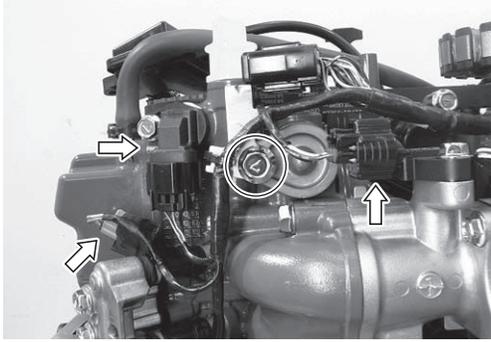
Wiring

- Connect the lead wire connectors to each sensor and actuator.
- Tighten the anode cover bolt securely.



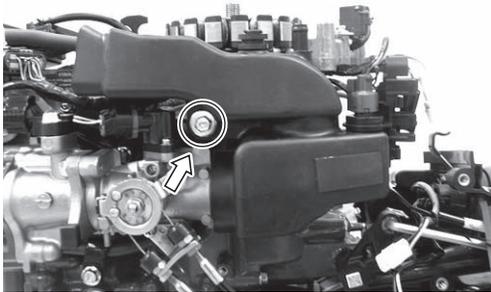
IDK1111B0078-01

1K-14 Charging System:



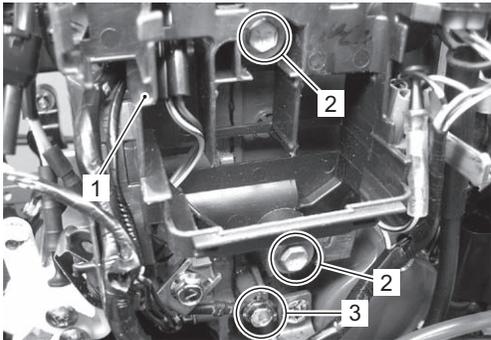
IDK1111B0079-01

- Install the air intake silencer case. Refer to “Air Intake Silencer Case Removal and Installation” in Section 1D (Page 1D-3).



IDK1111B0080-01

- Install the electric parts holder (1), then tighten it with bolts (2). Tighten the harness GND lead wire with bolt (3).



IDK1111B0081-01

- Connect the lead wire connectors to the Ignition coil and the high pressure fuel pump.
- Install ECM in position.



IDK1111B0082-01



IDK1111B0083-01

Flywheel

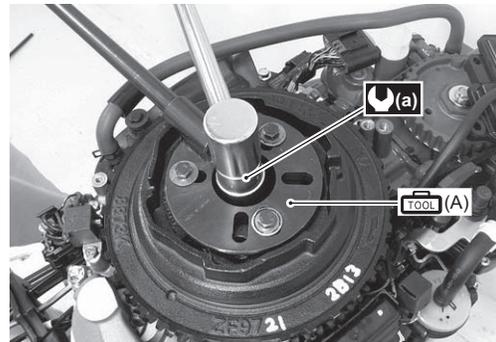
- Install flywheel and tighten flywheel nut to specified torque. Refer to “Flywheel Removal and Installation” (Page 1K-4).

Special tool

TOOL (A): 09930-39520 (Flywheel holder)

Tightening torque

Flywheel nut (a): 90 N·m (9.0 kgf-m, 65 lbf-ft)



IDK1111B0056-01

Final assembly check

Perform the following checks to ensure proper and safe operation.

- All parts removed have been returned to their original positions.
- Wire routing match's service manual illustration. For wire routing, refer to “Wiring Harness Routing Diagram” in Section 4A (Page 4A-3).
- Check that wiring harness / lead wire are routed properly and away from hot or rotating parts.

Battery Charge Coil Inspection

CENDK1111B06005

Electric Starter Model:

Measure battery charge coil resistance in the following procedure.

- 1) Disconnect battery charge coil leads from rectifier / regulator.
- 2) Measure resistance between leads in the combinations shown.
If measurement exceeds specification, replace battery charge coil.

