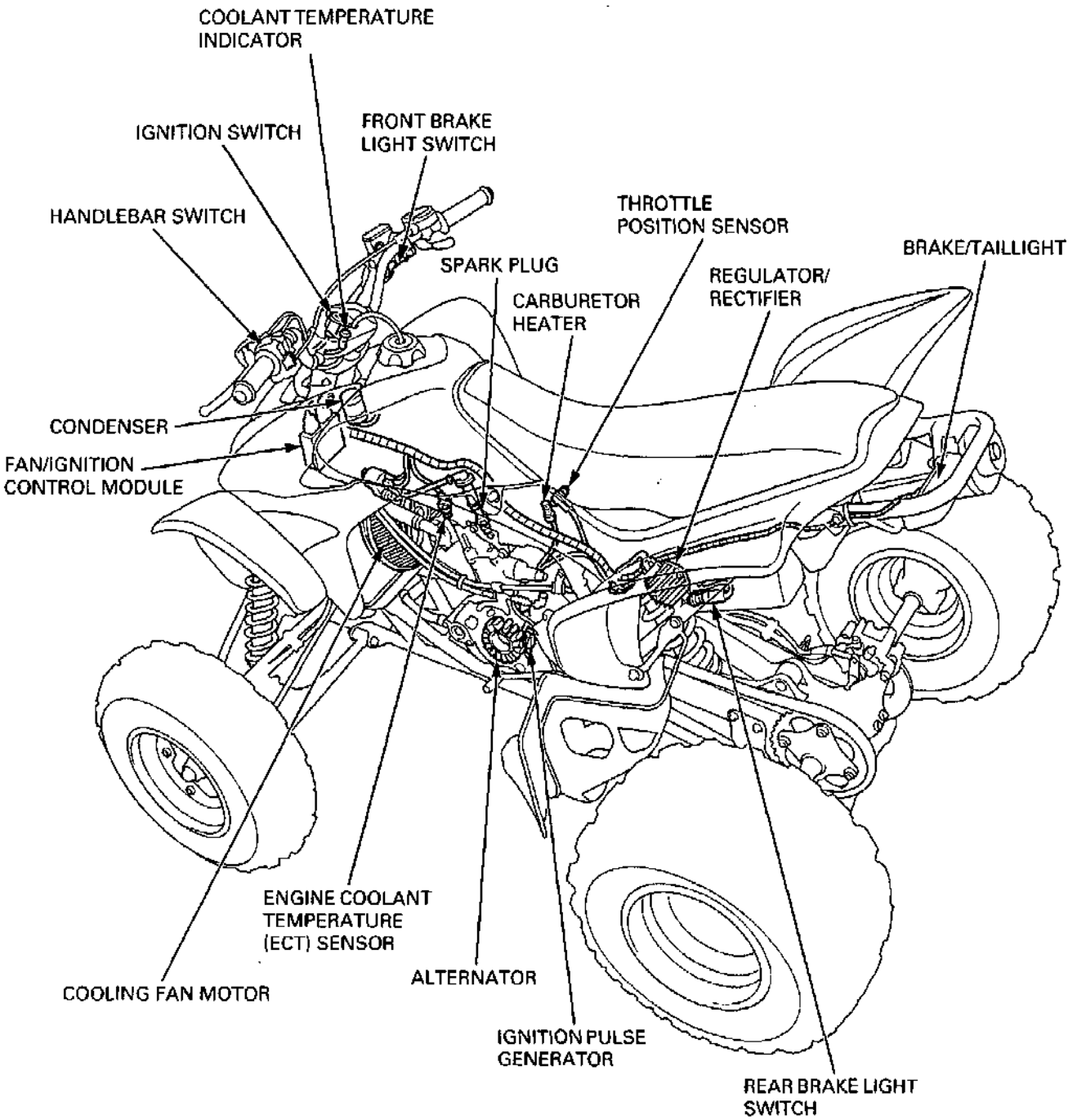
20. ELECTRICAL ('04 – '05)

COMPONENT LOCATION



SERVICE INFORMATION

GENERAL

- When servicing the ignition system, always follow the steps in the troubleshooting sequence on page 20-5.
- The ignition timing cannot be adjusted since the Ignition Control Module (ICM) is factory preset.
- The ICM may be damaged if dropped. Also, if the connector is disconnected when current is flowing, the excessive voltage may damage the ICM.
- A faulty ignition system is often related to poor connections. Check those connections before proceeding.
- Use a spark plug of the correct heat range. Using a spark plug with an incorrect heat range can damage the engine.
- Use an electric heating element to heat the water/coolant mixture for the engine coolant temperature (ECT) sensor inspection. Keep all flammable materials away from the electric heating element. Wear protective clothing, insulated gloves and eye protection.
- A continuity test can be made with the switches installed on the vehicle.
- The following color codes are used throughout this section.

Bu: Blue	G: Green	Lg: Light Green	R: Red
Bl: Black	Gr: Gray	O: Orange	W: White
Br: Brown	Lb: Light Blue	P: Pink	Y: Yellow

SPECIFICATION

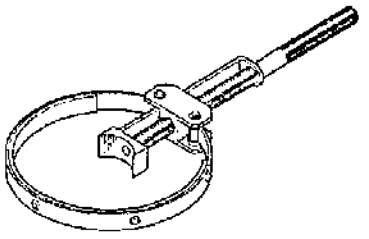
ITEM			SPECIFICATIONS
Alternator	Capacity		214 W/5,000 rpm
	Charging coil resistance (20°C/68°F)		0.1 – 1.0 Ω
Spark plug	Standard		IFR8H11 (NGK) VK24PRZ11 (DENSO)
	For extended high speed riding		IFR9H11 (NGK) VK27PRZ11 (DENSO)
Spark plug gap			1.0 – 1.1 mm (0.039 – 0.043 in)
Ignition coil peak voltage			100 V minimum
Exciter coil peak voltage		High	80 V minimum
		Low	30 V minimum
Ignition pulse generator peak voltage			0.7 V minimum
Ignition timing ("F" mark)			12° BTDC at idle
Bulb	Headlight		12 V - 30 W/30 W x 2
	Taillight		LED
	Coolant temperature indicator		12 V - 3.4 W
Carburetor heater resistance (20×C/68×F)			13 – 15 Ω
Throttle position sensor resistance (20°C/68°F)			4 – 6 kΩ
ECT sensor resistance		at 80°C (176°F)	47.5 – 56.8 Ω
		at 120°C (248°F)	14.9 – 17.3 Ω

TORQUE VALUES

Spark plug	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Engine coolant temperature (ECT) sensor	9.8 N·m (1.0 kgf·m, 7 lbf·ft)	Apply sealant to the threads.
Timing hole cap	9.8 N·m (1.0 kgf·m, 7 lbf·ft)	Apply grease to the threads and seating surface.
Flywheel nut	74 N·m (7.5 kgf·m, 54 lbf·ft)	Apply oil to the threads and seating surface.
Ignition pulse generator bolt	5 N·m (0.5 kgf·m, 3.6 lbf·ft)	
Alternator stator bolt	9.8 N·m (1.0 kgf·m, 7 lbf·ft)	

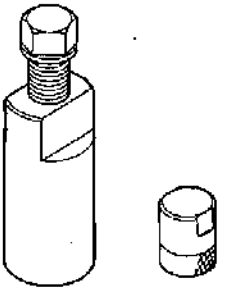
TOOLS

Flywheel holder
07725-0040000



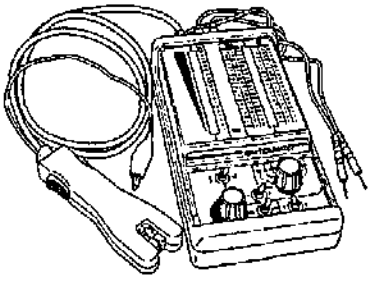
or commercially available equivalent

Flywheel puller
070MC-HP10100

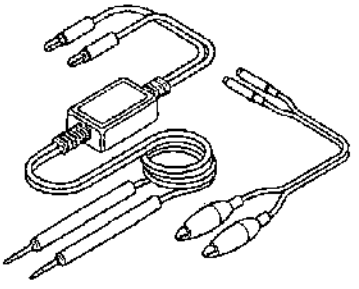


or 070MC-HP1A100 (U.S.A. only)

IgnitionMate peak voltage tester
MTP07-0286 (U.S.A. only)



Peak voltage adaptor
07HGJ-0020100



(not available in U.S.A.)
with commercially available digital multimeter (impedance 10 MΩ/DCV minimum)

TROUBLESHOOTING

IGNITION SYSTEM

- Inspect the following before diagnosing the system.
  - Faulty spark plug
  - Loose spark plug cap or spark plug wire connection
  - Water in the spark plug cap (leaking ignition coil secondary voltage)

