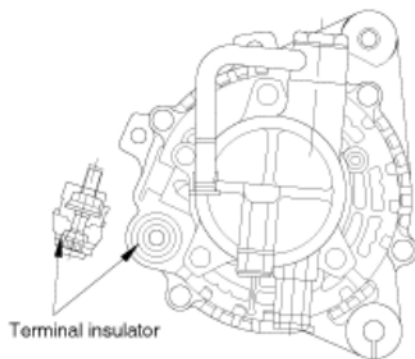
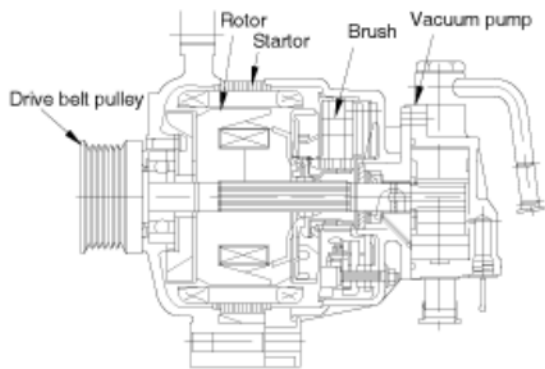


DESCRIPTION

The conventional internal voltage detection type alternator controls the charging voltage regardless of the battery condition and according to the external load change so that it sometimes causes battery under or over charging or causes flickering of meters and lamps due to ripples of generated voltage resulting from load fluctuation. The figure below show the internal circuits of the alternator and voltage regulator.



ON-VEHICLE INSPECTION

⚠ CAUTION

- Check that the battery cables are connected to the correct terminals.
- Disconnect the battery cables when the battery is given a quick charge.
- Do not perform tests with a high voltage insulation resistance tester.
- Never disconnect the battery while the engine is running.

CHECK BATTERY TERMINALS, FUSIBLE LINK AND FUSES

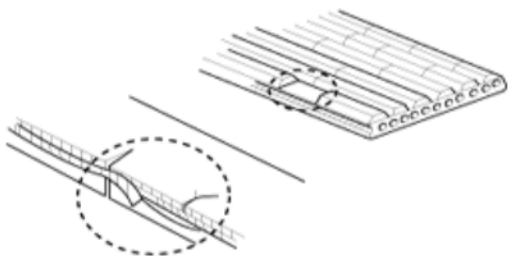
1. Check that the battery terminals are not loose or corroded.
2. Check the fusible link and fuses for continuity.

INSPECT DRIVE BELT

1. Visually check the belt for excessive wear, frayed cords etc.
If any defect has been found, replace the drive belt.

NOTICE

Cracks on the rib side of a belt are considered acceptable. If the belt has chunks missing from the ribs, it should be replaced.



2. Using a belt tension gauge, measure the drive belt tension.

VISUALLY CHECK ALTERNATOR WIRING AND LISTEN FOR ABNORMAL NOISES

1. Check that the wiring is in good condition.
2. Check that there is no abnormal noise from the alternator while the engine is running.

CHECK DISCHARGE WARNING LIGHT CIRCUIT

1. Warm up the engine and then turn it off.
2. Turn off all accessories.
3. Turn the ignition switch "ON". Check that the discharge warning light is it.
4. Start the engine. Check that the light goes off.

INSPECT CHARGING SYSTEM

VOLTAGE DROP TEST OF ALTERNATOR OUTPUT WIRE

English ▼

This test determines whether or not the wiring between the alternator "B" terminal and the battery (+) terminal is good by the voltage drop method.

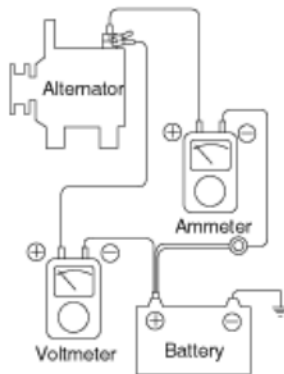
PREPARATION

1. Turn the ignition switch to "OFF".

NOTICE

To find abnormal conditions of the connection, actions should not be taken on the two terminals and each connection during the test.

2. Connect a digital voltmeter between the alternator "B" terminal and battery (+) lead wire to the battery (+) terminal. Connect the (+) lead wire of the voltmeter to the "B" terminal and the (-) lead wire to the battery (+) terminal.



CONDITIONS FOR THE TEST

1. Start the engine.
2. Switch on the headlamps, blower motor and so on. And then, read the voltmeter under this condition.

RESULT

1. The voltmeter may indicate the standard value.
Standard value: 0.2V max.
2. If the value of the voltmeter is higher than expected (above 0.2V max.), poor wiring is suspected. In this case check the wiring from the alternator "B" terminal to the fusible link to the battery (+) terminal. Check for loose connections, color change due to an overheated harness, etc. Correct them before testing again.
3. Upon completion of the test, set the engine speed at idle. Turn off the head lamps, blower motor and the ignition switch.

OUTPUT CURRENT TEST

This test determines whether or not the alternator gives an output current that is equivalent to the nominal output.

PREPARATION

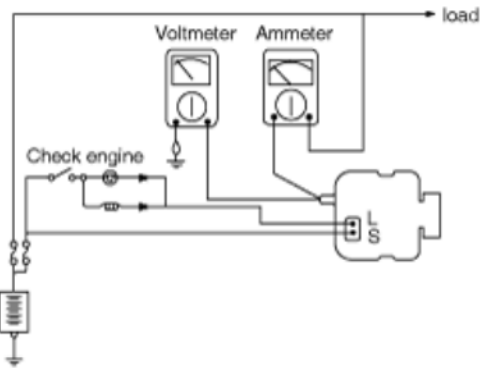
1. Prior to the test, check the following items and correct as necessary.
Check the battery installed in the vehicle to ensure that it is in good condition. The battery checking method is described in "BATTERY".
The battery that is used to test the output current should be one that has been partially discharged. With a fully charged battery, the test may not be conducted correctly due to an insufficient load.
Check the tension of the alternator drive belt.
2. Turn off the ignition switch.
3. Disconnect the battery ground cable.

4. Disconnect the alternator output wire from the alternator "B" terminal.
5. Connect a DC ammeter (0 to 150A) in series between the "B" terminal and the disconnected output wire. Be sure to connect the (-) lead wire of the ammeter to the disconnected output wire.

NOTICE

Tighten each connection securely, as a heavy current will flow. Do not rely on clips.

6. Connect a voltmeter (0 to 20V) between the "B" terminal and ground. Connect the (+) lead wire to the alternator "B" terminal and (-) lead wire to a good ground.
7. Attach an engine tachometer and connect the battery ground cable.
8. Leave the engine hood open.



TEST

1. Check to see that the voltmeter reads as the same value as the battery voltage. If the voltmeter reads 0V, and the open circuit in the wire between the alternator "B" terminal and battery (+) terminal, a blown fusible link or poor grounding is suspected.
2. Start the engine and turn on the headlights.
3. Set the headlights to high beam and the heater blower switch to HIGH, quickly increase the engine speed to 2,500 rpm and read the maximum output current value indicated by the ammeter.

NOTICE

After the engine starts up, the charging current quickly drops. Therefore, the above operation must be done quickly to read the maximum current value correctly.

RESULT

1. The ammeter reading must be higher than the limit value. If it is lower but the alternator output wire is in good condition, remove the alternator from the vehicle and test it.

Limit value (120Aalternator):50% of the rate voltage

NOTICE

- The nominal output current value is shown on the nameplate affixed to the alternator body.
- The output current value changes with the electrical load and the temperature of the alternator itself. Therefore, the nominal output current may not be obtained. If such is the case, keep the headlights on the cause discharge of the battery, or use the lights of another vehicle to increase the electrical load. The nominal output current may not be obtained if the temperature of the alternator itself or ambient temperature is too high. In such a case,

reduce the temperature before testing again.

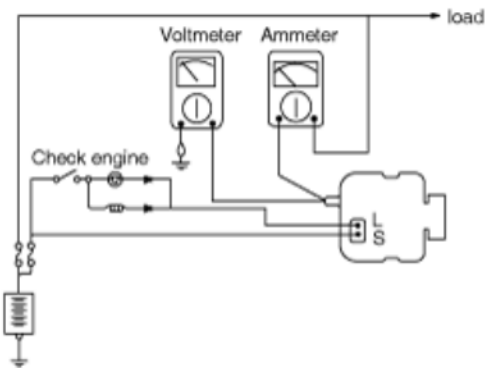
2. Disconnect the battery ground cable.
3. Remove the ammeter and voltmeter and the engine tachometer.
4. Connect the alternator output wire to the alternator "B" terminal.
5. Connect the battery ground cable.

REGULATED VOLTAGE TEST

The purpose of this test is to check that the electronic voltage regulator controls voltage correctly.

PREPARATION

1. Prior to the test, check the following items and correct if necessary.
Check that the battery installed on the vehicle is fully charged. For battery checking method, see "BATTERY".
Check the alternator drive belt tension.
2. Turn ignition switch to "OFF".
3. Disconnect the battery ground cable.
4. Connect a digital voltmeter between the "B" terminal of the alternator and ground. Connect the (+) lead of the voltmeter to the "B" terminal of the alternator. Connect the (-) lead to good ground or the battery (-) terminal.
5. Disconnect the alternator output wire from the alternator "B" terminal.
6. Connect a DC ammeter (0 to 150A) in series between the "B" terminal and the disconnected output wire. Connect the (-) lead wire of the ammeter to the disconnected output wire.
7. Attach the engine tachometer and connect the battery ground cable.



TEST

1. Turn on the ignition switch and check to see that the voltmeter indicates the following value.
Voltage: Battery voltage
If it reads 0V, there is an open circuit in the wire between the alternator "B" terminal and the battery and the battery (-), or the fusible link is blown.
2. Start the engine. Keep all lights and accessories off.
3. Run the engine at a speed of about 2,500 rpm and read the voltmeter when the alternator output current drops to 10A or less.

RESULT

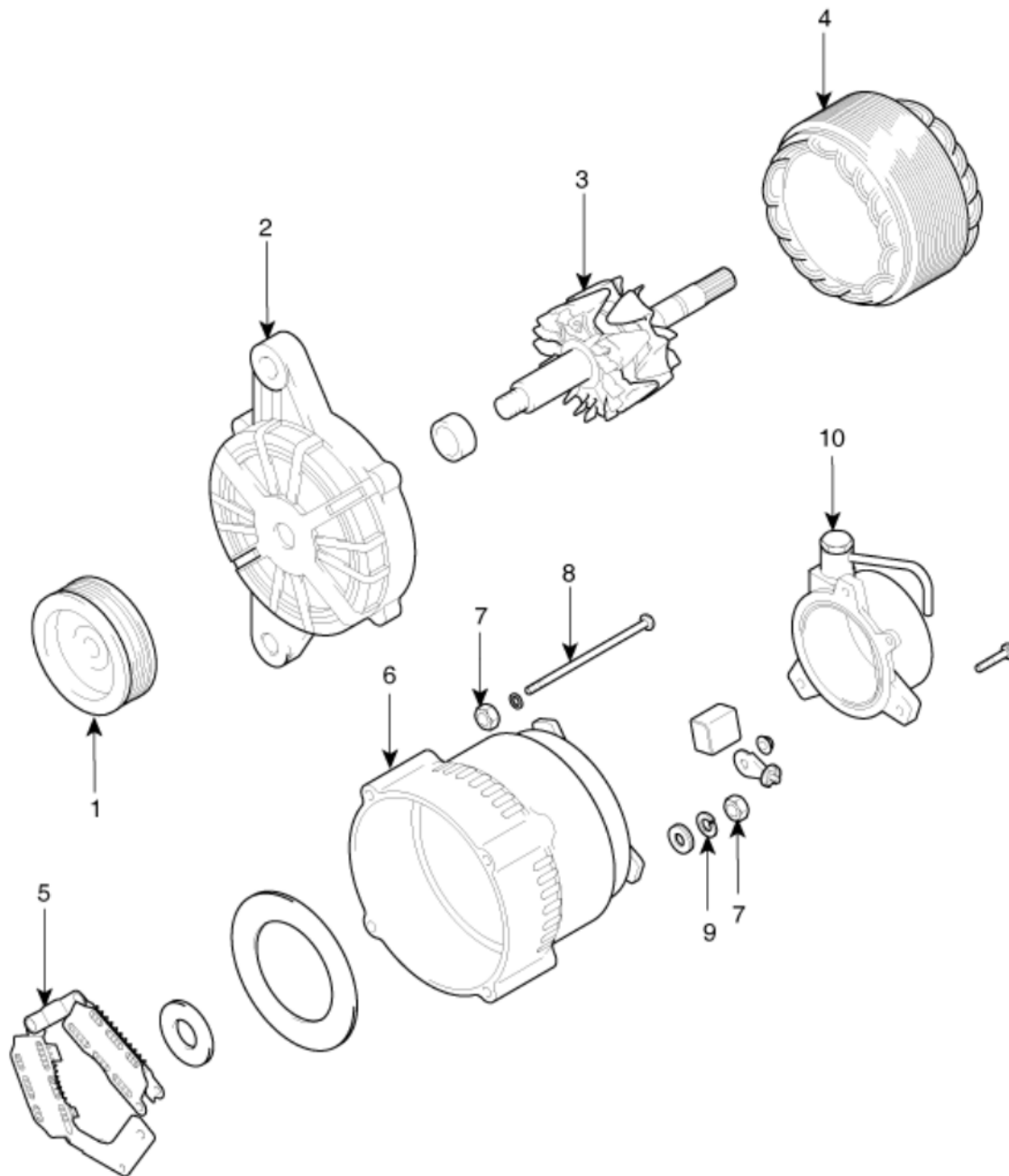
1. If the voltmeter reading agrees with the value listed in the Regulating Voltage Table below, the voltage regulator is functioning correctly. If the reading is other than the standard value, the voltage regulator or the alternator is faulty.

