

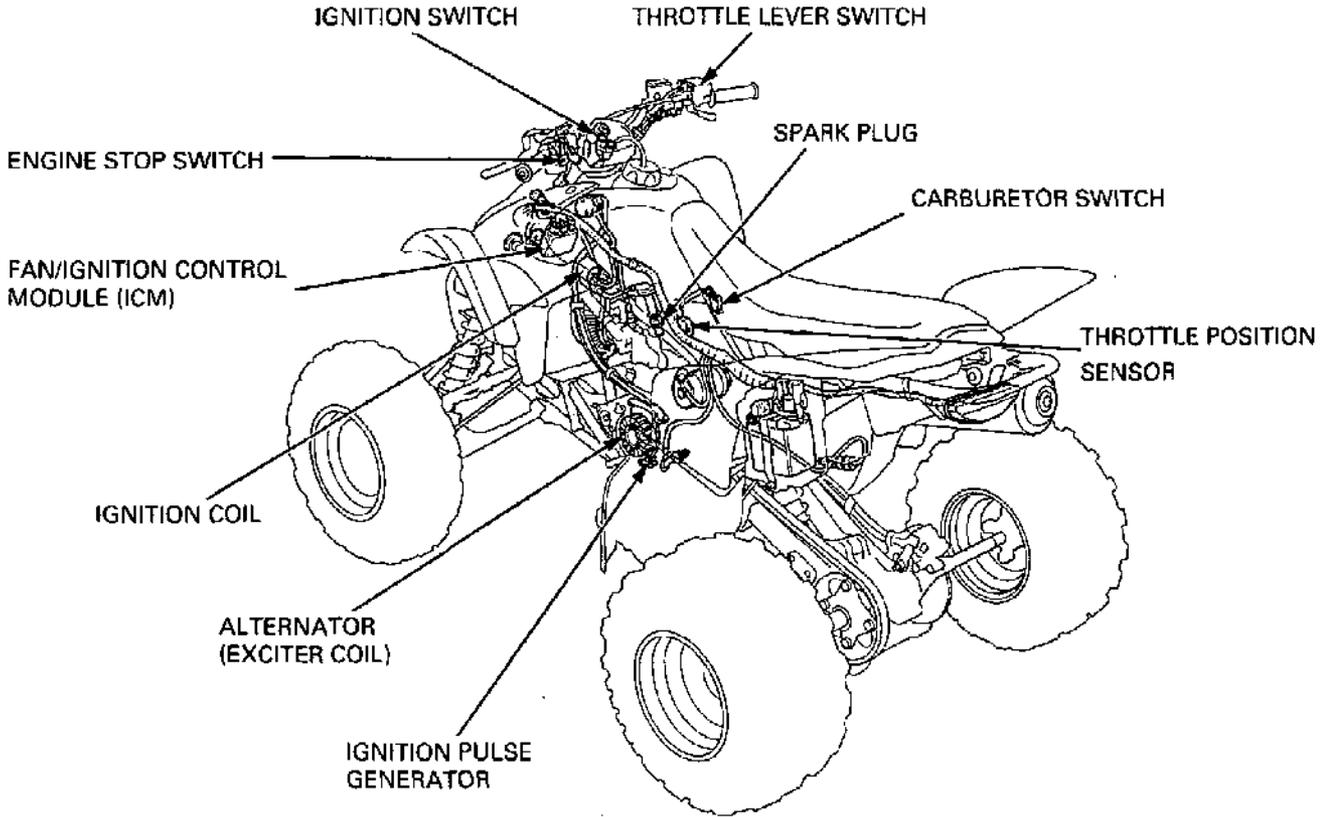
# 22. IGNITION SYSTEM (After '05)