No spark at plug

	Unusual condition	Probable cause (check in numerical order)
Ignition coil primary voltage	Low peak voltage.	1. The multitester impedance is too low; below 10 MΩ/DCV. 2. Cranking speed is too slow. (Operating force of the kickstarter is weak.) 3. The sampling time of the tester and measured pulse were not synchronized. (System is normal if measured voltage is over the standard voltage at least once.) 4. Poorly connected connectors or an open circuit in ignition system. 5. Faulty exciter coil. (Measure the peak voltage.) 6. Faulty ignition control module (ICM) (in case when above No. 1 – 5 are normal).
	No peak voltage.	1. Incorrect peak voltage adaptor connections. 2. Short circuit in the engine stop switch (black/white) wire. 3. Faulty ignition switch and/or engine stop switch. 4. Loose or poorly connected ICM connectors. 5. Open circuit or poor connection in ground wire of the ICM. 6. Faulty peak voltage adaptor. 7. Faulty exciter coil. (Measure the peak voltage). 8. Faulty ignition pulse generator. (Measure the peak voltage.) 9. Faulty ICM (in case when above No.1 – 8 are normal).
	Peak voltage is normal, but no spark jumps at the plug.	1. Faulty spark plug or leaking ignition coil secondary current. 2. Faulty ignition coil.
Exciter coil	Low peak voltage.	1. The multimeter impedance is too low. 2. Cranking speed is too slow. (Operating force of the kickstarter is weak.) 3. The sampling time of the tester and measured pulse were not synchronized. (System is normal if measured voltage is over the standard voltage at least once.) 4. Faulty exciter coil (in case when above No.1 – 3 are normal).
	No peak voltage.	1. Faulty peak voltage adaptor. 2. Faulty exciter coil.
Ignition pulse generator	Low peak voltage.	1. The multimeter impedance is too low. 2. Cranking speed is too slow. (Operating force of the kickstarter is weak.) 3. The sampling time of the tester and measured pulse were not synchronized. (System is normal if measured voltage is over the standard voltage at least once.) 4. Faulty ignition pulse generator (in case when above No.1 – 3 are normal).
	No peak voltage.	1. Faulty peak voltage adaptor. 2. Faulty ignition pulse generator.

GENERATING SYSTEM

GENERATING VOLTAGE INSPECTION

Start the engine and warm it up to the operating temperature.
Stop the engine.

Remove the top cover (page 3-5).

Disconnect the handlebar switch 4P connector.
Connect the voltmeter positive (+) probe to the Black wire terminal and negative (–) probe to the Green wire terminal of the wire harness side 4P connector.

Restart the engine.
Measure the generating voltage when the engine runs at 5,000 rpm.

The voltage will drops about 1 V when the fan motor is running.

STANDARD: 13 – 16 V

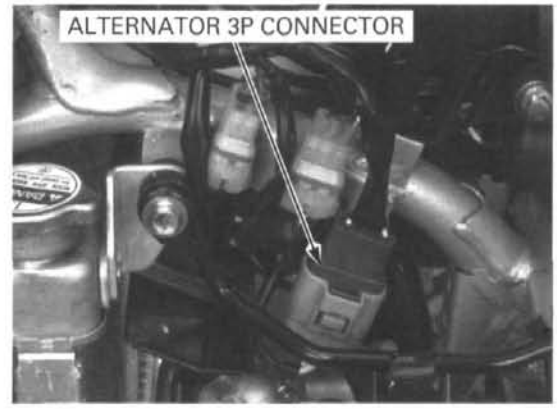
Connect the handlebar switch 4P connector.

Install the top cover (page 3-5).

ALTERNATOR CHARGING COIL INSPECTION

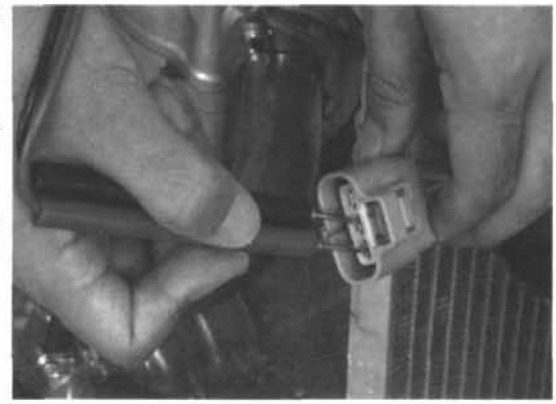
Remove the right front fender (page 3-6).

Disconnect the alternator 3P gray connector.



Measure the resistance between the Yellow wire terminals of the alternator side connector.

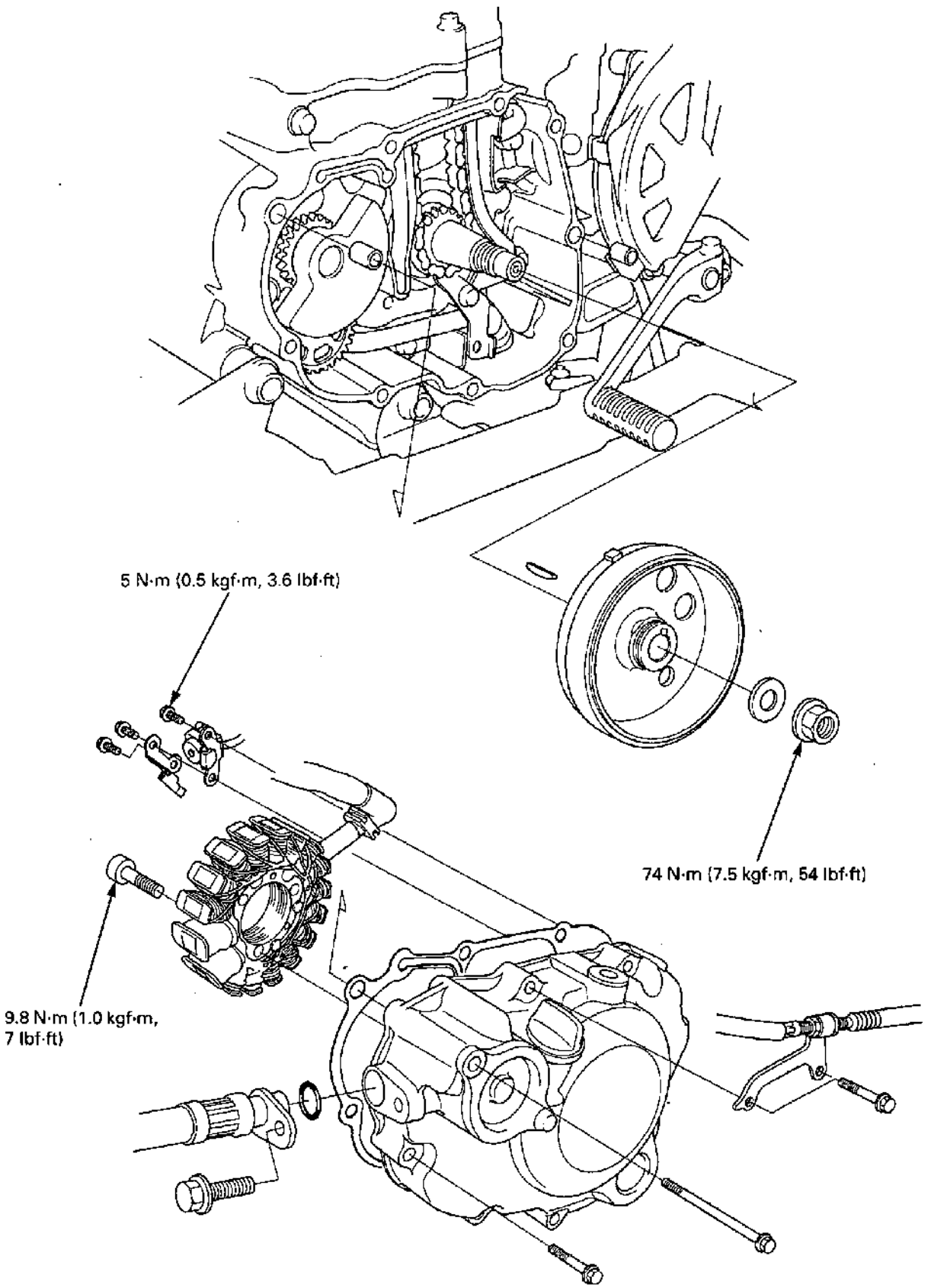
STANDARD: 0.1 – 1.0 Ω at 20°C (68°F)



Check for continuity between each wire terminal of the alternator side connector and ground.
There should be no continuity.

Replace the alternator stator if resistance is out of specification, or if any wire has continuity to ground.