REGULATING VOLTAGE TABLE

Voltage regulator ambient temperature °C (°F)	Regulating voltage (V)
-30 (-22)	14.1 ~ 15.2
20 (68)	14.1 ~ 14.7
120 (248)	13.3 ~ 14.7

- 2. Upon completion of the test, reduce the engine speed to idle, and turn off the ignition switch.
- 3. Disconnect the battery ground cable.
- 4. Remove the voltmeter and ammeter and the engine tachometer.
- 5. Connect the alternator output wire to the alternator "B" terminal.
- 6. Connect the battery ground cable.

COMPONENTS

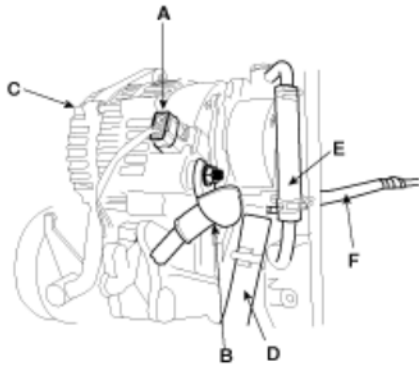


- 1. Pulley
- 2. Front frame assembly
- 3. Rotor
- 4. Stator
- 5. Brush & Regulator assembly

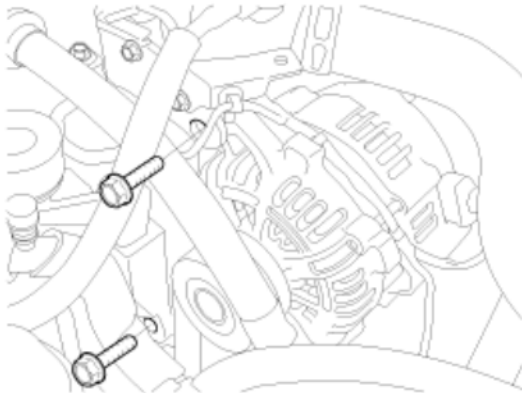
- 6. Rear frame assembly
- 7. Nuts
- 8. Through bolts
- 9. Washer
- 10. Pump assembly

REMOVAL

- 1) Disconnect the battery negative terminal first, then the positive terminal.
- 2) Disconnect the alternator connector(A) and "B" terminal cable(B) from the alternator(C).
- 3) Disconnect the vacuum pump oil drain hose(D), vacuum pump oil feed hose(E) and vacuum hose(F).



- 4) Remove the mounting bolt and remove the alternator.

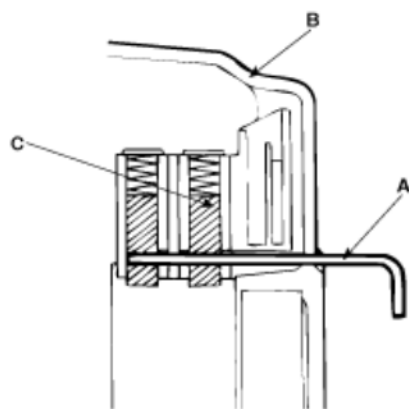


- 5) Installation is the reverse of removal.

INSTALLATION

Installation is the reverse of removal.

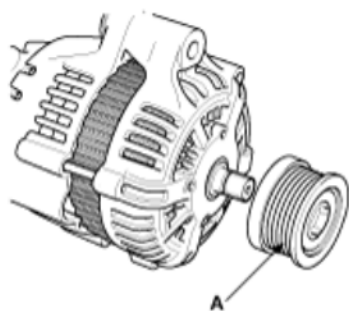
1. Before install the rotor to the rear bracket, fix the brush(C) by inserting the wire(A) to the rear bracket(B) hole.
2. Remove the wire(A) after assembly the rotor.



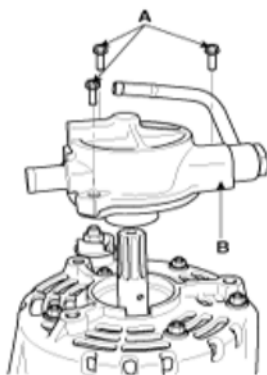
DISASSEMBLY

DISASSEMBLY

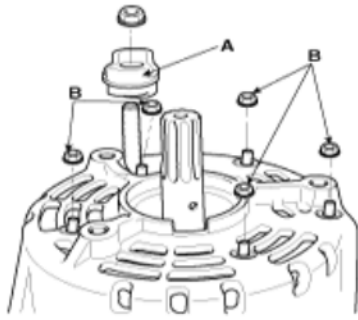
- 1) Remove the pulley(A).



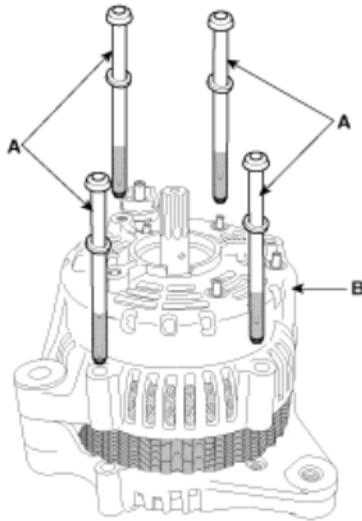
- 2) After loosening the three bolts(A). Remove the vacuum pump(B).



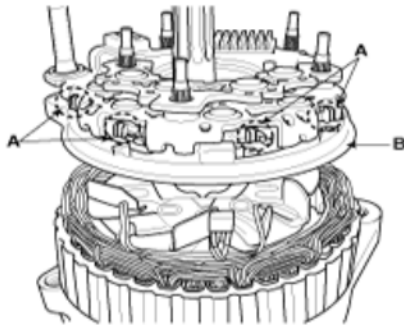
- 3) Remove the B terminal insulator(A) and loosen the five rear cover mounting nuts(B).



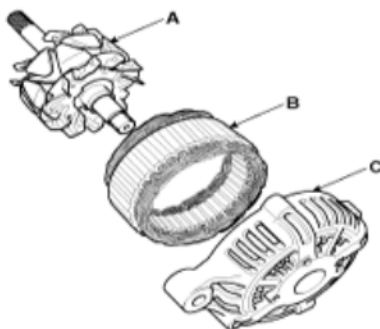
4) After loosening the four through bolts(A), remove the rear cover(B).



5) After removing the weld between the stator lead and diode lead(A), remove the regulator assembly(B).



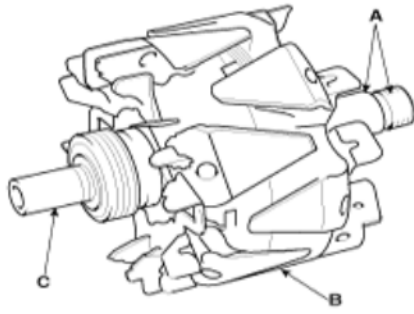
6) Separate the rotor(A), stator(B), and front cover(C).



INSPECTION

INSPECT ROTOR

1. Check that there is continuity between the slip rings(A).



2. Check that there is no continuity between the slip rings and the rotor(B) or rotor shaft(C).
3. If the rotor fails either continuity check, replace the alternator.

INSPECT STATOR

1. Check that there is continuity between each pair of leads(A).

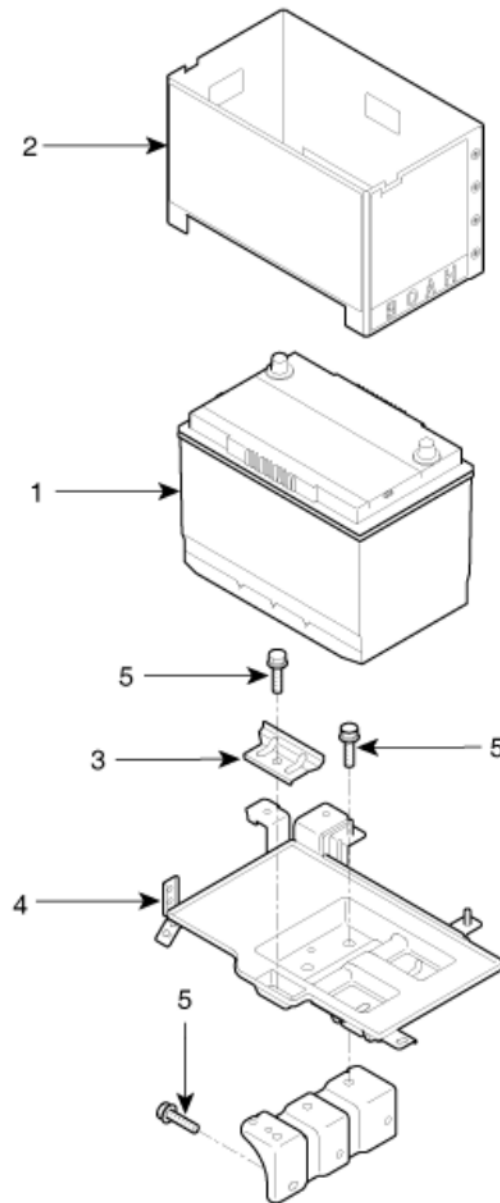


2. Check that there is no continuity between each lead and the coil core.
3. If the coil fails either continuity check, replace the generator.

DESCRIPTION

1. The Closed Maintenance Free(CMF) battery is, as the name implies, totally maintenance free and has no removable battery cell cap.
2. The Closed Maintenance Free(CMF) battery is, water never needs to be added to the maintenance free battery.
3. The battery is completely sealed, except for small vent holes in the cover.