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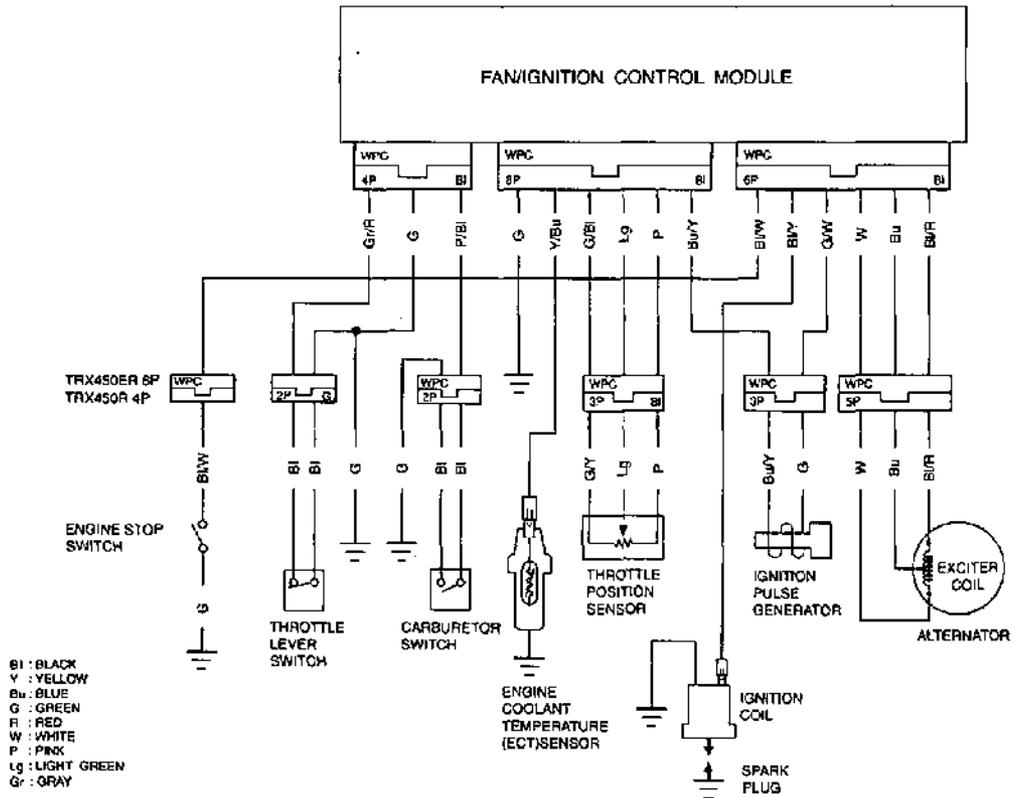
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# IGNITION SYSTEM (After '05)

## COMPONENT LOCATION



## SYSTEM DIAGRAM



# SERVICE INFORMATION

## GENERAL

- Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is turned to ON and current is present.
- When servicing the ignition system, always follow the steps in the troubleshooting table on page 22-4.
- 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. Always turn the ignition switch to OFF before servicing.
- A faulty ignition system is often related to poor connections. Check those connections before proceeding.
- Make sure the battery is adequately charged. Using the starter motor with a weak battery results in a slower engine cranking speed as well as no spark at the spark plug (TRX450ER only).
- Use spark plug with the correct heat range. Using spark plug with an incorrect heat range can damage the engine.
- For ignition pulse generator removal/installation, see page 21-11.
- For ignition switch inspection, see page 24-7.
- For engine stop switch inspection, see page 24-7.

## SPECIFICATIONS

ITEM		SPECIFICATIONS
Spark plug	Standard	IFR7L11 (NGK), VK22PRZ11 (DENSO)
	For extended high speed riding	IFR8H11 (NGK), VK24PRZ11 (DENSO)
Spark plug gap		1.0 – 1.1 mm (0.039 – 0.043 in)
Ignition coil primary peak voltage		100 V minimum
Exciter coil peak voltage	High	45 V minimum
	Low	15 V minimum
Ignition pulse generator peak voltage		0.7 V minimum
Ignition timing ("F"mark)		11.4° BTDC at idle
Throttle position sensor resistance (20°C/68°F)		4 – 6 kΩ

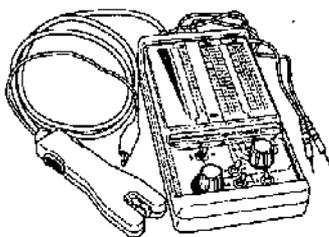
## TORQUE VALUE

Timing hole cap 9.8 N·m (1.0 kgf·m, 7 lbf·ft)  
 Throttle position sensor screw 3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)