Special tool

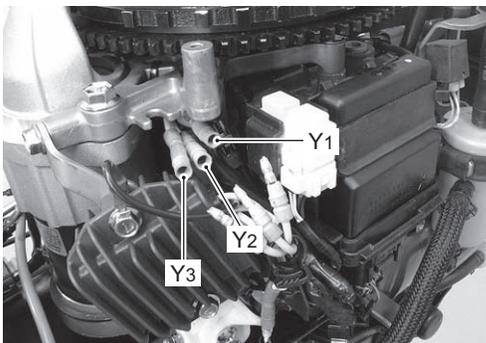
 : 09930-99320 (Digital tester)

Tester knob indication

Resistance (Ω)

Battery charge coil resistance

Terminal for tester probe connection	Resistance
Y1 to Y2	0.7 – 1.1 Ω
Y2 to Y3	
Y3 to Y1	



IDK1111B0084-01

- 3) Connect battery charge coil leads to rectifier / regulator.

Manual Starter Model:

Measure battery charge coil resistance in the following procedure.

- 1) Disconnect battery charge coil lead wires from rectifier / regulator (if it is connected).
- 2) Connect the tester probe to battery charge coil lead wires as shown.
If measurement exceeds specification, replace battery charge coil.

Special tool

 : 09930-99320 (Digital tester)

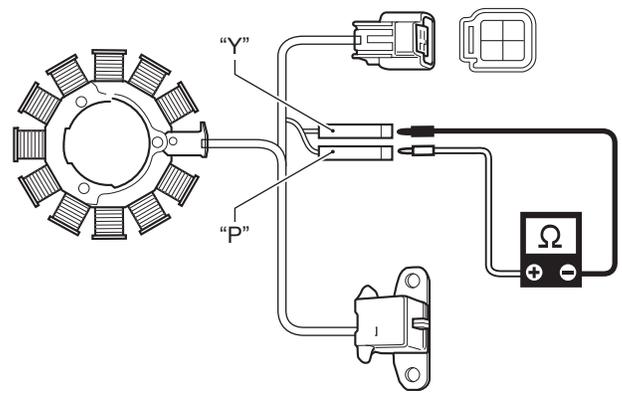
Tester knob indication

Resistance (Ω)

Tester probe connection	
Prove	Other prove
Pink	Yellow

Battery charge coil resistance (for manual starter models)

Standard: 0.5 – 0.8 Ω



IDK1111B0042-02

Rectifier / Regulator Removal and Installation

CENDK1111B06006

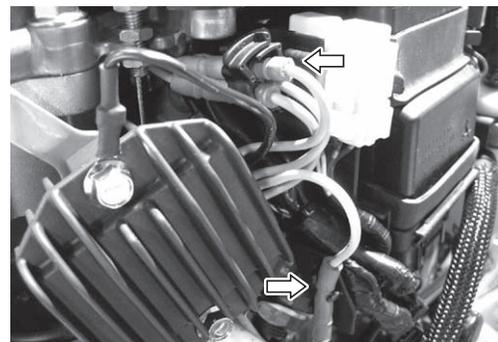
Removal

▲ CAUTION

Failure to take proper precaution when removing electrical parts may result in personal injury and/or damage to electronic components.

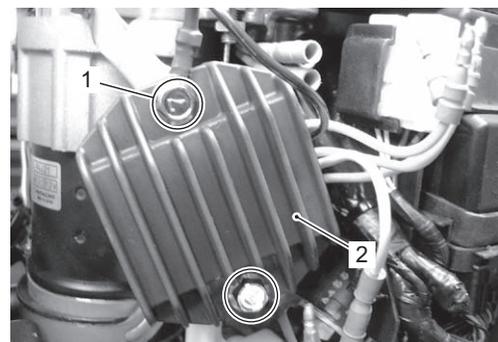
Prior to removing electrical parts, disconnect battery cables from battery.

- 1) Remove PORT lower side cover.
Refer to "Lower Side Cover Removal and Installation" in Section 2A (Page 2A-2).
- 2) Disconnect all lead wires connectors from rectifier and regulator.



IDK1111B0043-01

- 3) Remove the bolts (1) and rectifier / regulator (2).