COMPONENTS

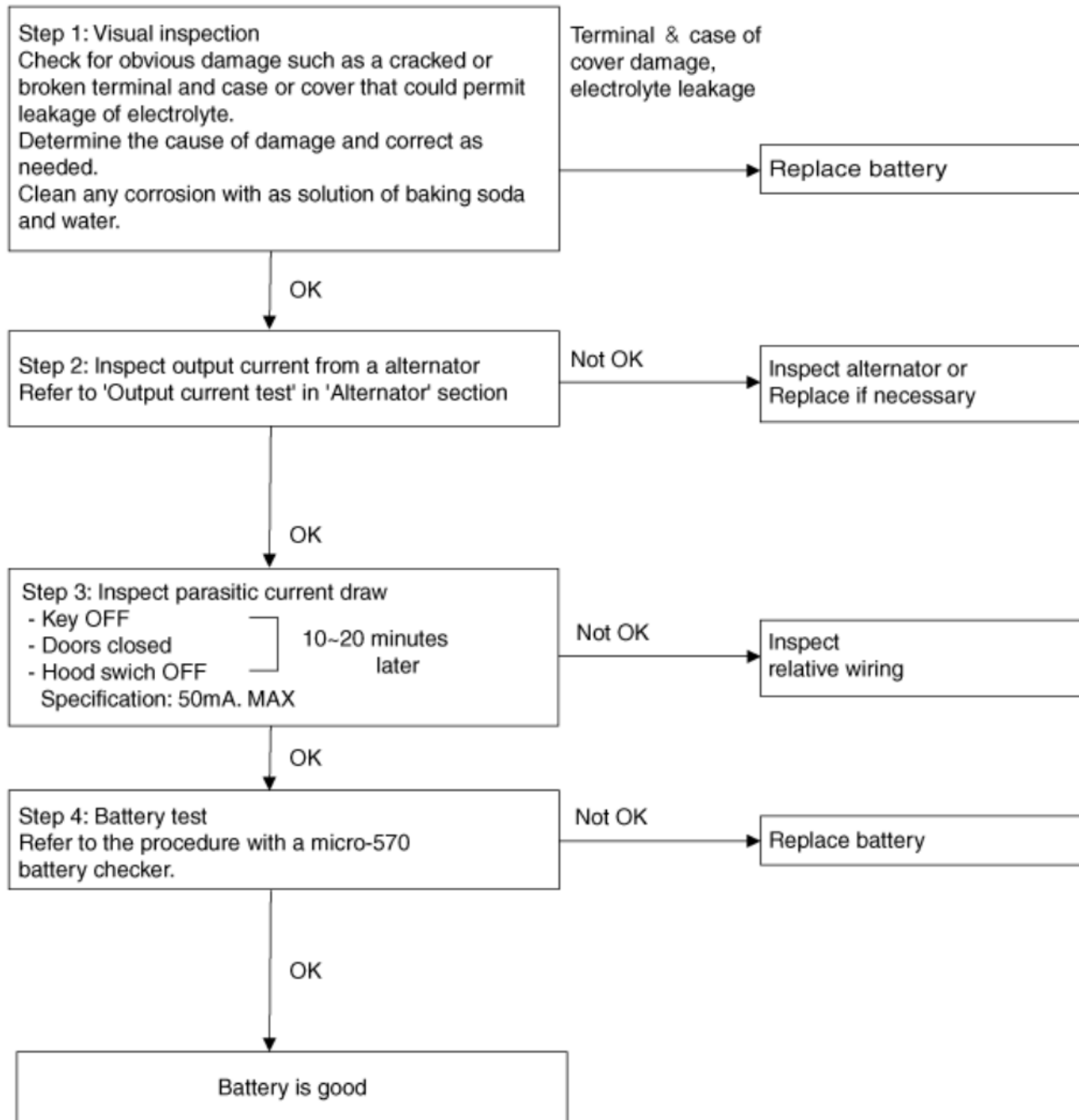


- 1. Battery assembly
- 2. Battery insulation pad
- 3. Battery mounting bracket

- 4. Battery tray assembly
- 5. Bolts

INSPECTION

Battery Diagnostic Flow



Vehicle parasitic current inspection

1. Turn the all electric devices OFF, and then turn the ignition switch OFF.
2. Close all doors except the engine hood, and then lock all doors.
 - (1) Disconnect the hood switch connector.

(2) Close the trunk lid.

(3) Close the doors or remove the door switches.

3. Wait a few minutes until the vehicle's electrical systems go to sleep mode.

NOTICE

For an accurate measurement of a vehicle parasitic current, all electrical systems should go to sleep mode. (It takes at least one hour or at most one day.) However, an approximate vehicle parasitic current can be measured after 10~20 minutes.

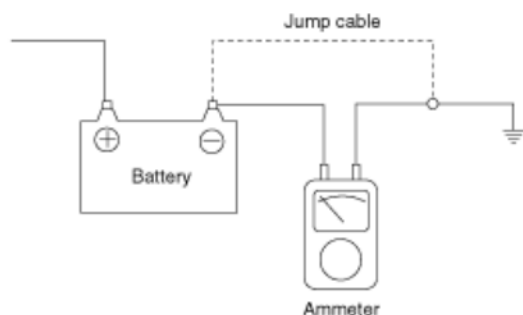
4. Connect an ammeter in series between the battery (-) terminal and the ground cable, and then disconnect the clamp from the battery (-) terminal slowly.

CAUTION

Be careful that the lead wires of an ammeter do not come off from the battery (-) terminal and the ground cable to prevent the battery from being reset. In case the battery is reset, connect the battery cable again, and then start the engine or turn the ignition switch ON for more than 10 sec. Repeat the procedure from No. 1.

To prevent the battery from being reset during the inspection,

- Connect a jump cable between the battery (-) terminal and the ground cable.
- Disconnect the ground cable from the battery (-) terminal.
- Connect an ammeter between the battery (-) terminal and the ground cable.
- After disconnecting the jump cable, read the current value of the ammeter.



5. Read the current value of the ammeter.

- If the parasitic current is over the limit value, search for abnormal circuit by removing a fuse one by one and checking the parasitic current.
- Check the parasitic current again, and search for suspected unit by removing a unit connected with the abnormal circuit one by one.

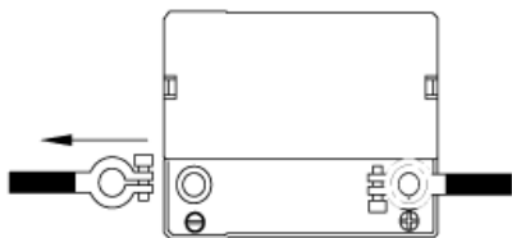
Limit value (after 10~20 min.) : Below 50mA

CLEANING

- Make sure the ignition switch and all accessories are in the OFF position.
- Disconnect the battery cables (negative first).
- Remove the battery from the vehicle.

⚠ CAUTION

Care should be taken in the event the battery case is cracked or leaking, to protect your skin from the electrolyte. Heavy rubber gloves (not the household type) should be worn when removing the battery.

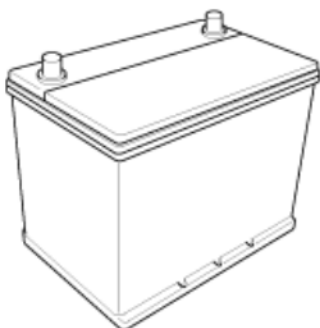


4. Inspect the battery tray for damage caused by the loss of electrolyte. If acid damage is present, it will be necessary to clean the area with a solution of clean warm water and baking soda. Scrub the area with a stiff brush and wipe off with a cloth moistened with baking soda and water.
5. Clean the top of the battery with the same solution as described above.
6. Inspect the battery case and cover for cracks. If cracks are present, the battery must be replaced.
7. Clean the battery posts with a suitable battery post tool.
8. Clean the inside surface of the terminal clamps with a suitable battery cleaning tool. Replace damaged or frayed cables and broken terminal clamps.
9. Install the battery in the vehicle.
10. Connect the cable terminals to the battery post, making sure tops of the terminals are flush with the tops of the posts.
11. Tighten the terminal nuts securely.
12. Coat all connections with light mineral grease after tightening.

⚠ CAUTION

When batteries are being charged, an explosive gas forms beneath the cover of each cell. Do not smoke near batteries being charged or which have recently been charged. Do not break live circuit at the terminals of batteries being charged.

A spark will occur when the circuit is broken. Keep open flames away from battery.



TROUBLESHOOTING

Before starting troubleshooting, inspect each of the following sections, and if there is an abnormality, carry out a repair.

1. Check that the actuator and pulley assembly are all normal.
2. Check if the pulley assembly and the movement of cables are working smoothly.
3. Check if there is no excessive play or tension in each cable.

TROUBLESHOOTING PROCEDURES

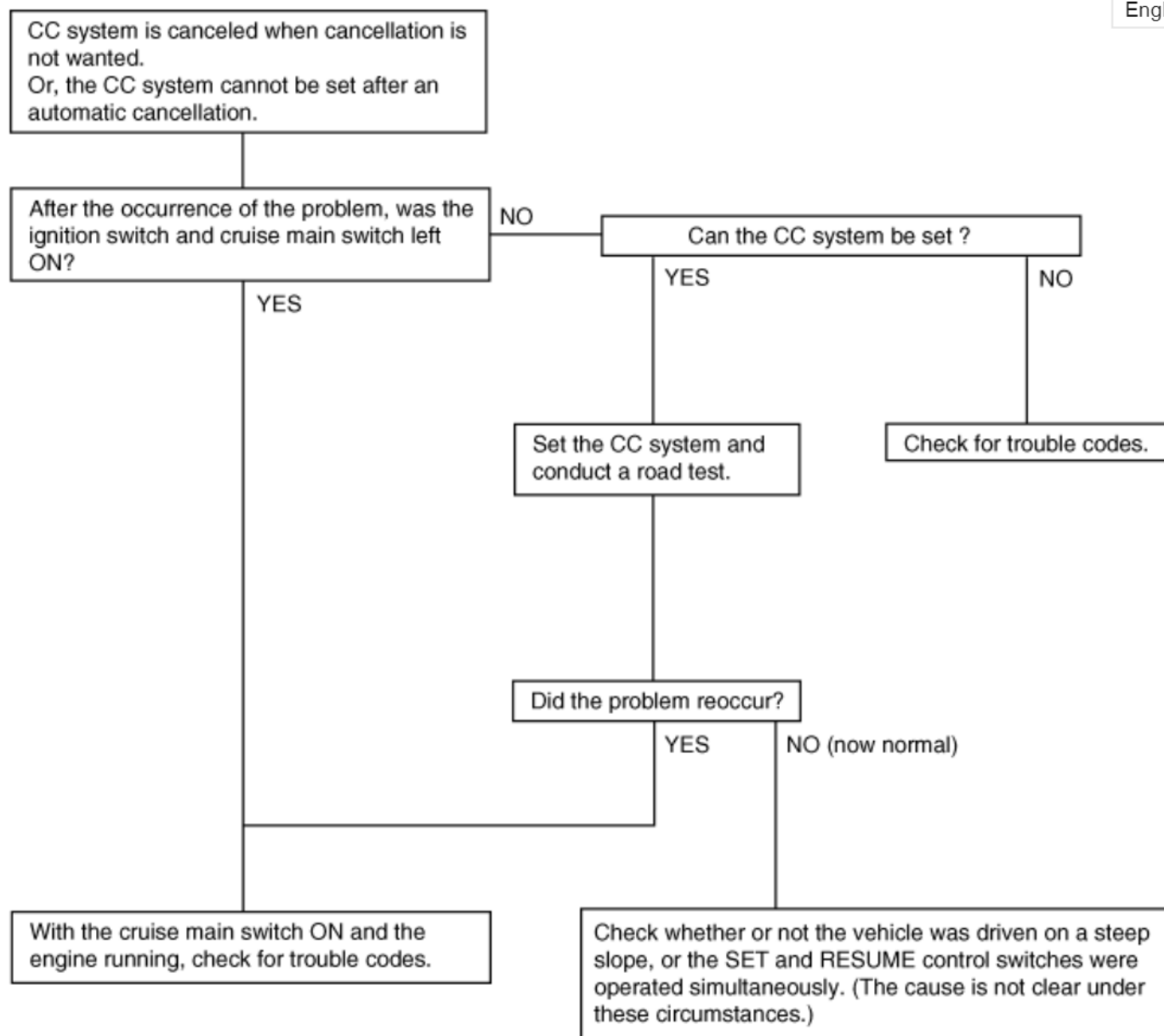
First, select the applicable malfunction symptom from the "TROUBLE SYMPTOM CHARTS" shown on next pages.

Determine the condition of all function circuits.

1. Make the following preliminary inspections.
 - Check that the installation of the actuator, accelerator cable are correct, and that the cables and links are securely connected.
 - Check that the accelerator pedal moves smoothly.
 - Adjust the cable so there is not excessive tension or excessive play on the accelerator cable.
 - Check that the actuator and unit assembly, cruise main, control switch and the connector of each cancel switch are connected securely.
2. Check in the sequence indicated in the "TROUBLE SYMPTOM CHARTS".
3. If a normal condition is indicated, replace the cruise control module.