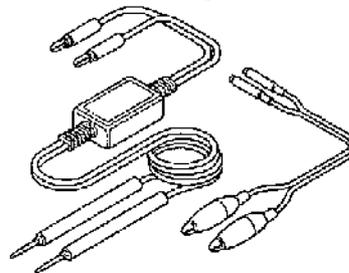
Apply locking agent to the threads

## TOOLS

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)

## IGNITION SYSTEM (After '05)

### TROUBLESHOOTING

- The ICM cut-off the ignition if the throttle lever is closed (throttle switch is off) and the throttle drum open (carburetor switch is off), also the ICM cut-off the ignition when the throttle lever free play less than 5 mm (3/16 in).
- Inspect the following before diagnosing the system:
  - Faulty spark plug
  - Loose spark plug cap or spark plug wire connection
  - Water got into the spark plug cap (leaking the ignition coil secondary voltage)

#### No Spark at Spark Plug

Unusual Condition		Probable Cause (Check in numerical order)
Ignition coil primary voltage	Low peak voltage.	<ol style="list-style-type: none"> <li>1. Incorrect peak voltage adaptor connections. (System is normal if measured voltage is over the specifications with reverse connections).</li> <li>2. The multimeter impedance is too low.</li> <li>3. Cranking speed is too slow.                             <ul style="list-style-type: none"> <li>- operating force of the kickstarter is weak.</li> <li>- battery is under charged.</li> </ul> </li> <li>4. The sampling timing of the tester and measured pulse were not synchronized. (System is normal if measured voltage is over the standard voltage at least once)</li> <li>5. Poorly connected connectors or an open circuit in the ignition system.</li> <li>6. Faulty exciter coil. (Measure peak voltage)</li> <li>7. Faulty ignition coil.</li> <li>8. Faulty ignition control module (ICM) (when above No.1 through 7 are normal).</li> </ol>
	No peak voltage.	<ol style="list-style-type: none"> <li>1. Incorrect peak voltage adaptor connections. (System is normal if measured voltage is over the specifications with reverse connections).</li> <li>2. Short circuit in Black/white wire of the ignition switch and engine stop switch.</li> <li>3. Faulty ignition switch, engine stop switch.</li> <li>4. Loose or poorly connected ICM connector(s).</li> <li>5. Open circuit or poor connection in the Green wire (ground) of the ICM.</li> <li>6. Faulty peak voltage adaptor.</li> <li>7. Faulty exciter coil. (Measure peak voltage)</li> <li>8. Faulty ignition pulse generator. (Measure peak voltage)</li> <li>9. Faulty ICM (when above No. 1 through 8 are normal).</li> </ol>
	Peak voltage is normal, but no spark jumps at the plug.	<ol style="list-style-type: none"> <li>1. Faulty spark plug or leaking ignition coil secondary current.</li> <li>2. Faulty ignition coil.</li> </ol>
Exciter coil	Low peak voltage	<ol style="list-style-type: none"> <li>1. The multimeter impedance is too low; below 10 MΩ/DCV.</li> <li>2. Cranking speed is too slow.                             <ul style="list-style-type: none"> <li>- operating force of the kickstarter is weak.</li> <li>- battery is under charged.</li> </ul> </li> <li>3. The sampling timing of the tester and measured pulse were not synchronized. (System is normal if measured voltage is over the standard voltage at least once)</li> <li>4. Faulty exciter coil (when above No.1 through 3 are normal).</li> </ol>
	No peak voltage	<ol style="list-style-type: none"> <li>1. Faulty peak voltage adaptor.</li> <li>2. Faulty exciter coil.</li> </ol>
Ignition pulse generator	Low peak voltage.	<ol style="list-style-type: none"> <li>1. The multimeter impedance is too low; below 10 MΩ/DCV.</li> <li>2. Cranking speed is too slow.                             <ul style="list-style-type: none"> <li>- operating force of the kickstarter is weak.</li> <li>- battery is under charged.</li> </ul> </li> <li>3. The sampling timing of the tester and measured pulse were not synchronized. (System is normal if measured voltage is over the standard voltage at least once)</li> <li>4. Faulty ignition pulse generator (when above No. 1 through 3 are normal).</li> </ol>
	No peak voltage.	<ol style="list-style-type: none"> <li>1. Faulty peak voltage adaptor.</li> <li>2. Faulty ignition pulse generator.</li> </ol>