ALTERNATOR

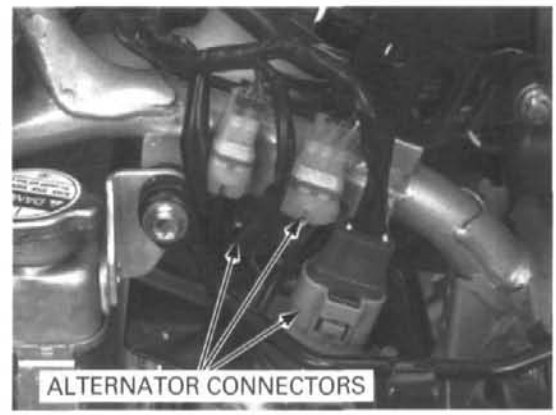


LEFT CRANKCASE COVER REMOVAL

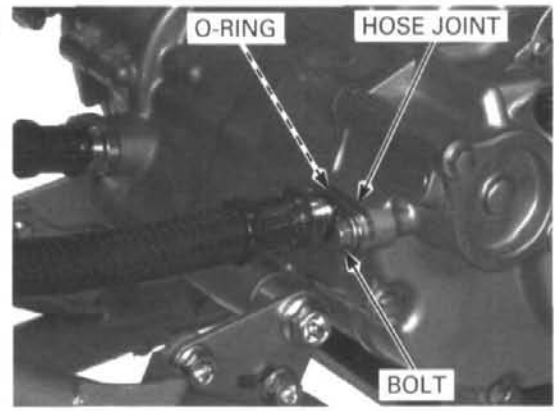
Drain the engine oil (page 4-15).
Remove both front fenders (page 3-6).

Disconnect the alternator connectors.

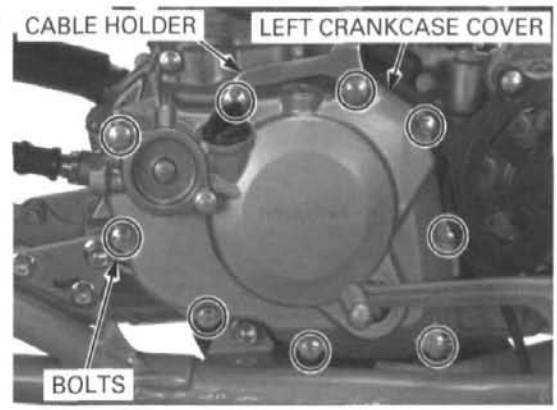
Remove the wire bands and free the alternator wire from the frame.



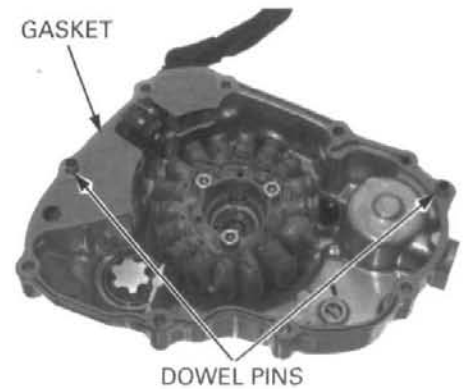
Remove the bolt, oil cooler hose joint and O-ring from the left crankcase cover.



Remove the nine bolts, cable holder and left crankcase cover.



Remove the dowel pins and gasket.



STATOR REPLACEMENT

Remove the left crankcase cover (page 20-8).

Remove the three bolts, wire clamp and ignition pulse generator.
Remove the three socket bolts, wire grommet and alternator stator from the left crankcase cover.

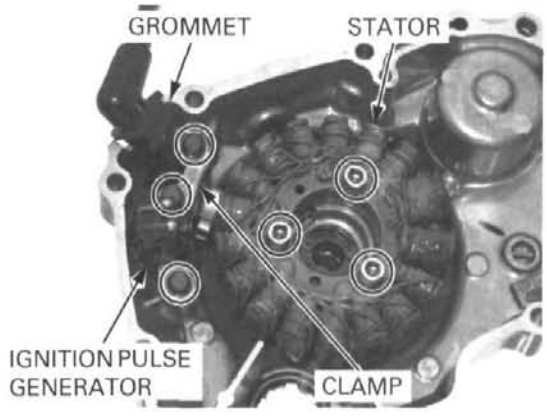
Install the alternator stator into the left crankcase cover and tighten the three socket bolts.

TORQUE: 9.8 N·m (1.0 kgf·m, 7 lbf·ft)

Install the wire grommet into the left crankcase cover groove properly.
Install the ignition pulse generator and wire clamp and tighten the three bolts.

TORQUE: 5 N·m (0.5 kgf·m, 3.6 lbf·ft)

Install the left crankcase cover (page 20-10).



FLYWHEEL REMOVAL

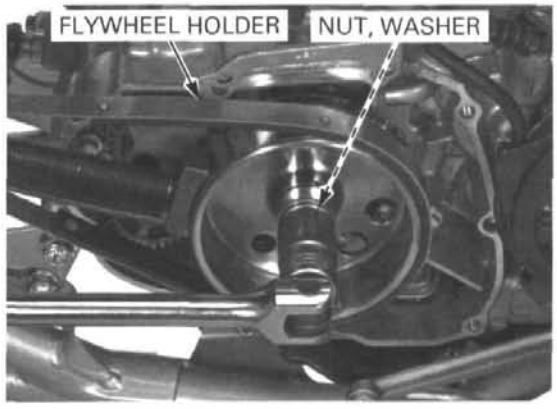
Remove the left crankcase cover (page 20-8).

Hold the flywheel using the special tool and loosen the flywheel nut.

TOOL:

Flywheel holder	**07725-0040000 or commercially available equivalent**

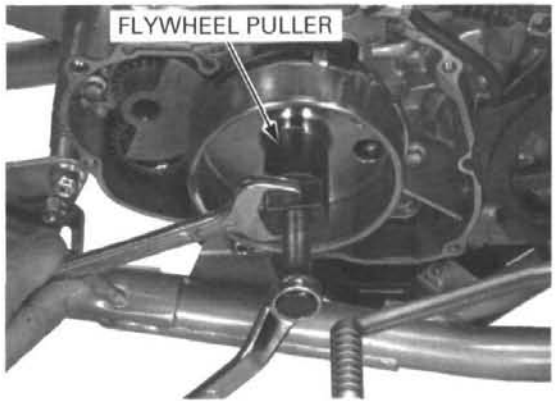
Remove the flywheel nut and washer.



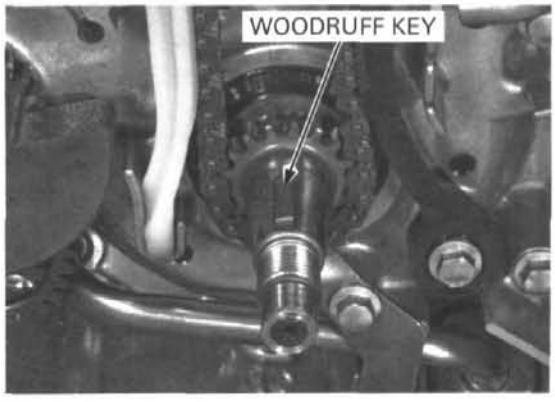
Remove the flywheel using the special tool.

TOOL:

Flywheel puller	**070MC-HP10100 or 070MC-HP1A100 (U.S.A. only)**



Remove the woodruff key from the crankshaft.



FLYWHEEL INSTALLATION

Clean any oil from the tapered portion of the crankshaft and flywheel.

Install the woodruff key into the crankshaft key groove.

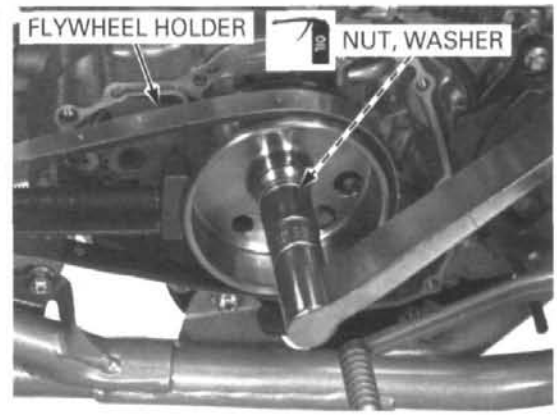
Install the flywheel onto the crankshaft by aligning the key way with the woodruff key.

Apply oil to the flywheel nut threads and seating surface.
Install the washer and flywheel nut.
Hold the flywheel using the special tool and tighten the flywheel nut.

TOOL:

Flywheel holder	**07725-0040000 or commercially available equivalent**

TORQUE: 74 N·m (7.5 kgf·m, 54 lbf·ft)



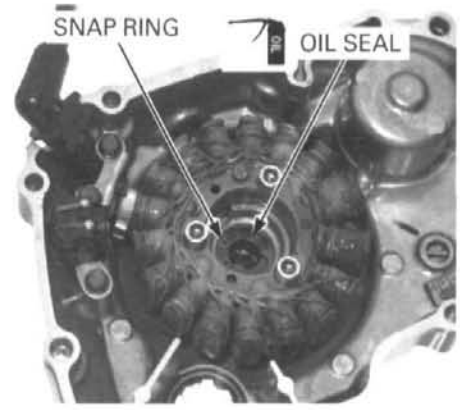
Install the left crankcase cover (page 20-10).

LEFT CRANKCASE COVER INSTALLATION

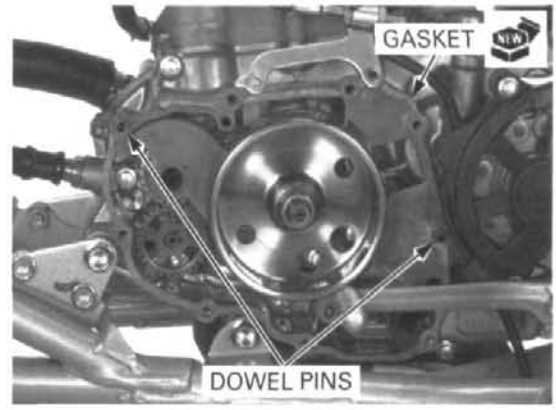
Check the oil seal in the left crankcase cover for wear or damage.