TROUBLE SYMPTOM CHARTS

TROUBLE SYMPTOM 1



CC : Cruise Control

TROUBLE SYMPTOM 2

Trouble symptom	Probable cause	Remedy
The set vehicle speed varies greatly upward or downward "Surging" (repeated alternating acceleration and deceleration) occurs after setting	Malfunction of the vehicle speed sensor circuit	Repair the vehicle speed sensor system, or replace the part
	Malfunction of the speedometer cable or speedometer drive gear	
	Malfunction of the actuator and unit	Replace the actuator and unit

TROUBLE SYMPTOM 3

Trouble symptom	Probable cause	Remedy
The CC system is not canceled when the brake pedal is depressed	Damaged or disconnected wiring of the stop lamp switch	Repair the harness or replace the stop lamp switch

	Malfunction of the actuator and unit	Replace the actuator and unit
--	--------------------------------------	-------------------------------

TROUBLE SYMPTOM 4

Trouble symptom	Probable cause	Remedy
The CC system is not canceled when the shift lever is moved to the "N" position (It is canceled, however, when the brake pedal is depressed)	Damaged or disconnected wiring of inhibitor switch input circuit	Repair the harness or repair or replace the inhibitor switch
	Improper adjustment of inhibitor switch	
	Malfunction of the actuator and unit	Replace the actuator and unit

TROUBLE SYMPTOM 5

Trouble symptom	Probable cause	Remedy
Cannot decelerate (coast) by using the SET switch	Temporary damaged or disconnected wiring of SET switch input circuit	Repair the harness or replace the SET switch
	Actuator circuit poor contact	Repair the harness or replace the actuator
	Malfunction of the actuator	
	Malfunction of the actuator and unit	Replace the actuator and unit

TROUBLE SYMPTOM 6

Trouble symptom	Probable cause	Remedy
Cannot accelerate or resume speed by using the RESUME switch	Damaged or disconnected wiring, or short circuit, or RESUME switch input circuit	Repair the harness or RESUME switch
	Actuator circuit poor contact	Repair the harness or replace the actuator
	Malfunction of the actuator	
	Malfunction of the actuator and unit	Replace the actuator and unit

TROUBLE SYMPTOM 7

Trouble symptom	Probable cause	Remedy
CC system can be set while driving at a vehicle speed of less than 40km/h (25mph), or there is no automatic cancellation at that speed	Malfunction of the vehicle-speed sensor circuit	Repair the vehicle speed sensor system, or replace the part
	Malfunction of the speedometer cable or the speedometer drive gear	
	Malfunction of the actuator and unit	Replace the actuator and unit

TROUBLE SYMPTOM 8

Trouble symptom	Probable cause	Remedy
The cruise main switch indicator lamp does not illuminate (But CC system is normal)	Damaged or disconnected bulb of cruise main switch indicator lamp	Repair the harness or replace the part.
	Harness damaged or disconnected	

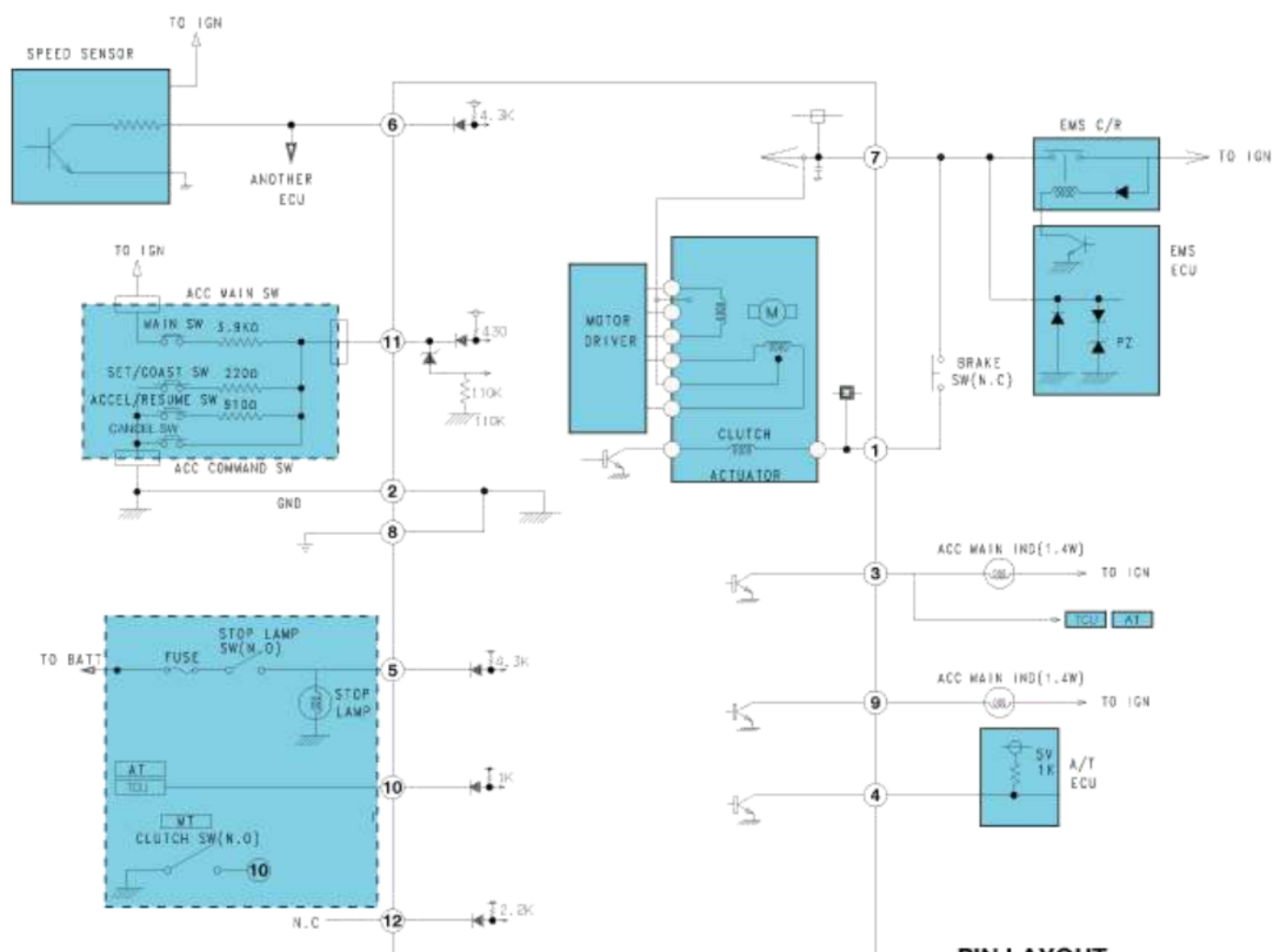
TROUBLE SYMPTOM 9

Trouble symptom	Probable cause	Remedy
Malfunction of control function by ON/OFF switching of idle switch	Malfunction of circuit related to idle switch function	Repair the harness or replace the part
	Malfunction of the actuator and unit	

TROUBLE SYMPTOM 10

Trouble symptom	Probable cause	Remedy
Overdrive is not canceled during fixed speed driving	Malfunction of circuit related to overdrive cancellation, or malfunction of actuator and unit	Repair the harness or replace the part
No shift to overdrive during manual driving		

CIRCUIT DIAGRAM

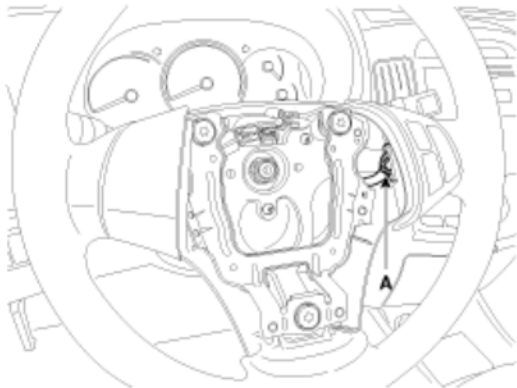


PIN LAYOUT

No	Name	Note
1	BRK	AUTUATOR CLUTCH
2	GND	GND
3	SET	SET INDICATOR
4	AT	OD CONTROL
5	STOP	STOP LAMP SW
6	SPD	SPEED SENSOR
7	IGN1	POWER SOURCE
8	GND	GND
9	MAIN	MAIN INDICATOR
10	CLU	INH./CLUTCH SW
11	COM	MAIN/COMMAND SW
12	NC	NO CONNECTION

REMOVAL

- 1. Remove the air bag module assembly. (Refer to 'RT','ST' group)
- 2. Disconnect the auto cruise control main switch connector.



- 3. Remove the auto cruise control main switch assembly.
- 4. To install, reverse the removal procedure.

INSPECTION

- 1. Operate the switches and check for continuity between the terminals.
- 2. If continuity is not as specified, replace the switch.

Switches	State	Terminals							
		1	2	3	4	5	6	7	8
Main	ON							●	○
Set/Coast							●	○	
Accel/Resume							●	○	
Cancel							●	○	

THE MICRO 570 ANALYZER

The Micro 570 Analyzer provides the ability to test the charging and starting systems, including the battery, starter and alternator.

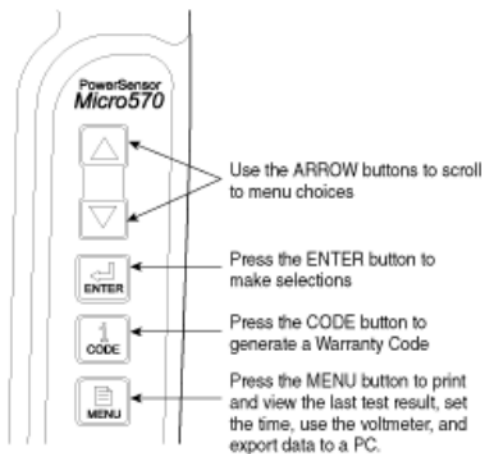
⚠ CAUTION

- ※ Because of the possibility of personal injury, always use extreme caution and appropriate eye protection when working with batteries.
 - ※ When charging battery by test result, Battery must be fully charged.
- To get accurate test result, battery surface voltage must have subsided ahead before test when you test battery after charged. (See following Battery Test Results)



Keypad

The Micro 570 button on the key pad provide the following functions :



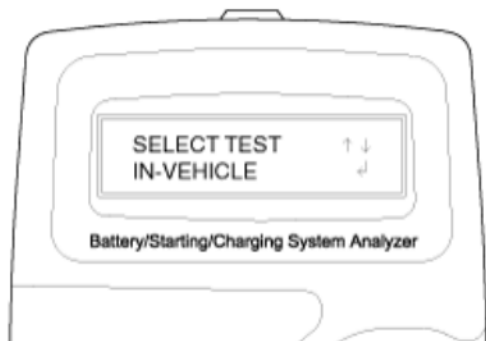
Battery Test Procedure

1. Connect the tester to the battery.
 - Red clamp to battery positive (+) terminal.
 - Black clamp to battery negative (-) terminal.

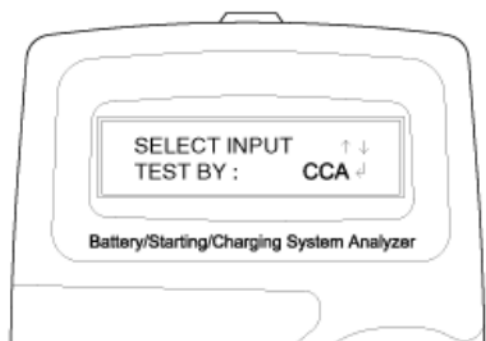
**CAUTION**

Connect clamps securely. If "CHECK CONNECTION" message is displayed on the screen, reconnect clamps securely.

- The tester will ask if the battery is connected "IN-VEHICLE" or "OUT-OF-VEHICLE". Make your selection by pressing the arrow buttons; then press ENTER.

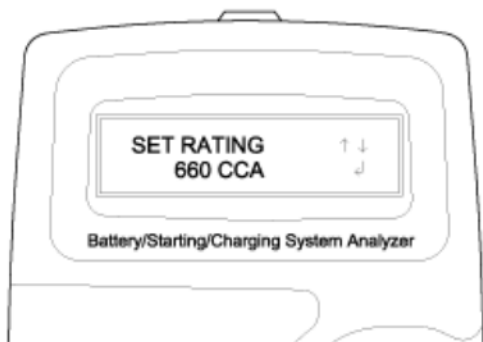


- Select CCA and press the ENTER button.

**NOTICE**

CCA : Cold cranking amps, is an SAE specification for cranking batteries at -0.4°F (-18°C).