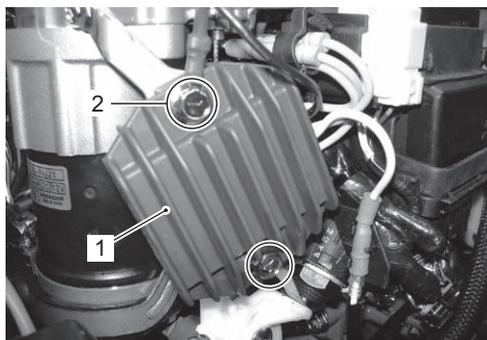


IDK1111B0044-01

1K-16 Charging System:

Installation

- 1) Install rectifier / regulator (1), then tighten bolts (2) securely.
- 2) Connect lead wire connector to rectifier / regulator. Check that lead wire routed properly.



IDK1111B0046-01

Rectifier / Regulator Inspection

CENDK1111B06007

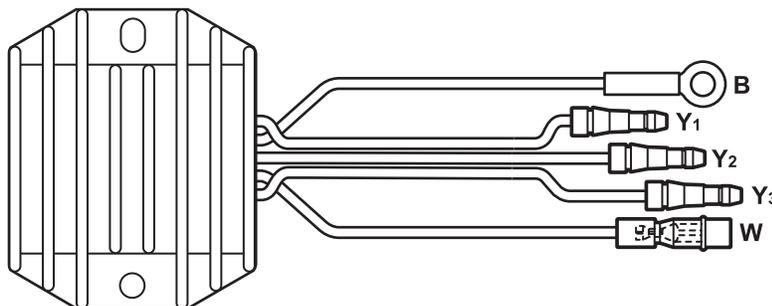
Inspect the rectifier / regulator in the following procedures:

- 1) Remove the rectifier / regulator.
Refer to "Rectifier / Regulator Removal and Installation" (Page 1K-15).
- 2) Measure resistance between leads in the combinations shown.
If measurement exceeds specification, replace rectifier / regulator.

NOTE

The values given below are for a SUZUKI pocket tester.

As thyristors, diodes, etc. are used inside this rectifier / regulator, the resistance values will differ when an ohmmeter other than SUZUKI pocket tester is used.



IDK1111B0003-02

Special tool

 : 09900-25010 (Pocket tester)

Tester knob indication

Resistance (x 1 kΩ)

Rectifier and Regulator Resistance

Unit: Approx. kΩ

Tester probe (-) (Black) connection	Tester probe (+) (Red) connection					
	—	B	W	Y1	Y2	Y3
B	—	—	0.85 – 17	0.85 – 8.5	0.85 – 8.5	0.85 – 8.5
W	∞	∞	—	∞	∞	∞
Y1	∞	∞	0.85 – 8.5	—	∞	∞
Y2	∞	∞	0.85 – 8.5	∞	—	∞
Y3	∞	∞	0.85 – 8.5	∞	∞	—

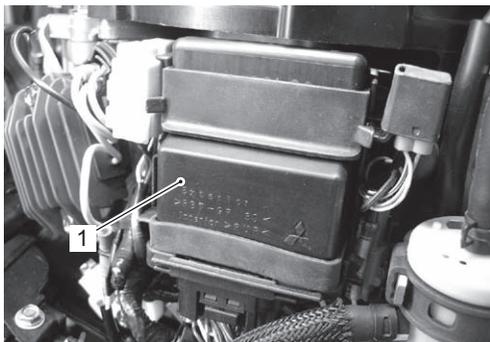
IDK1111B0004-02

Battery Relay Inspection

CENDK1111B06011

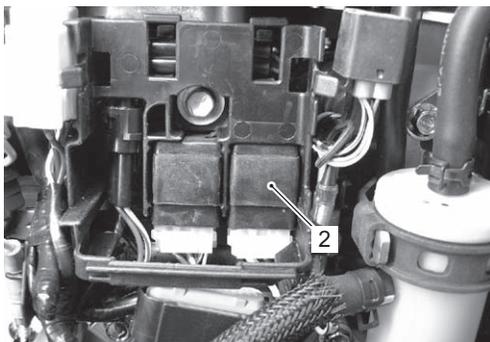
Inspect the battery relay using the following procedures:

- 1) Disconnect lead wire connector from ECM (1), then remove ECM.