**Engine does not start**

- Throttle cable stick
- Faulty throttle lever switch
- Faulty carburetor switch

# IGNITION SYSTEM INSPECTION

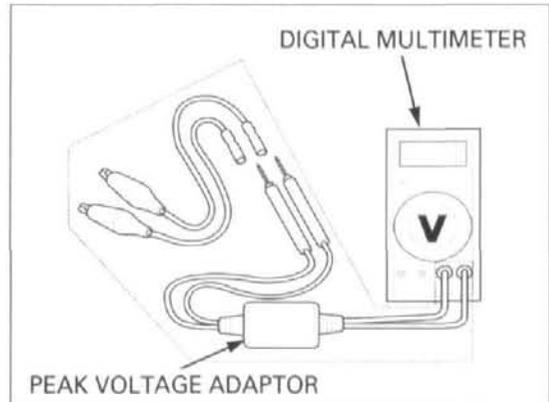
### NOTE:

- If there is no spark at the plug, check all connections for loose or poor contact before measuring the peak voltage.
- Use the recommended digital multimeter or a commercially available digital multimeter with an impedance of 10 M $\Omega$ /DCV minimum.
- The display value differs depending upon the internal impedance of the multimeter.

Use the peak voltage tester or connect the peak voltage adaptor to the digital multimeter.

### TOOLS:

IgnitionMate peak voltage tester	MTP07-0286 (U.S.A. only) or
Peak voltage adaptor with commercially available digital multimeter (impedance 10 M $\Omega$ /DCV minimum)	07HGJ-0020100 (not available in U.S.A.)



## 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.



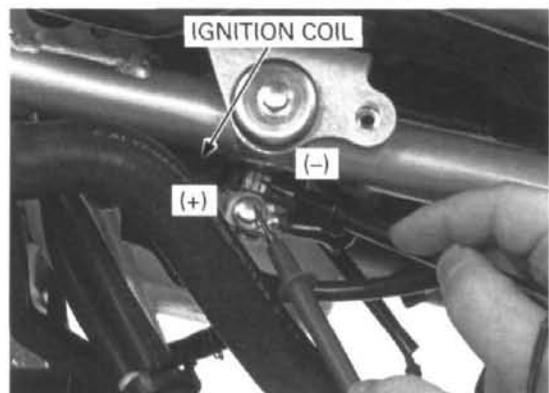
With the ignition coil primary wire connected, connect the peak voltage tester or adaptor probes to the ignition coil primary terminal and body ground.

### TOOLS:

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

### CONNECTION:

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



Shift the transmission into neutral.  
Turn the ignition switch to "ON".  
Crank the engine with starter motor (TRX450ER) or kickstarter (TRX450R) 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 22-4).

## 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 M $\Omega$ /DCV minimum)

### CONNECTIONS:

**High: Black/red terminal (+) – White terminal (-)**

**Low: Blue terminal (+) – White terminal (-)**

Shift the transmission into neutral.

Crank the engine with starter motor (TRX450ER) or kickstarter (TRX450R) and read the exciter coil peak voltage.

**PEAK VOLTAGE: High: 45 V minimum**  
**Low: 15 V minimum**

If the peak voltage measured at the ICM connector is abnormal, measure the peak voltage at the alternator exciter coil 5P connector.

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

Disconnect the alternator exciter coil 5P connector and connect the tester probes to the wire terminals of the exciter coil side 5P connector.