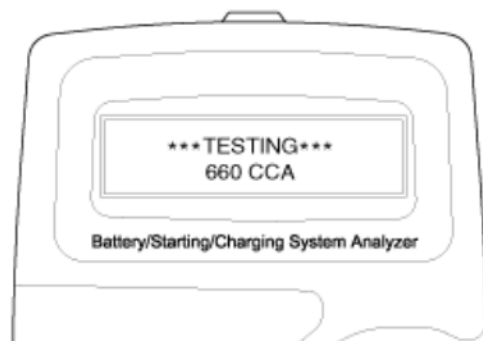
- Set the CCA value displayed on the screen to the CCA value marked on the battery label by pressing up and down buttons and press ENTER.



NOTICE

The battery ratings(CCA) displayed on the tester must be identical to the ratings marked on battery label.

5. The tester will conduct battery test.



6. The tester displays battery test results including voltage and battery ratings.
Refer to the following table and take the appropriate action as recommended by the Micro 570.



Battery Test Results

Result On Printer	Remedy
GOOD BATTERY	No action is required.
GOOD RECHARGE	Battery is in a good state. Recharge the battery and use. ※ You have to follow instruction below when you charge battery and retest, otherwise test result can be inaccurate. (See 'Charge and Retest method after battery charge' below.)
CHARGE & RETEST	Battery is not charged properly.

	– Charge and test the battery again. ※ You have to follow instruction below when you charge battery and retest, otherwise test result can be inaccurate. (See 'Charge and Retest method after battery charge' below.)
REPLACE BATTERY	Replace battery and recheck the charging system. – Improper connection between battery and vehicle cables may cause "REPLACE BATTERY". Retest the battery after removing cables and connecting the tester to the battery terminal directly prior to replacing the battery.
BAD CELL-REPLACE	Charge and retest the battery. – If the Micro 570 recommends "REPLACE BATTERY", replace the battery and recheck the charging system.

[Charge and Retest method after battery charge]

Battery charge

Set battery charger to 'Auto Mode' (The Mode that charging current drops as the battery charges.) and charge battery until charging current down close to zero or the charger alerts you with an alarm when charge is complete.

(Minimum charging time recommended: More than 3 hours with Auto Mode that explained above)

- If battery is not fully charged, battery surface voltage will be high while the amount of current charged (CCA) in battery is low. If you measure the battery under this condition, tester may misjudge that battery sulfation occurred because the amount of current in battery is too low in comparison with battery voltage.

* Surface voltage: When battery is charged electrolyte temperature increases and chemical reaction become active resulting in an excessive increase of battery voltage.

It is known that it takes approximate one day to subside this increased surface voltage completely.

Battery Test after charge

Do not test battery right after the charge. Test battery after battery surface voltage has subsided as instructed in the following procedure.

- (1) When battery charge is complete, install the battery in the vehicle.
- (2) Put IG key to ON position and turn on head lamp with low beam, and wait 5 minutes. (Discharge for 5 minutes)
- (3) Turn off the head lamp and IG key, and wait 5 minutes. (Waiting for 5 minutes)
- (4) Remove +, - cable from the battery and test battery.

⚠ WARNING

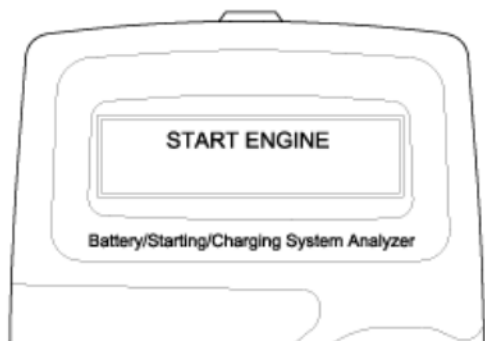
Whenever filing a claim for battery, the print out of the battery test results must be attached.

Starter Test Procedure

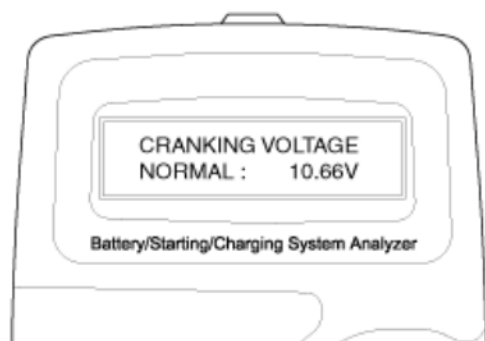
7. After the battery test, press ENTER immediately for the starter test.



8. Start the engine.



9. Cranking voltage and starter test results will be displayed on the screen.
Refer to the following table and take the appropriate action as recommended by the Micro 570.



Starter Test Results

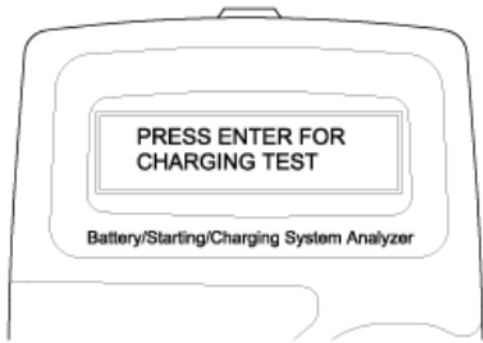
Result On Printer	Remedy
CRANKING VOLTAGE NORMAL	System shows a normal starter draw.
CRANKING VOLTAGE LOW	Cranking voltage is lower than normal level. – Check starter.
CHARGE BATTERY	The state of battery charge is too low to test. – Charge the battery and retest.
REPLACE BATTERY	Replace battery. – If the vehicle is not started though the battery condition of "GOOD BATTERY" is displayed, check wiring for open circuit, battery cable connection, starter and repair or replace as necessary. – If the engine does crank, check fuel system.

NOTICE

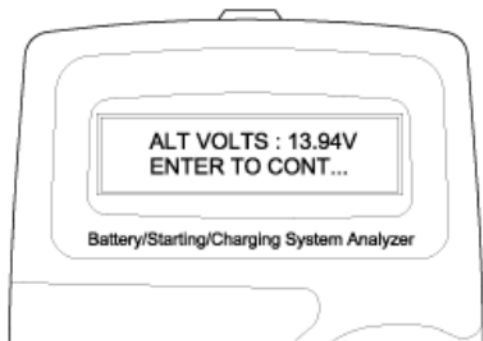
When testing the vehicle with old diesel engines, the test result will not be favorable if the glow plug is not heated. Conduct the test after warming up the engine for 5 minutes.

Charging System Test Procedure

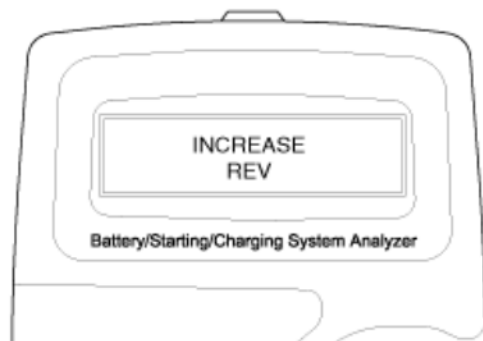
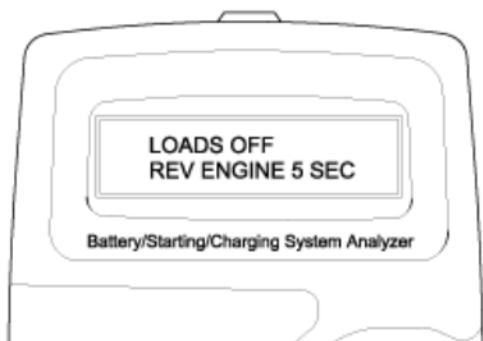
10. Press ENTER to begin charging system test.

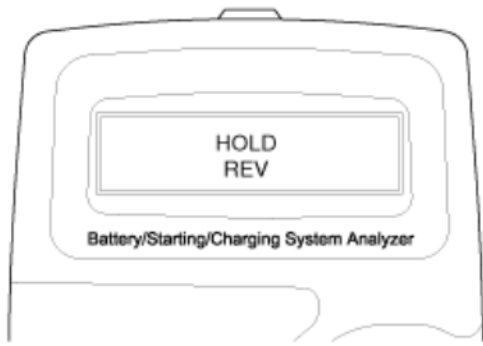


11. The tester displays the actual voltage of alternator.
Press ENTER to continue.

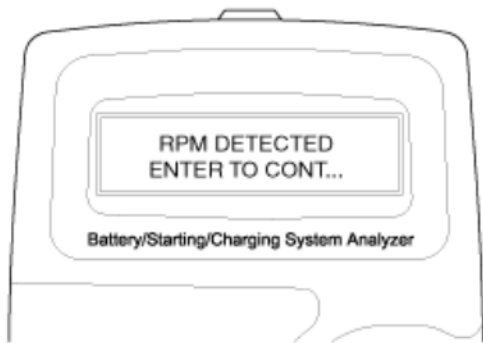


12. Turn off all electrical load and rev engine for 5 seconds with pressing the accelerator pedal. (Follow the instructions on the screen)

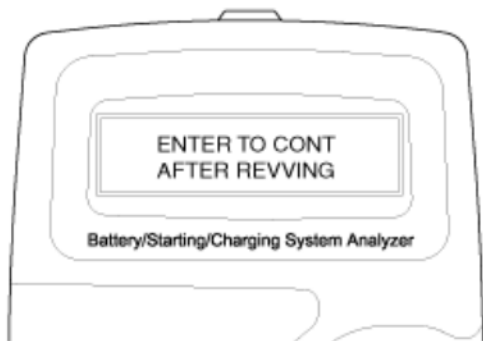




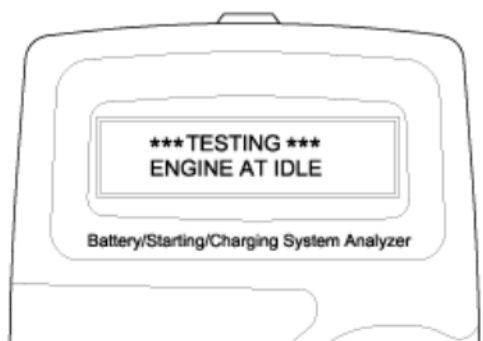
13. The message that engine RPM is detected will be displayed on the screen. Press ENTER to continue.

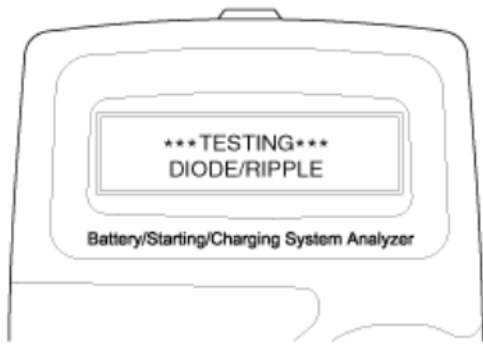


14. If the engine RPM is not detected, press ENTER after revving engine.

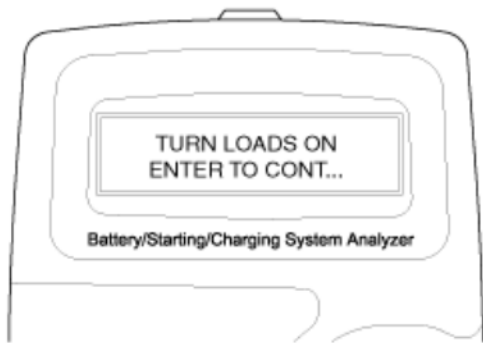


15. The tester will conduct charging system test during loads off.

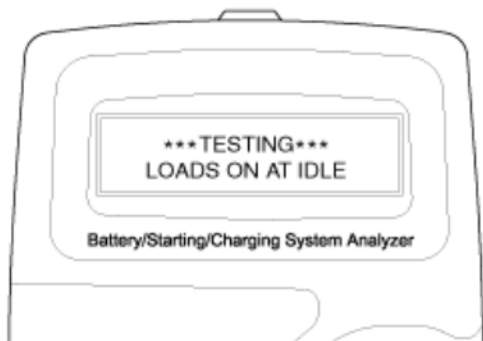




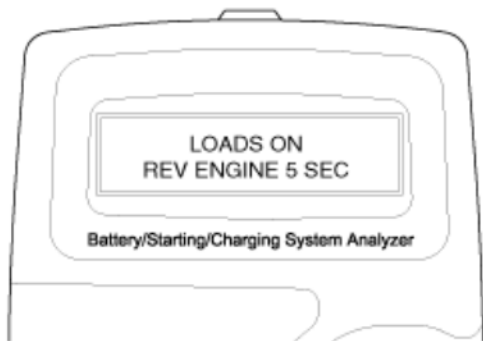
16. Turn on electrical loads (air conditioner, lamps, audio and etc). Press ENTER to continue.