Remove the snap ring and replace the oil seal with a new one if necessary.

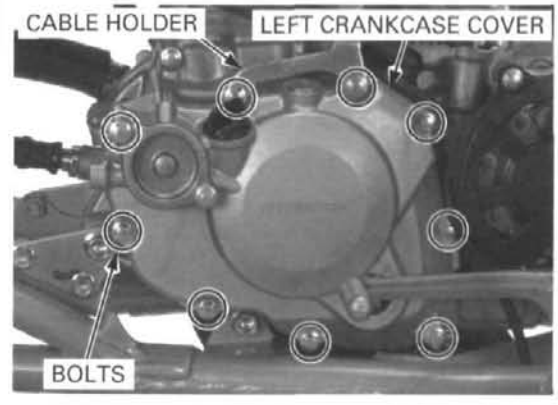
Apply oil to the oil seal lip.



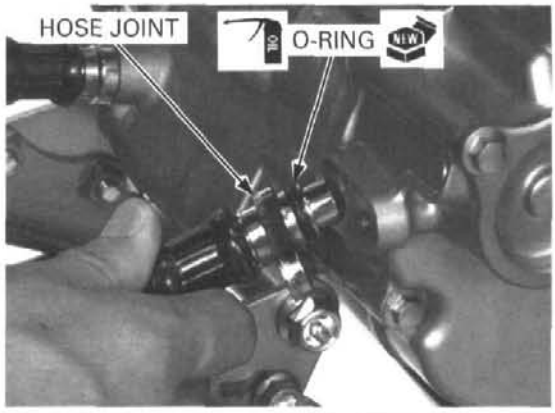
Install the dowel pins and a new gasket.



Install the left crankcase cover and cable holder, and tighten the nine bolts in a crisscross pattern in 2 or 3 steps.



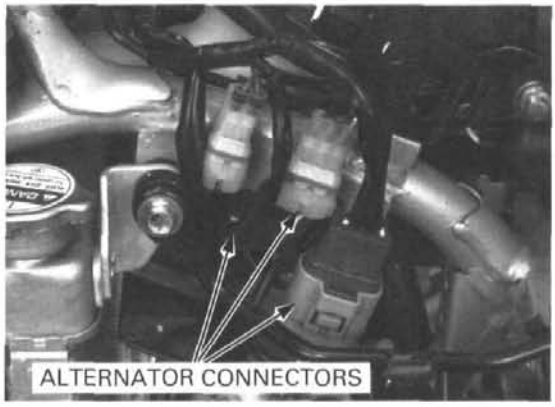
Coat a new O-ring with oil and install it onto the oil cooler hose joint.
Install the oil cooler hose joint onto the left crankcase cover and tighten the bolt securely.



Route the alternator wire properly and install the wire bands (page 1-24).

Connect the alternator connectors.

Fill the crankcase with the recommended engine oil (page 4-15).
Install both front fenders (page 3-6).



REGULATOR/RECTIFIER

WIRE HARNESS INSPECTION

Remove the rear fender (page 3-7).

Disconnect the 5P black connector from the regulator/rectifier.
Check the connector for loose contacts or corroded terminals.

IGNITION SWITCH LINE

Check the Red wire for continuity between the regulator/rectifier and ignition switch connectors.
There should be continuity.

GROUND LINE

Check for continuity between the Green wire terminal and ground.
There should be continuity.

GENERATING COIL LINE

Measure the resistance between the Yellow wire terminals.

STANDARD: 0.1 – 1.0 Ω at 20°C (68°F)

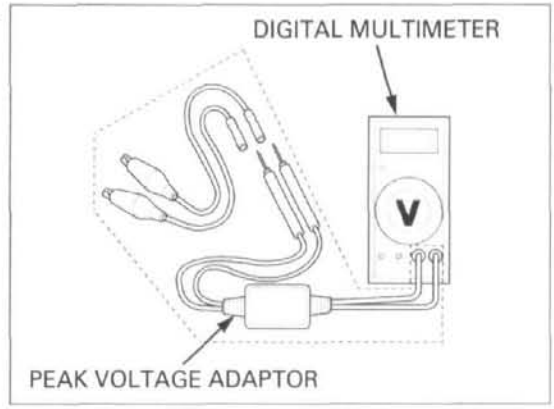
Check for continuity between each Yellow wire terminal and ground.
There should be no continuity.

IGNITION SYSTEM INSPECTION

NOTE:

- If there is no spark at the spark plug, check all connections for loose or poor contact before measuring each peak voltage.
- If using the peak voltage adaptor, use a commercially available digital multimeter with an impedance of 10 MΩ/DCV minimum.
- The display value differs depending upon the internal impedance of the multimeter.

Connect the peak voltage adaptor to the digital multimeter, or use the peak voltage tester (U.S.A. only).



If using the peak voltage tester (U.S.A. only), follow the manufacturer's instruction.

TOOLS:

IgnitionMate peak voltage tester **MTP07-0286 (U.S.A. only) or**
Peak voltage adaptor **07HGJ-0020100 (Not available in U.S.A.)**
with commercially available digital multimeter (impedance 10 MΩ/DCV minimum)

IGNITION COIL PRIMARY PEAK VOLTAGE

NOTE:

- Check all system connections before inspection. If the system is disconnected, incorrect peak voltage might be measured.
- Check the cylinder compression and check that the spark plug is installed correctly.

Remove the right front fender (page 3-6).

Disconnect the spark plug cap from the spark plug. Connect a known good spark plug to the spark plug cap and ground it to the cylinder head as done in a spark test.

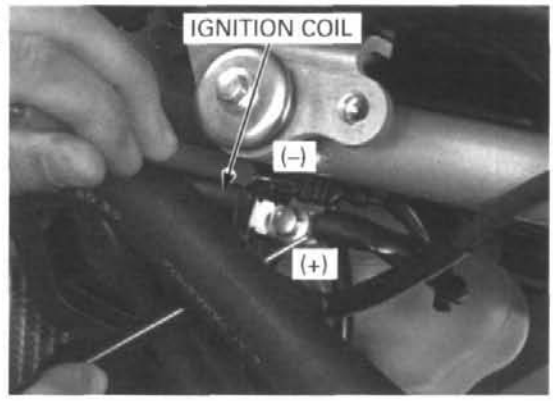
With the ignition coil primary wire connected, connect the peak voltage tester or adaptor probes to the ignition coil primary terminal and body ground.

TOOLS:

IgnitionMate peak voltage tester **MTP07-0286 (U.S.A. only) or**
Peak voltage adaptor **07HGJ-0020100 (Not available in U.S.A.)**
with commercially available digital multimeter (impedance 10 MΩ/DCV minimum)

CONNECTION:

Black/yellow terminal (–) – Body ground (+)



Shift the transmission into neutral.
Turn the ignition switch to "ON".
Crank the engine with kickstarter and read ignition coil primary peak voltage.

PEAK VOLTAGE: 100 V minimum

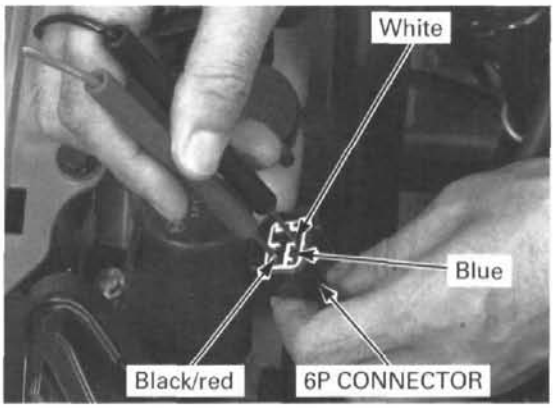
If the peak voltage is lower than the standard value, follow the checks described in the troubleshooting chart (page 20-5).

ALTERNATOR EXCITER COIL PEAK VOLTAGE

NOTE:

- Check the cylinder compression and check that the spark plug is installed correctly.

Disconnect the 6P black connector from the ignition control module (ICM).
Connect the peak voltage tester or adaptor probes to the exciter coil wire terminals of the 6P black connector.



TOOLS:
IgnitionMate peak voltage tester MTP07-0286 (U.S.A. only) or
Peak voltage adaptor 07HGJ-0020100 (Not available in U.S.A.)
with commercially available digital multimeter (impedance 10 MΩ/DCV minimum)

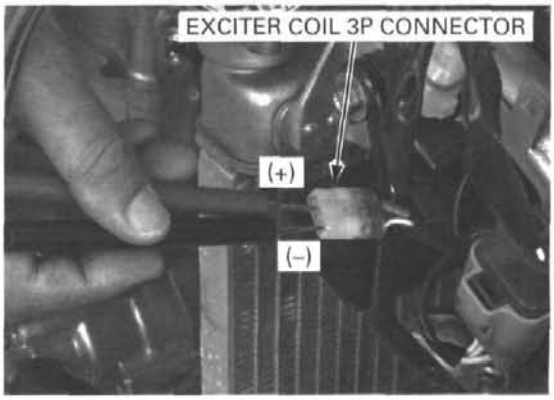
CONNECTIONS:
High: Black/red terminal (+) – White terminal (–)
Low: Blue terminal (+) – White terminal (–)

Shift the transmission into neutral.
Crank the engine with the kickstarter and read the exciter coil peak voltage.