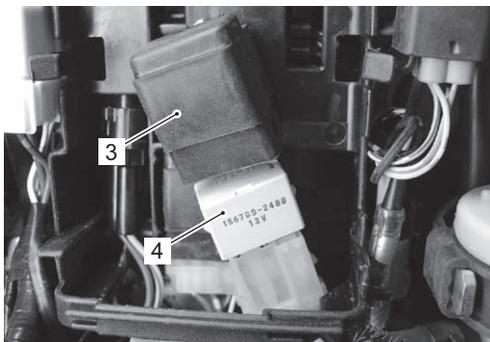


IDK1111B0047-01

- 2) Pull out the battery relay and relay cover (2) from electric parts holder.
- 3) Remove the relay cover (3), then disconnect the battery relay (4) from the lead wire connector.



IDK1111B0048-01



IDK1111B0049-01

- 4) Check continuity between terminal (5) and (6) each time 12 V power supply is applied to terminal (7) and (8).

Connect the positive (+) lead to terminal (8), and negative (-) lead to terminal (7).

NOTICE

If the 12 V power supply wire is connected to wrong terminal or touched to each other, the power supply wire, tester may be damaged.

Be careful not to touch 12 V power supply wires to each other or with other terminals.

Special tool

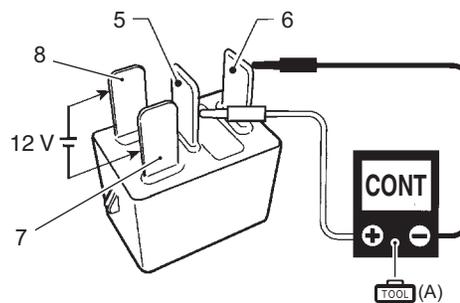
TOOL : 09930-99320 (Digital tester)

Tester knob indication

Continuity (\bullet))

Battery relay function

	Continuity
12 V power applied	Yes
12 V power not applied	No



IDK1111B0005-01

- 5) Measure the resistance between relay terminals (7) and (8).

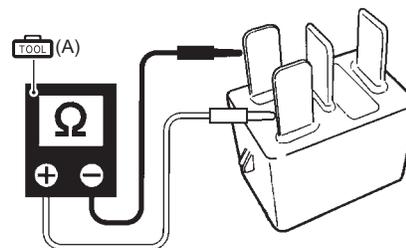
If out of specification, replace battery relay.

Tester knob indication

Resistance (Ω)

Battery relay solenoid coil resistance

Standard: 145 – 190 Ω



IDK1111B0006-01

- 6) Reinstall parts removed earlier.

1K-18 Charging System:

Fuse Inspection

CENDK1111B06008

Inspect the fuse in the following procedures.

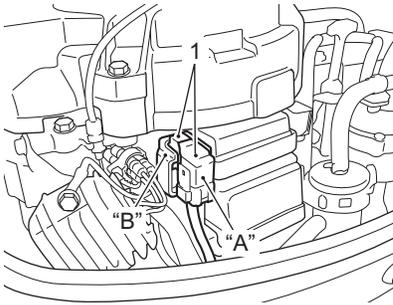
- 1) Remove the fuse from fuse case (1).
- 2) Inspect continuity between both terminal of fuse.
If no continuity is indicated, replace fuse.

Special tool

 : 09930-99320 (Digital tester)

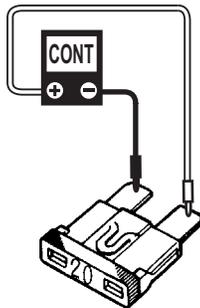
Tester knob indication

Continuity (•)))



IDK1111B0050-01

"A": Main fuse 30A (White fuse case)
"B": ECM fuse (Yellow fuse case)



IAJ3111B0029-01