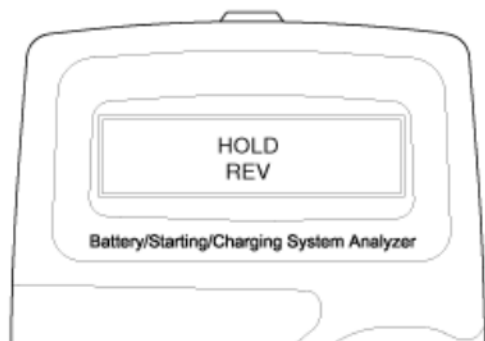
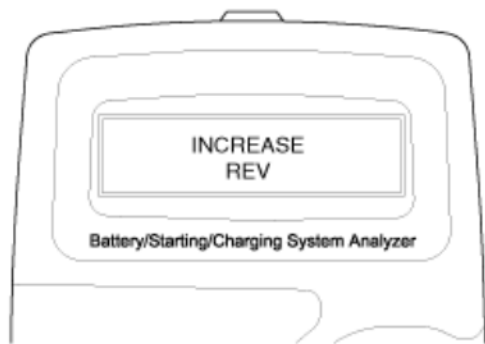


17. The tester will conduct charging system test during loads on.

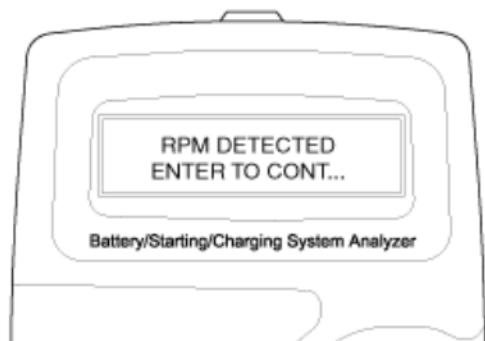


18. Rev engine for 5 seconds with pressing the accelerator pedal. (Follow the instructions on the screen)

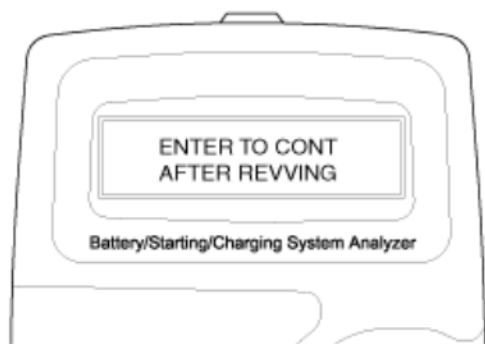




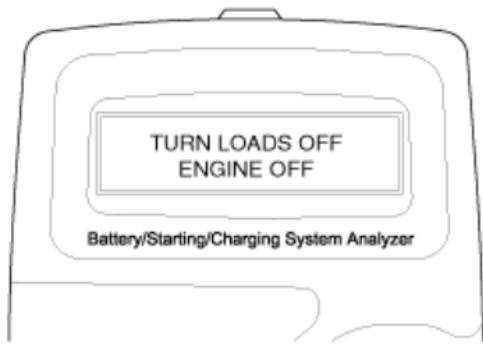
19. The message that engine RPM is detected will be displayed on the screen. Press ENTER to continue.



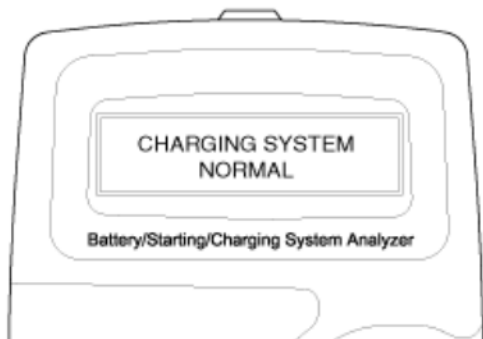
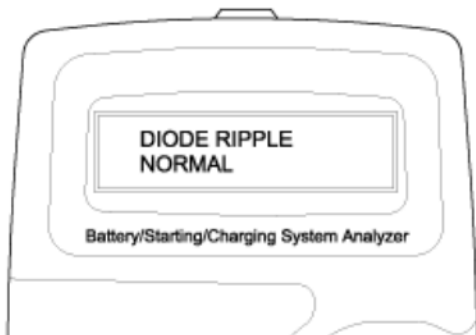
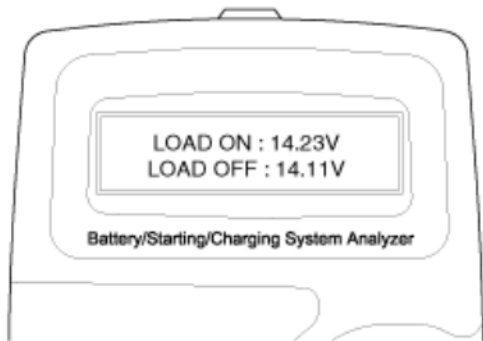
20. If the engine RPM is not detected, press ENTER after revving engine.



21. Turn off electrical loads (air conditioner, lamps, audio and etc). Turn the engine off.



22. Charging voltage and charging system test results will be displayed on the screen.
 Shut off engine and disconnect the tester clamps from the battery. Refer to the following table and take the appropriate action as recommended by the Micro 570.



Charging System Test Results

Result On Printer	Remedy
CHARGING SYSTEM	Charging system is normal.

NORMAL / DIODE RIPPLE NORMAL	
NO CHARGING VOLTAGE	Alternator does not supply charging current to battery. – Check belts, connection between alternator and battery and replace belts or cable or alternator as necessary.
LOW CHARGING VOLTAGE	Alternator does not supply charging current to battery and electrical load to system fully. – Check belts and alternator and replace as necessary.
HIGH CHARGING VOLTAGE	The voltage from alternator to battery is higher than normal limit during voltage regulating. – Check connection and ground and replace regulator as necessary. – Check electrolyte level in the battery.
EXCESS RIPPLE DETECTED	One or more diodes in the alternator is not functioning properly. – Check alternator mounting and belts and replace as necessary.

SPECIFICATION**STARTING SYSTEM**

Item		Specifications	
Starter	Type		PRE.engaged drive
	Rated voltage		12V, 2.0KW
	No. of pinion teeth		12
	No-load characteristics	Voltage	11V
		Amperage	130A, MAX
		Speed	3,600rpm, MIN
	Commutator diameter	Standard	35 mm (1.378 in)
		Limit	
	Undercut depth	Standard	0.7 mm (0.028 in)
		Limit	

CHARGING SYSTEM

Item		Specifications
Alternator	Rated voltage	12V, 120A
	Speed	1,000 ~ 12,000 rpm
	Voltage regulator	I.C regulator built-in type
	Regulator setting voltage	14.4 ± 0.3V(AT 20°C full charged battery)
	Temperature compensation	-10 ± 3mV/°C
Battery	Type	CMF 80AH
	Cold cranking amperage at -18°C (0°F)	720A
	Reserve capacity	160min
	Specific gravity at 20°C (77°F)	1.280 ± 0.01

NOTICE

- COLD CRANKING AMPERAGE is the amperage a battery can deliver for 30 seconds and maintain a terminal voltage of 7.2V or greater at a specified temperature.
- REVERSE CAPACITY RATING is amount of time a battery can deliver 25A and maintain a minimum terminal voltage of 10.5V at 25.7°C(77°F)

PREHEATING SYSTEM

Item		Specifications
Glow plug	Rated voltage	DC 11V
	Current	16A ± 1.5A after 4 seconds loading at rated voltage

Glow plug relay	Rated voltage	DC 12V	English ▼
	Operating voltage range	DC 9V ~ DC 16V	
	Operating temperature range	-40°C ~ 120°C	
	Rated load current	DC 12V, 70A	

TIGHTENING TORQUE

Items	Nm	kgf.m	lb·ft
Generator terminal (B+)	10.8 ~ 14.7	1.1 ~ 1.5	8.0 ~ 10.8
Generator mounting bolts	38.2 ~ 58.8	3.9 ~ 6.0	28.2 ~ 43.4
Starter motor terminal (B+)	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Starter motor mounting bolts	58.8 ~ 53.9	4.3 ~ 5.5	31.1 ~ 39.8
Battery terminal	0.4 ~ 5.9	0.4 ~ 0.6	2.9 ~ 4.3
Glow plug	9.8 ~ 13.7	1.0 ~ 1.4	7.2 ~ 10.1
Glow plug plate attaching nut	0.8 ~ 0.15	0.08 ~ 0.15	0.6 ~ 1.1

TROUBLESHOOTING

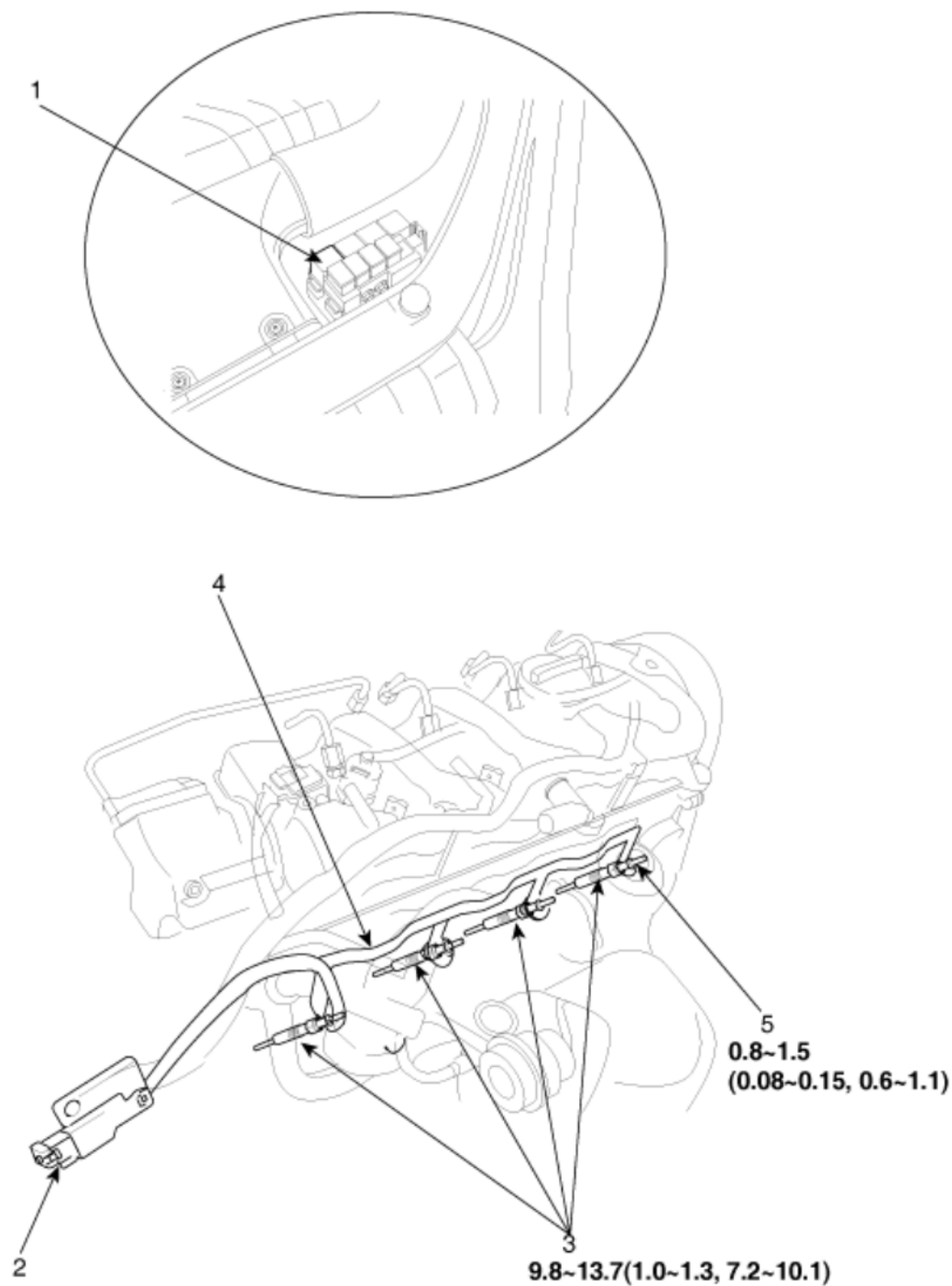
CHARGING SYSTEM

Symptom	Suspect Area	Remedy
Charging warning indicator does not light with ignition switch "ON" and engine off	Fuse blown Light burned out Wiring connection loose Electronic voltage regulator	Check fuses Replace light Tighten loose connections Replace voltage regulator
Charging warning indicator does not go out with engine running (Battery requires frequent recharging)	Drive belt loose or worn Battery cables loose, corroded or worn Fuse blown Fusible link blown Electronic voltage regulator or generator Wiring	Adjust tension or replace drive belt Repair or replace cables Check fuses Replace fusible link Test generator Repair wiring
Engine hesitates/poor acceleration Overcharge	Drive belt loose or worn Wiring connection loose or open circuit Fusible link blown Poor grounding Electronic voltage regulator or generator Worn battery Electronic voltage regulator Voltage sensing wire	Adjust tension or replace drive belt Tighten loose connection or repair wiring Replace fusible link Repair Test generator, if faulty, repair or replace Replace battery Replace voltage regulator Repair wire