PEAK VOLTAGE: High: 80 V minimum
Low: 30 V minimum

If the peak voltage measured at the ICM connector is abnormal, measure the peak voltage at the alternator exciter coil connector.

Remove the right front fender (page 3-6).



Disconnect the alternator exciter coil 3P connector and connect the tester probes to the wire terminals of the exciter coil side 3P connector.

CONNECTIONS:
High: Black/red terminal (+) – White terminal (–)
Low: Blue terminal (+) – White terminal (–)

In the same manner as at the ICM connector, measure the peak voltage and compare it to the voltage measured at the ICM connector.

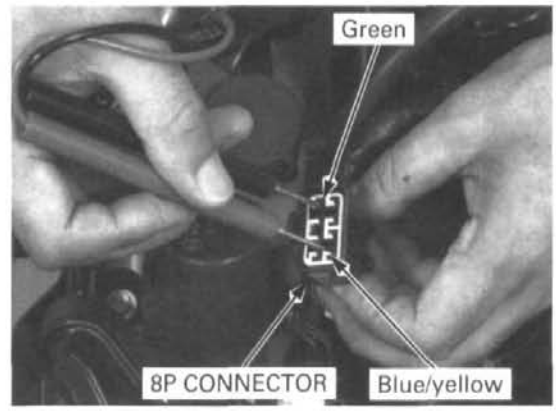
- If the peak voltage measured at the ICM is abnormal and the one measured at the alternator exciter coil is normal, the wire harness has an open or short circuit, or loose connection.
- If both peak voltages are abnormal, follow the checks described in the troubleshooting chart (page 20-5).

IGNITION PULSE GENERATOR PEAK VOLTAGE

NOTE:

- Check the cylinder compression and check that the spark plug is installed correctly.

Disconnect the 8P black connector from the ICM.
Connect the peak voltage tester or adaptor probes to the ignition pulse generator wire terminals of the 8P black connector.



TOOLS:

IgnitionMate peak voltage tester	**MTP07-0286 (U.S.A. only) or**
Peak voltage adaptor	**07HGJ-0020100 (Not available in U.S.A.)**

with commercially available digital multimeter (impedance 10 MΩ/DCV minimum)

CONNECTION:

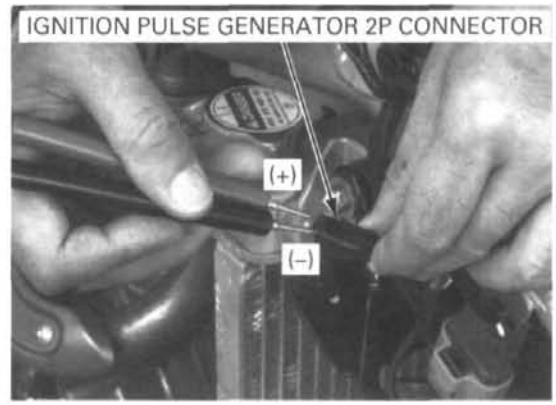
Blue/yellow terminal (+) – Green terminal (–)

Shift the transmission into neutral.
Crank the engine with the kickstarter and read the ignition pulse generator peak voltage.

PEAK VOLTAGE: 0.7 V minimum

If the peak voltage measured at the ICM connector is abnormal, measure the peak voltage at the ignition pulse generator connector.

Remove the right front fender (page 3-6).



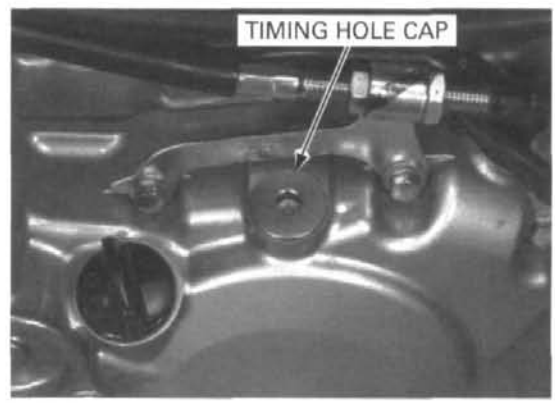
Disconnect the ignition pulse generator 2P connector and connect the tester probes to the Blue/yellow (+) and Green (–) wire terminals of the ignition pulse generator side 2P connector.
In the same manner as at the ICM connector, measure the peak voltage and compare it to the voltage measured at the ICM connector.

- If the peak voltage measured at the ICM is abnormal and the one measured at the ignition pulse generator is normal, the wire harness has an open or short circuit, or loose connection.
- If both peak voltages are abnormal, follow the checks described in the troubleshooting chart (page 20-5).

IGNITION TIMING

Warm up the engine.

Stop the engine and remove the timing hole cap.

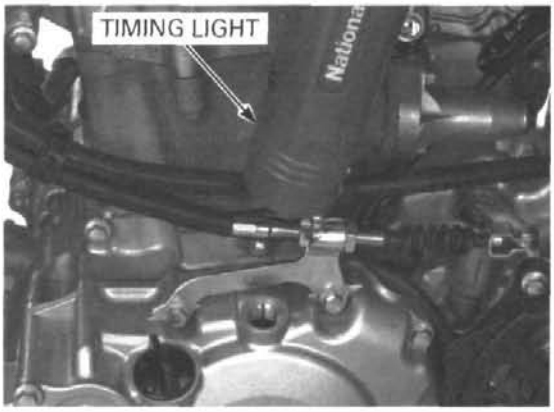


Read the manufacturer's instructions for timing light operation.

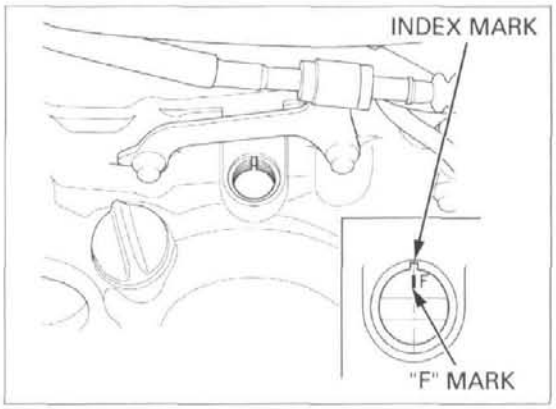
Connect a timing light to the spark plug wire.

Start the engine and let it idle.

IDLE SPEED: 1,600 ± 100 rpm

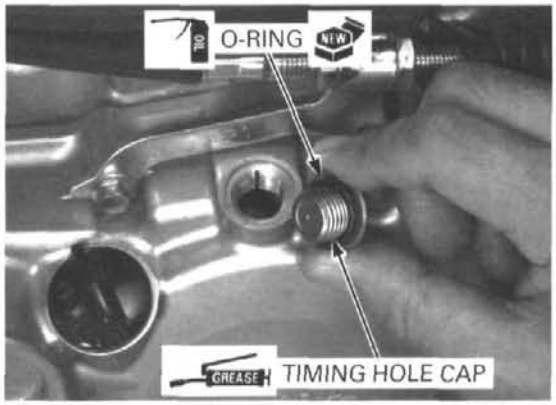


The ignition timing is correct if the "F" mark on the flywheel aligns with the index mark on the left crankcase cover.



Coat a new O-ring with oil and install it onto the timing hole cap.
Apply grease to the timing hole cap threads and seating surface.
Install the timing hole cap and tighten it.

TORQUE: 9.8 N·m (1.0 kgf·m, 7 lbf·ft)



IGNITION COIL

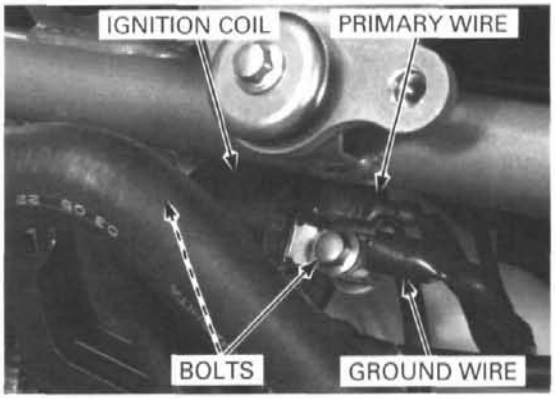
REMOVAL/INSTALLATION

Remove the right front fender (page 3-6).

Remove the spark plug cap from the spark plug.

Disconnect the primary wire connector.
Remove the bolts, ground terminal and ignition coil.

Installation is in the reverse order of removal.