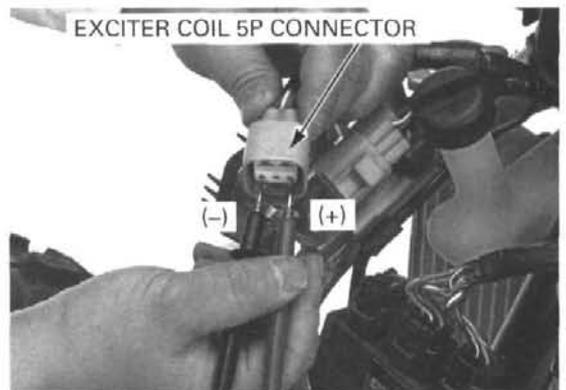
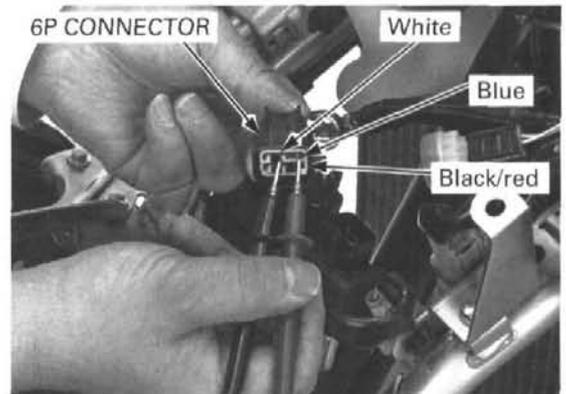
### CONNECTIONS:

**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 22-4).



### IGNITION PULSE GENERATOR PEAK VOLTAGE

#### NOTE:

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

Disconnect the 8P and 6P black connector from the ICM.

Connect the peak voltage tester or adaptor probes to the ignition pulse generator wire terminals of the 8P and 6P black connector.

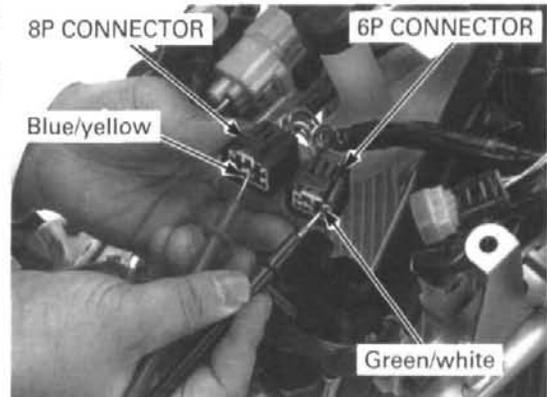
#### TOOLS:

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 M $\Omega$ /DCV minimum)



#### CONNECTION:

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

Shift the transmission into neutral.

*TRX450ER:* Crank the engine with the starter motor and read the ignition pulse generator peak voltage.

*TRX450R:* Crank the engine with the kickstarter and read the ignition pulse generator peak voltage.

#### PEAK VOLTAGE: 0.7 V minimum

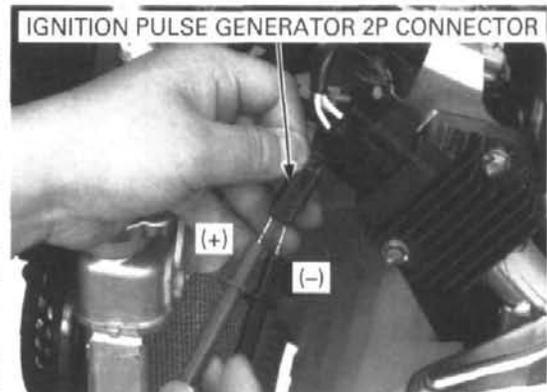
If the peak voltage measured at the ICM connector is abnormal, measure the peak voltage at the ignition pulse generator connector.

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

Disconnect the ignition pulse generator 2P black connector and connect the tester probes to the Blue/yellow (+) and Green (-) wire terminals of the ignition pulse generator side 2P black 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 22-4).