STARTING SYSTEM

Symptom	Suspect Area	Remedy
Engine will not crank	Battery charge low Battery cables loose, corroded or worn out Transaxle range switch (Vehicle with automatic transaxle only) Fusible link blown Starter motor faulty Ignition switch faulty	Charge or replace battery Repair or replace cables Adjust or replace switch Replace fusible link Repair starter motor Inspect
Engine cranks slowly	Battery charge low Battery cables loose, corroded or worn out Starter motor	Charge or replace battery Repair or replace cables Repair starter motor
Starter keeps running	Starter motor Ignition switch	Repair starter motor Inspect
Starter spins but engine will not crank	Short in wiring Pinion gear teeth broken or starter motor Ring gear teeth broken	Repair wiring Repair starter motor Replace flywheel ring gear or torque converter

COMPONENT LOCATION



- 1. Glow relay
- 2. Glow plug connector

- 3. Glow plug
- 4. Plate

- 5. Washer nuts

INSPECT PREHEATING SYSTEM

Conditions before inspection :

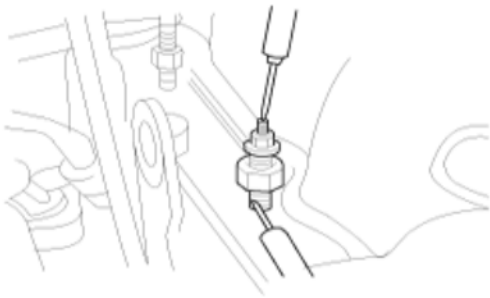
Battery voltage : 12V

1. Connect voltmeter between glow plug plate and plug body (ground).
2. Check indicated value on voltmeter with ignition switch ON.
3. Check that preheat indication lamp lights for about 6 seconds and indicates battery voltage (about 9V or over) for about 36 seconds immediately after ignition switch is turned on. [At cooling water temperature 20°C (68°F)]

NOTICE

Continuity time varies depending upon cooling water temperature.

4. After checking 3, set ignition switch at START position.
5. The system is normal if battery voltage (about 9V or over) is generated for about 6 seconds during engine cranking and after start operation. [at cooling water temperature 20°C (68°F)]
6. When the voltage or continuity time is not normal, check the terminal voltage in glow control unit, and single parts.



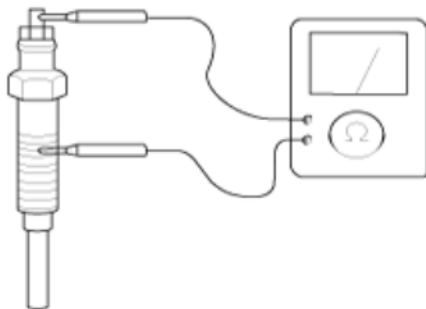
INSPECT GLOW PLUS

1. Check the continuity between the terminal and body as illustrated. Replace if discontinuity or with large resistance.
Standard value : 0.25Ω

CAUTION

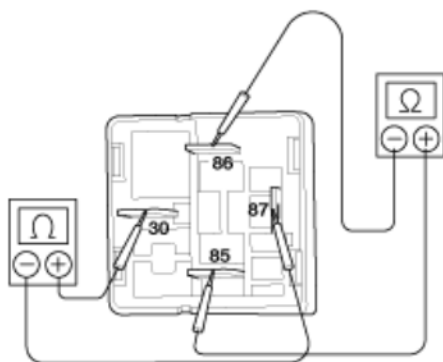
Remove oil from plug before measuring as glow plug resistance is very small.

2. Check for rust on glow plug plate.
3. Check glow plug for damage.

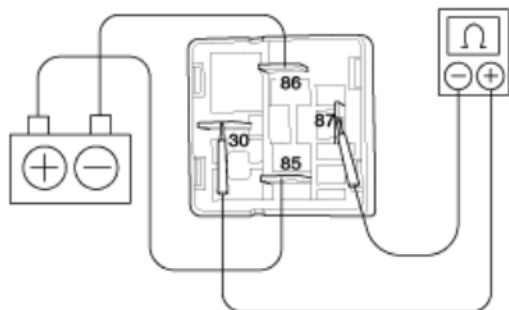


INSPECT GLOW PLUG RELAY

1. Remove the glow plug relay.
2. Inspect the relay continuity.
 - Using an ohmmeter, check that there is continuity between terminals 85 and 86. If there is no continuity, replace the relay.
 - Check that there is no continuity between terminals 30 and 87. If there is continuity, replace the relay.



3. Inspect the relay operation.
 - Apply battery positive voltage across terminals 85 and 86.
 - Using an ohmmeter, check that there is continuity between terminals 87 and 30. If there is no continuity, replace the relay.



4. Install the glow plug relay.

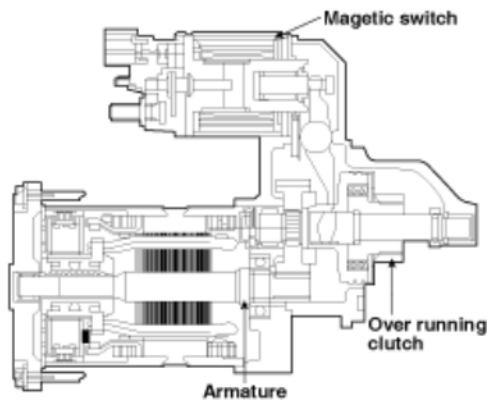
DESCRIPTION

The starting system includes the battery, starter motor, solenoid switch, ignition switch, inhibitor switch(A/T), ignition lock switch, connection wires and the battery cable.

When the ignition key is turned to the start position, current flows and energizes the starter motor's solenoid coil.

The solenoid plunger and clutch shift lever are activated, and the clutch pinion engages the ring gear.

The contacts close and the starter motor cranks. In order to prevent damage caused by excessive rotation of the starter armature when the engine starts, the clutch pinion gear overruns.

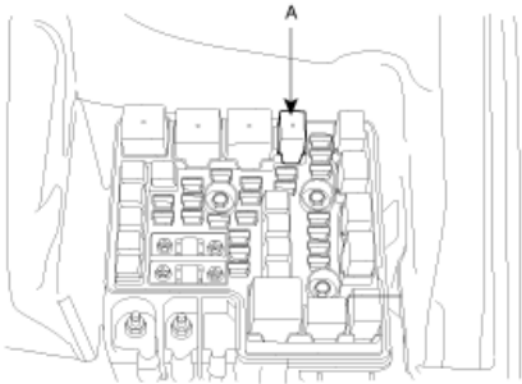


INSPECTION

STARTER CIRCUIT

The battery must be in good condition and fully charged.

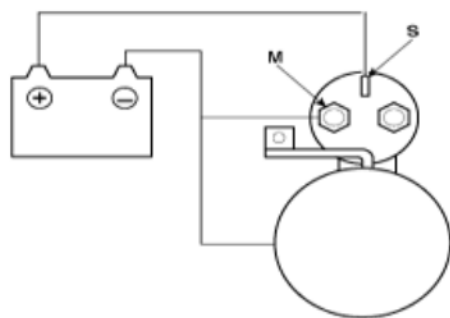
1. Remove the fuel pump relay(A) from the fuse box.



2. With the shift lever in N or P (A/T) or clutch pedal pressed (M/T), turn the ignition switch to "START"
 If the starter normally cranks the engine, starting system is OK.
 If the starter will not crank the engine at all, go to next step.
 If it won't disengage from the ring gear when you release key, check for the following until you find the cause.
 - Solenoid plunger and switch malfunction.
 - Dirty pinion gear or damaged overrunning clutch.
3. Check the battery condition. Check electrical connections at the battery, battery negative cable connected to the body, engine ground cables, and the starter for looseness and corrosion. Then try starting the engine again.
 If the starter cranks normally the engine, repairing the loose connection repaired the problem.
 The starting system is now OK.
 If the starter still does not crank the engine, go to next step.
4. Disconnect the connector from the S-terminal of solenoid. Connect a jumper wire from the B-terminal of solenoid to the S-terminal of solenoid.
 If the starter cranks the engine, go to next step.
 If the starter still does not crank the engine, remove the starter, and repair or replace as necessary.
5. Check the following items in the order listed until you find the open circuit.
 - Check the wire and connectors between the driver's under-dash fuse/relay box and the ignition switch, and between the driver's under-dash fuse/relay box and the starter.
 - Check the ignition switch (Refer to BE group - ignition system)
 - Check the transaxle range switch connector or ignition lock switch connector.
 - Inspect the starter relay.

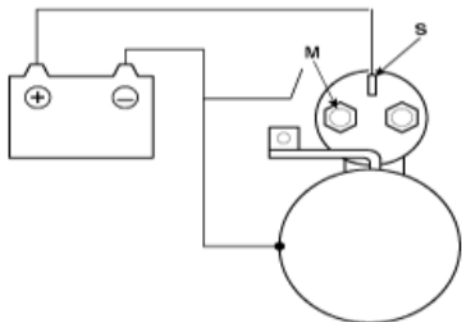
STARTER SOLENOID TEST

1. Disconnect the wires from the Sterminal and the M terminal.
2. Connect the battery as shown. If the starter pinion pops out, it is working properly. To avoid damaging the starter, do not leave the battery connected for more than 10 seconds.

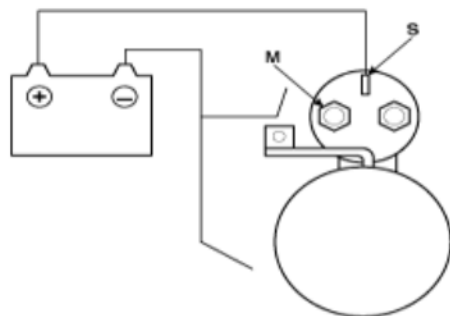


3. Disconnect the battery from the M terminal.

If the pinion does not retract, the hold-in coil is working properly. To avoid damaging the starter, do not leave the battery connected for more than 10 seconds.

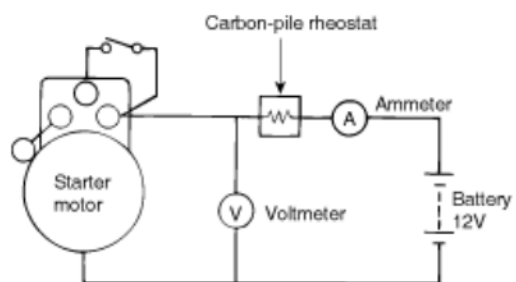


4. Disconnect the battery also from the body. If the pinion retracts immediately, it is working properly. To avoid damaging the starter, do not leave the battery connected for more than 10 seconds.