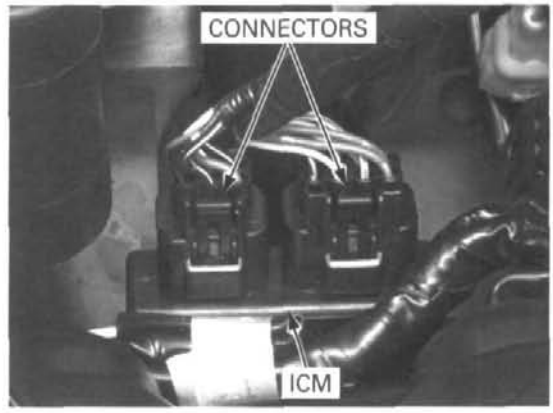
ICM (IGNITION CONTROL MODULE)

REMOVAL/INSTALLATION

Remove the top cover (page 3-5).

Disconnect the ICM 6P and 8P connectors.
Remove the ICM from the holder.

Installation is in the reverse order of removal.



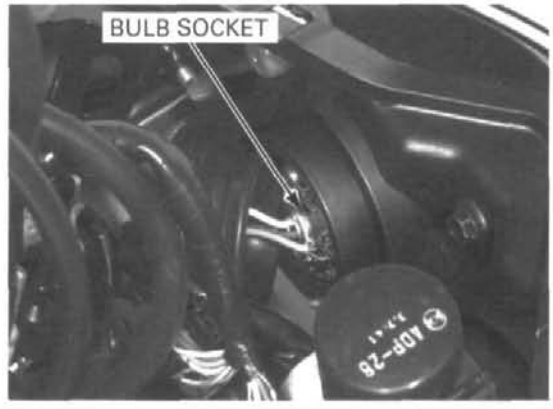
HEADLIGHT

BULB REPLACEMENT

Remove the top cover (page 3-5).

Remove the dust cover from the headlight.

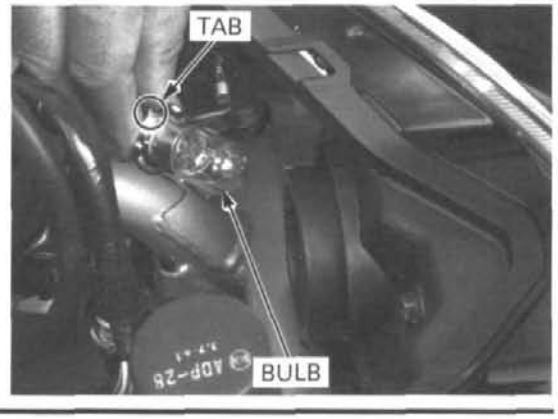
Remove the bulb socket by turning it counterclockwise while pushing it in.



Remove the bulb from the headlight.

Install a new bulb by aligning the tab with the groove in the headlight.

Install the removed parts in the reverse order of removal.

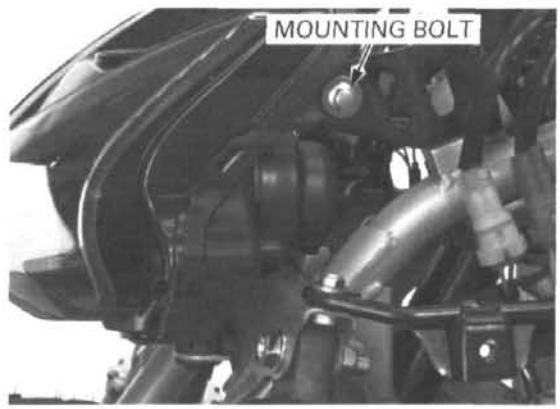


REMOVAL/INSTALLATION

Remove both front fenders (page 3-6).

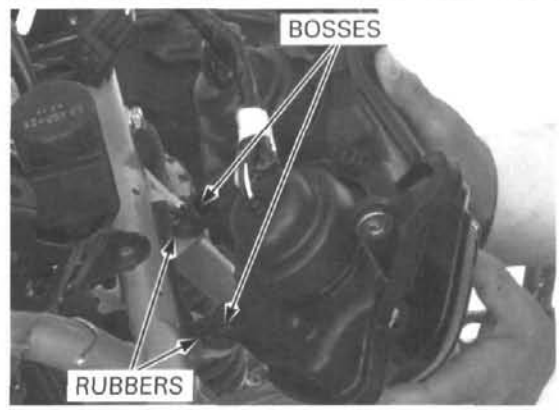
Disconnect the headlight 3P black connector.

Remove the two headlight mounting bolts.



Tilt the headlight forward and remove it by releasing the two bosses from the mounting rubbers.

Install the headlight in the reverse order of removal.

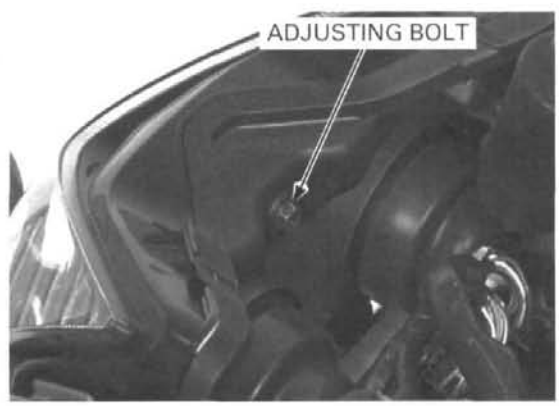


AIMING

Remove the top cover (page 3-5).

Adjust the headlight beam vertically by turning the adjusting bolt.

Install the top cover (page 3-5).

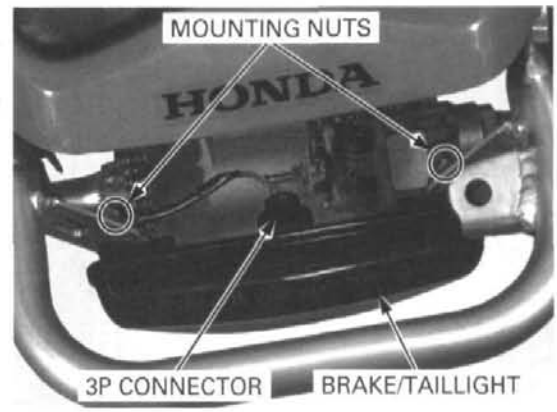


BRAKE/TAILLIGHT

REMOVAL/INSTALLATION

Disconnect the brake/taillight 3P connector.
Remove the two mounting nuts and the brake/taillight.

Install the brake/taillight in the reverse order of removal.

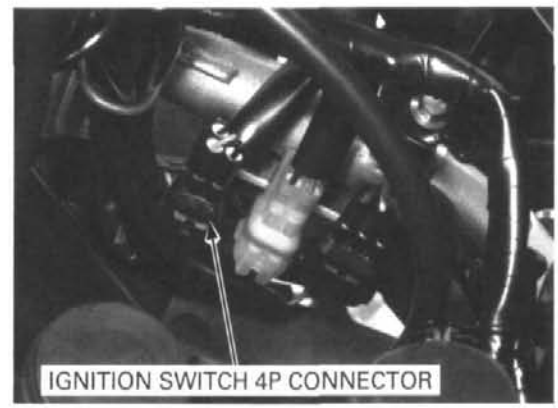


IGNITION SWITCH

INSPECTION

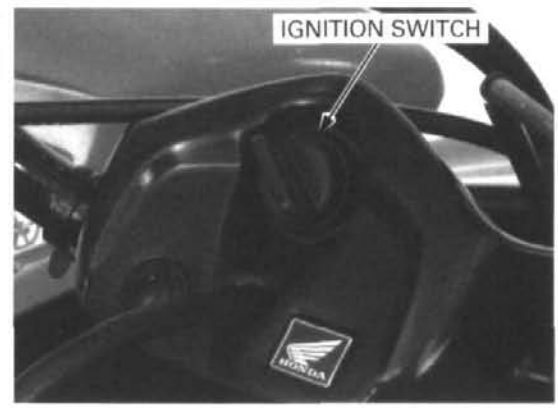
Remove the top cover (page 3-5).

Disconnect the ignition switch 4P black connector.



Check for continuity between the switch side connector terminals in each switch position.
Continuity should exist between the color coded wires as shown below:

COLOR	Black/white	Green	Red	Black
OFF	○	○	○	○
ON				

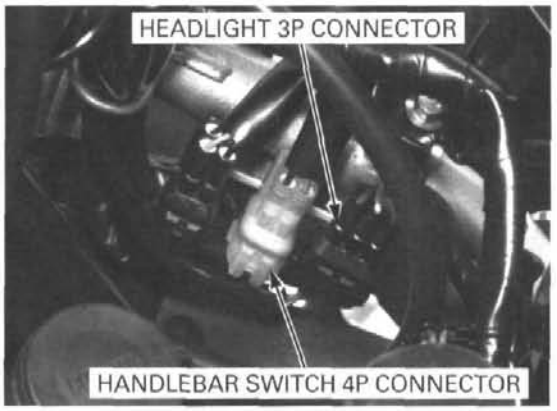


HANDLEBAR SWITCH

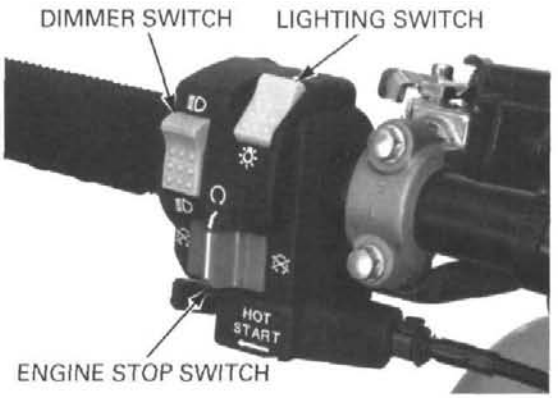
INSPECTION

Remove the top cover (page 3-5).