FREE RUNNING TEST

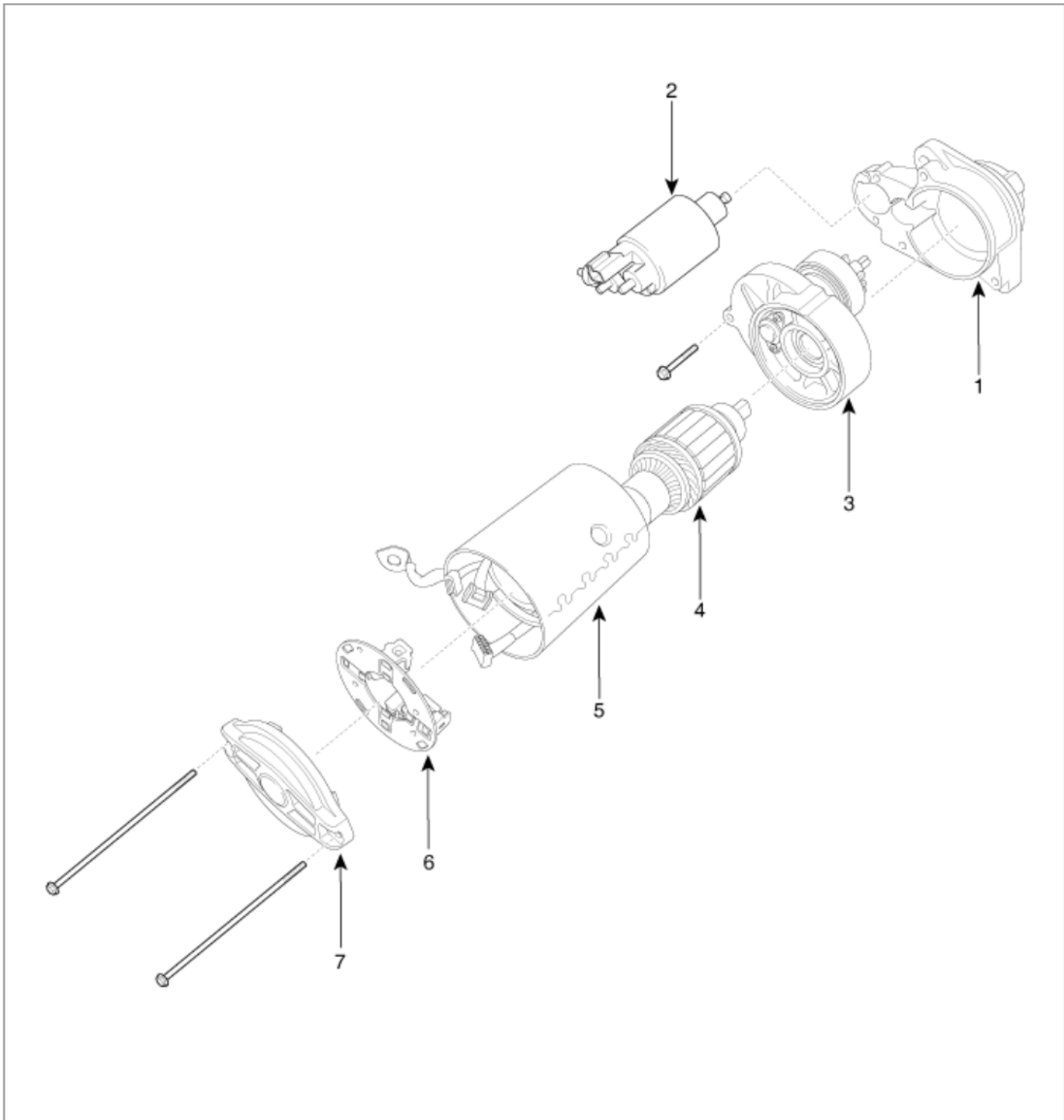
1. Place the starter motor in a vise equipped with soft jaws and connect a fully-charged 12-volt battery to starter motor as follows :
2. Connect a test ammeter (100-ampere scale) and carbon pile rheostat as shown in the illustration.
3. Connect a voltmeter (15-volt scale) across starter motor.
4. Rotate carbon pile to the off position.
5. Connect the battery cable from battery's negative post to the starter motor body.
6. Adjust until battery voltage shown on the voltmeter reads 11 volts.
7. Confirm that the maximum amperage is within the specifications and that the starter motor turns smoothly and freely :
 - : Max. 130 Amps
 - : Min. 3,600 rpm



CLEANING

1. Do not immerse parts in cleaning solvent. Immersing the yoke assembly and/or armature will damage the insulation. Wipe these parts with a cloth only.
2. Do not immerse the drive unit in cleaning solvent. The overrun clutch is pre-lubricated at the factory and solvent will wash lubrication from the clutch.
3. The drive unit may be cleaned with a brush moistened with cleaning solvent and wiped dry with a cloth.

COMPONENTS

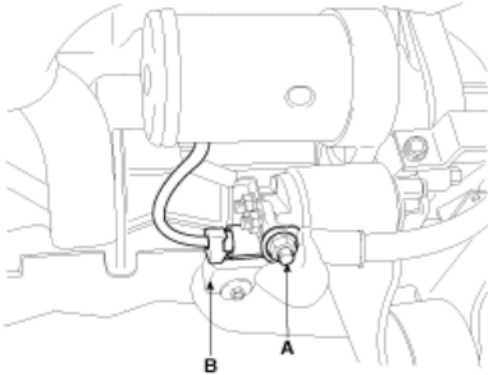


- 1. Front bracket
- 2. Magnetic switch
- 3. Housing
- 4. Armature

- 5. Yoke assembly
- 6. Brush holder
- 7. Rear cover

REMOVAL

1. Disconnect the battery negative cable.
2. Disconnect the starter cable(A) from the B terminal on the solenoid, then disconnect the connector(B) from the S terminal.

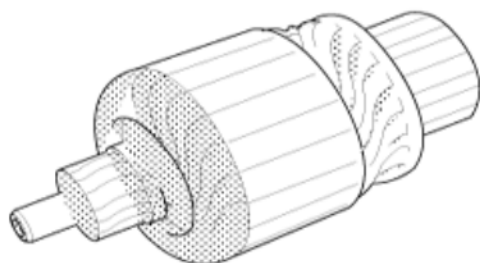


3. Remove the 2 bolts holding the starter, then remove the starter.
Tightening torque
42.2~53.9 N.m (4.3~5.5 kgf.m, 31.1~39.8 lb-ft)
4. Installation is the reverse of removal.
5. Connect the battery positive cable and negative cable to the battery.

INSPECTION

ARMATURE INSPECTION AND TEST

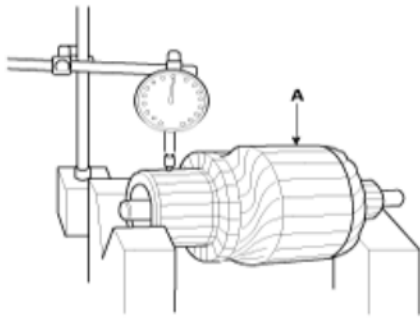
1. Remove the starter.
2. Disassemble the starter as shown at the beginning of this procedure.
3. Inspect the armature for wear or damage from contact with the permanent magnet. If there is wear or damage, replace the armature.



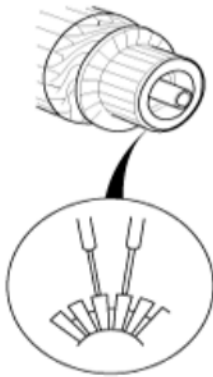
4. Measure the commutator (A) runout.
 - If the commutator runout is within the service limit, check the commutator for carbon dust or brass chips between the segments.
 - If the commutator runout is not within the service limit, replace the armature.

Commutator Runout

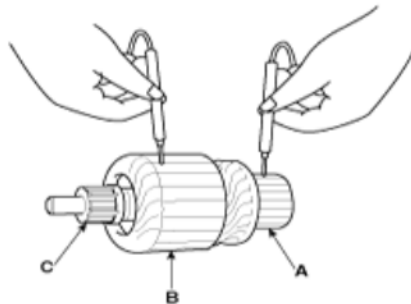
Standard (New) : 0.02mm (0.001 in.) max.



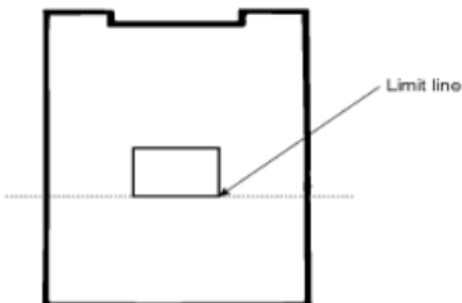
5. Check for continuity between the segments of the commutator. If an open circuit exists between any segments, replace the armature.



6. Check with an ohmmeter that no continuity exists between the commutator (A) and armature coil core (B), and between the commutator and armature shaft (C). If continuity exists, replace the armature.



INSPECT STARTER BRUSH

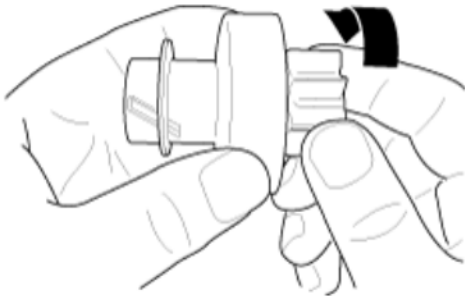


STARTER BRUSH HOLDER TEST



INSPECT OVERRUNNING CLUTCH

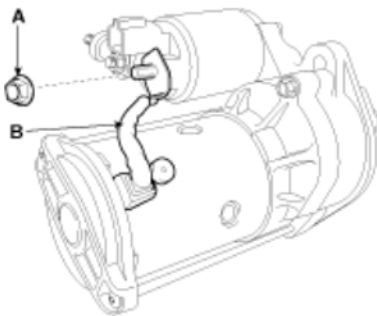
1. Slide the overrunning clutch along the shaft.
Replace it if does not slide smoothly.
2. Rotate the overrunning clutch (A) both ways.
Does it lock in one direction and rotate smoothly in reverse? If it does not lock in either direction or it locks in both directions, replace it.



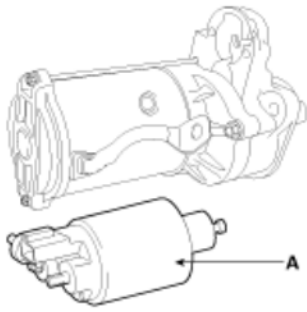
3. If the starter driver gear (B) is worn or damaged, replace the overrunning clutch assembly: the gear is not available separately.
Check the condition of the flywheel or torque converter ring gear if the starter drive gear teeth are damaged.

DISASSEMBLY

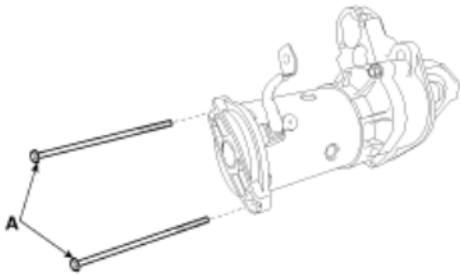
- 1) Remove the nut(A) and disconnect the lead wire(B) from the magnetic switch terminal(C).



- 2) Remove the 2 bolts(A) and pull out the yoke assembly(B) with the armature(C) from the front bracket(D).

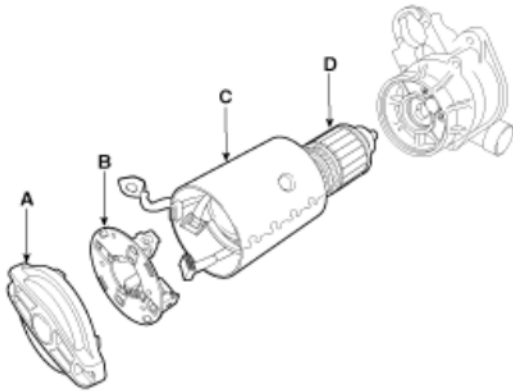


3) Remove the through bolts (A).

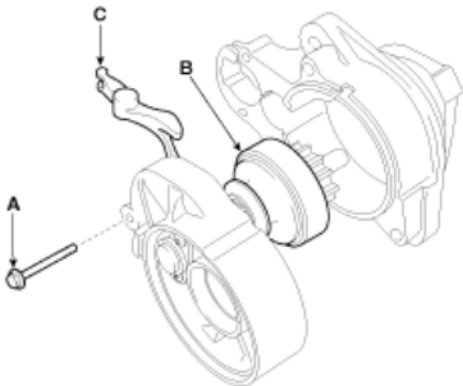


4) Remove the rear bracket (A) and brush holder assembly (B).

5) Remove the yoke (C) and armature (D).



6) Remove the mounting bolt (A) and the overrunning clutch (B), lever (C).



7) Reassembly is the reverse of disassembly.