Disconnect the handlebar switch 4P connector and headlight 3P black connector.



Check for continuity between the switch side connector terminals in each switch position.
Continuity should exist between the color coded wires as shown below:



ENGINE STOP SWITCH

COLOR	Black/white	Green
	○	○
	○	○

LIGHTING SWITCH/DIMMER SWITCH

COLOR	Black	Brown	●
ON	○	○	○
OFF		(○	○)

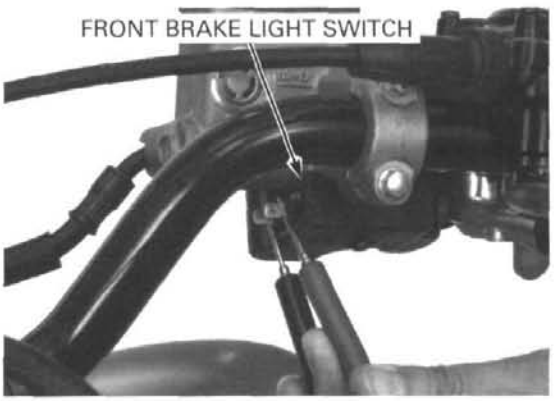
COLOR	Black/white	●	Green
HIGH	○	○	
(N)	○	○	○
LOW		○	○

BRAKE LIGHT SWITCH

FRONT BRAKE LIGHT SWITCH

Disconnect the front brake light switch connectors and check for continuity between the switch terminals.

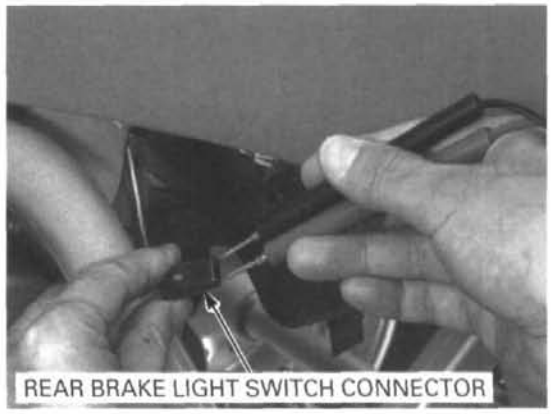
There should be continuity with the front brake lever squeezed and no continuity with the lever released.



REAR BRAKE LIGHT SWITCH

Disconnect the rear brake light switch 2P black connector and check for continuity between the switch side connector terminals.

There should be continuity with the rear brake pedal depressed and no continuity with the pedal released.


REAR BRAKE LIGHT SWITCH CONNECTOR

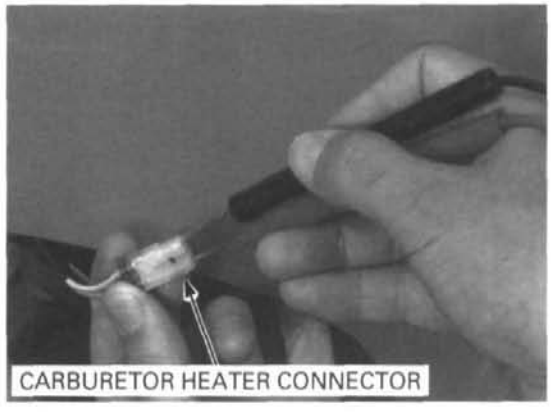
CARBURETOR HEATER

INSPECTION

Disconnect the carburetor heater 2P connector and measure the resistance between the heater side connector terminals.

STANDARD: 13 – 15 Ω at 20°C (68°F)

If the resistance is out of above range, replace the carburetor heater.


CARBURETOR HEATER CONNECTOR

THROTTLE POSITION SENSOR

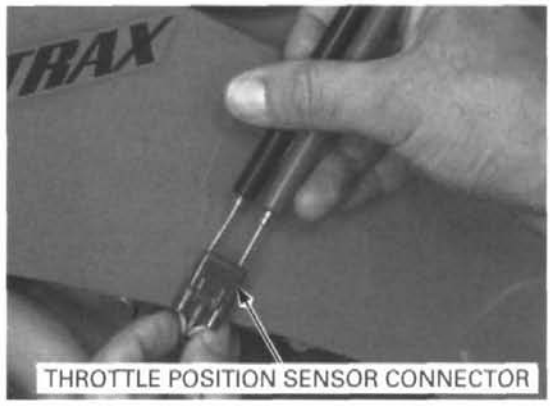
INSPECTION

Disconnect the throttle position sensor 3P connector.
Measure the resistance between the Pink and Green/yellow wire terminal of the sensor side connector.

STANDARD: 4 – 6 kΩ at 20°C (68°F)

Check that the resistance between the Light green and Green/yellow wire terminals varies with the throttle position while operating the throttle lever.

From fully closed position to fully open position:
Resistance increases
From fully open position to fully closed position:
Resistance decreases

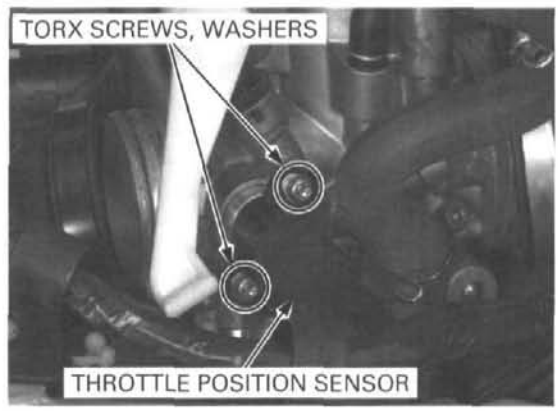


THROTTLE POSITION SENSOR CONNECTOR

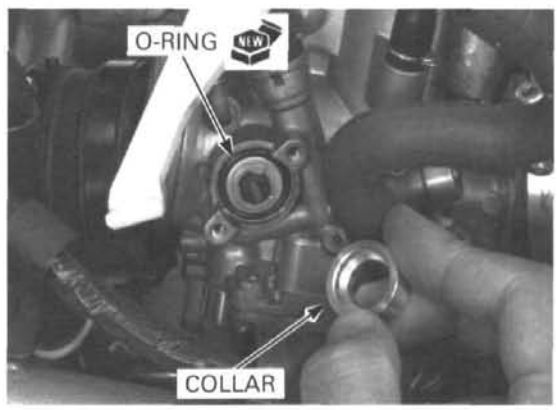
REPLACEMENT

Remove the carburetor from the insulator and connecting hose (page 7-6).

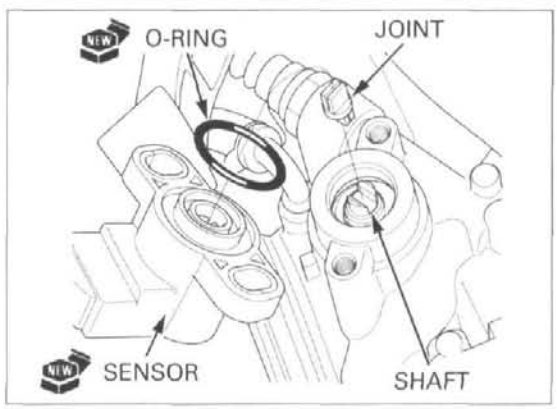
Remove the following:
- two torx screws and washers
- throttle position sensor
- O-ring
- joint
- collar
- O-ring



Install a new O-ring and the collar onto the carburetor body.



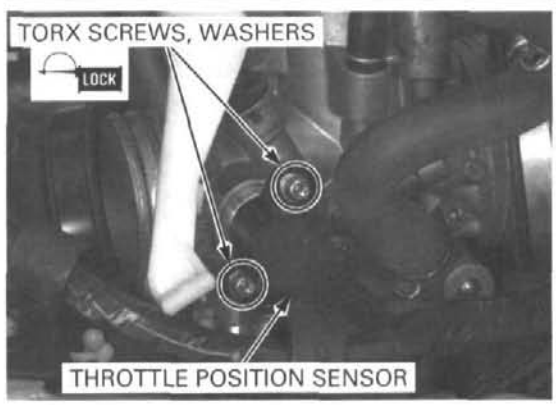
Install a new O-ring into the throttle position sensor groove.
Install the joint into the throttle valve shaft by aligning the joint tab with the shaft groove.
Install a new throttle position sensor by aligning the sensor shaft tab with the joint tab groove.



Apply locking agent to the torx screw threads and loosely install them with the washers.

Adjust the sensor position so that the resistance between the Light green and Green/yellow wire terminals is 490 – 510 Ω and tighten the torx screws.

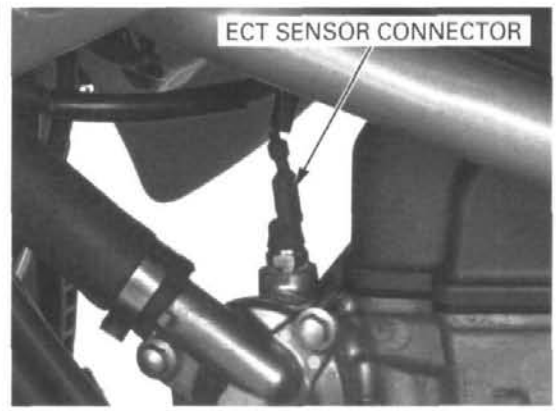
Install the carburetor (page 7-21).



COOLANT TEMPERATURE INDICATOR

SYSTEM INSPECTION

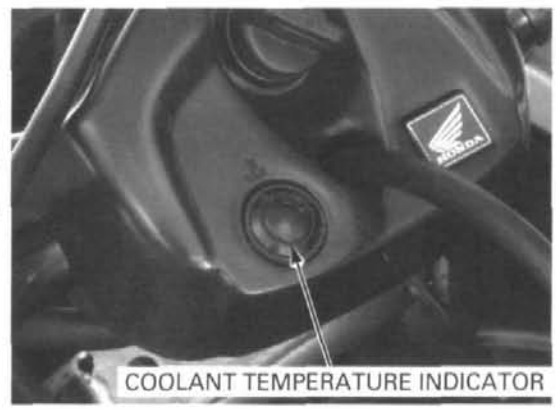
Disconnect the engine coolant temperature (ECT) sensor connector.



Start the engine and check the indicator.

- If the indicator lights for 3 seconds then goes off, go to next step.
- If the indicator lights and stays on, check for a short circuit in the following wire:
  - Yellow/blue wire between the ECT sensor and fan/ignition control module (ICM) connectors
  - Gray wire between the fan/ICM and indicator connectors

If the wires are OK, replace the fan/ICM.



Ground the ECT sensor connector with a jumper wire.
Start the engine and check the indicator.

- If the indicator lights, the system is OK.
- If the indicator does not light or lights for 3 seconds then goes off, check for an open circuit in the following wire:
  - Yellow/blue wire between the ECT sensor and fan/ICM connectors
  - Gray wire between the fan/ICM and indicator connectors

If the wire is OK, disconnect the indicator 2P red connector.
Start the engine and measure the voltage between the Black wire terminal (+) and Gray wire terminal (–) of the wire harness side connector.

- If there is generating voltage, check for blown indicator bulb.
- If there is no voltage, check for an open circuit in the black wire between the indicator and ignition switch connectors. If the black wire is OK, replace the fan/ICM.

COOLING FAN MOTOR

INSPECTION

NOTE:

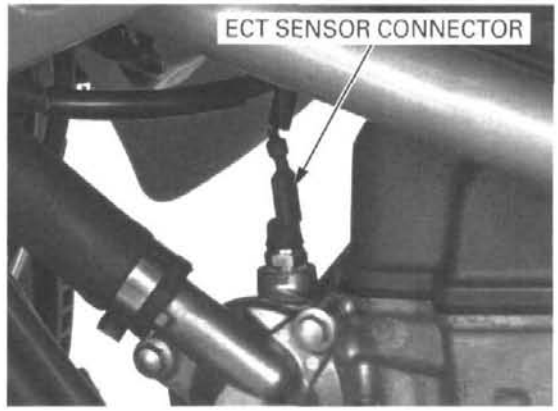
- Make sure that the coolant temperature indicator system functions properly before checking the fan motor system.

Fan motor does not stop when the engine is running

Disconnect the engine coolant temperature (ECT) sensor connector.
Start the engine and check the fan motor.

- If the fan motor does not start, check the ECT sensor (page 20-24).
- If the fan motor starts, check for a short circuit in the following wire:
  - Green wire between the fan/ICM and fan motor connectors
  - Green wire of the fan motor

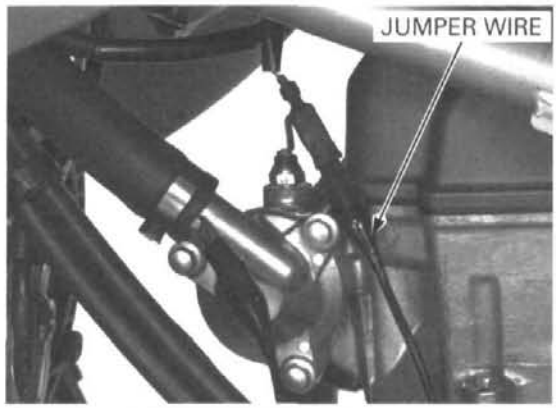
If the wires are OK, replace the fan/ICM.



Fan motor does not start

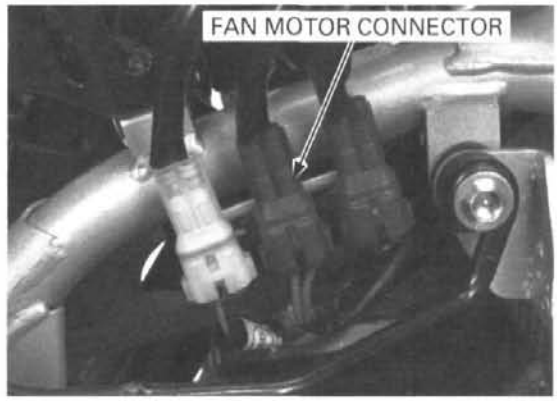
Disconnect the ECT sensor connector and ground it with a jumper wire.
Start the engine and check the fan motor.

- If the fan motor starts, check the ECT sensor (page 20-24).
- If the fan motor does not start, check for an open circuit in the following wire:
  - Green wire between the fan/ICM and fan motor connectors
  - Green wire of the fan motor



If the wire is OK, disconnect the fan motor 2P blue connector.
Start the engine and measure the voltage between the Black wire terminal (+) and Green wire terminal (–) of the wire harness side connector.

- If there is generating voltage, replace the fan motor.
- If there is no voltage, check for an open circuit in the black wire between the fan motor and ignition switch connectors. If the black wire is OK, replace the fan/ICM.

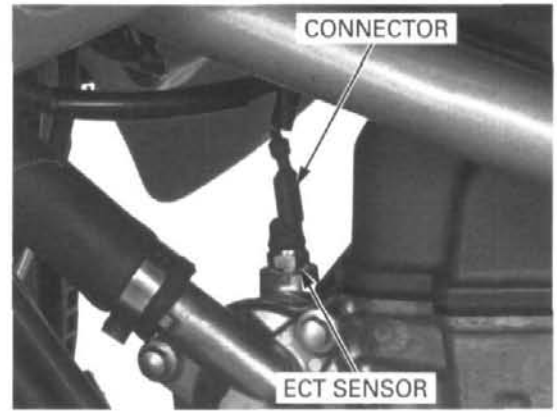


ENGINE COOLANT TEMPERATURE (ECT) SENSOR

INSPECTION

Drain the coolant (page 9-7).

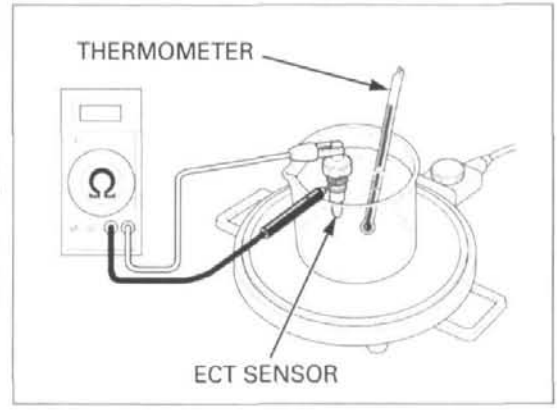
Disconnect the ECT sensor connector and remove the ECT sensor.



Suspend the ECT sensor in a pan of coolant (50 – 50 mixture) on an electric heating element and measure the resistance through the sensor as the coolant heats up.

NOTE:

- Soak the ECT sensor in coolant up to its threads with at least 40 mm (1.57 in) from the bottom of the pan to the bottom of the sensor.
- Keep the temperature constant for 3 minutes before testing. A sudden change of temperature will result in incorrect readings. Do not let the thermometer or ECT sensor touch the pan.



Resistance: 47.5 – 57 Ω at 80°C (176°F)
14.8 – 17.3 Ω at 120°C (248°F)

Replace the ECT sensor if it is out of specifications by more than 10% at any temperature listed.

Apply sealant to the ECT sensor threads. Do not apply to the sensor head.

Install the ECT sensor and tighten it.

TORQUE: 9.8 N·m (1.0 kgf·m, 7 lbf·ft)

Connect the ECT sensor connector.

Fill and bleed the cooling system (page 9-7).