## 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: 1,700 ± 100 rpm**

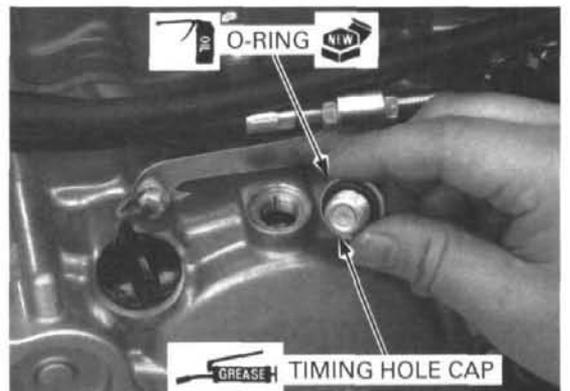
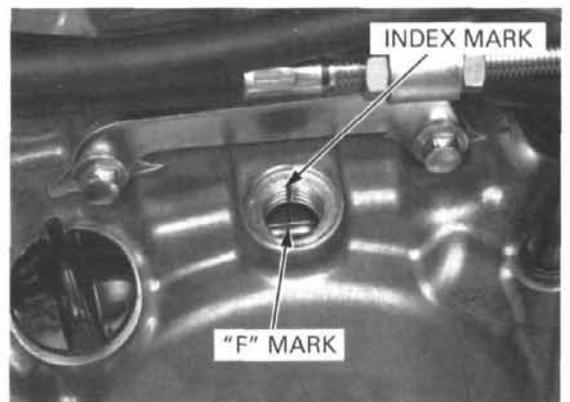
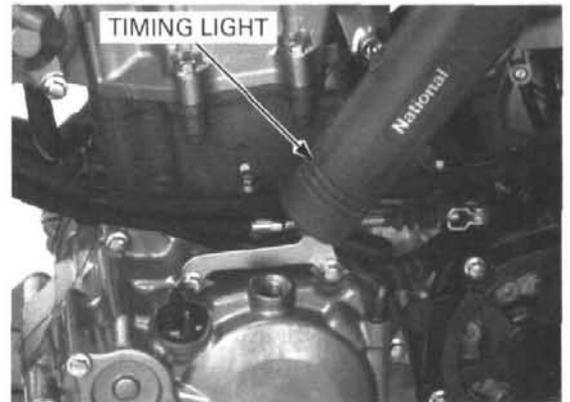
The ignition timing is correct if the "F" mark on the flywheel aligns with the index mark on the left crankcase cover.

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.

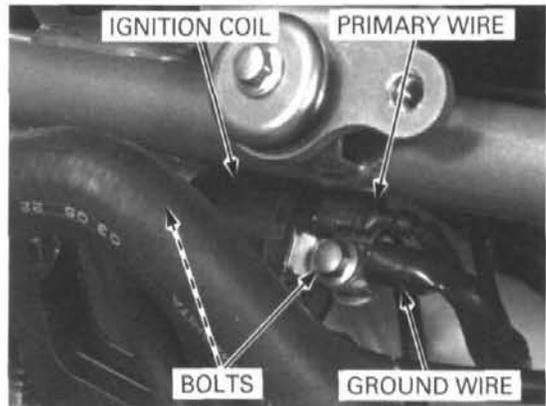
**TORQUE: 9.8 N·m (1.0 kgf·m, 7 lbf·ft)**



## IGNITION COIL

### REMOVAL/INSTALLATION

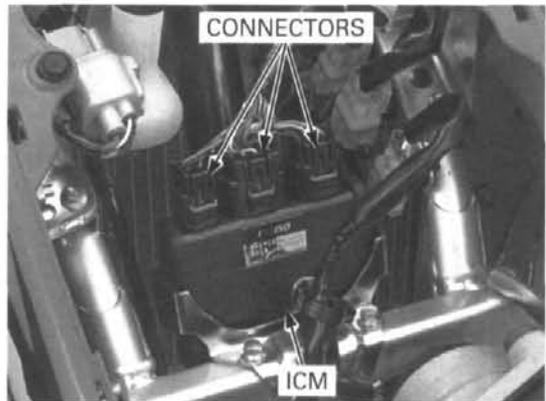
Remove the right front fender (page 3-6).  
Remove the spark plug cap from the spark plug.  
Disconnect the primary wire connector.  
Remove the bolts, ground terminal and ignition coil.  
Installation is in the reverse order of removal.



## ICM (IGNITION CONTROL MODULE)

### REMOVAL/INSTALLATION

Remove the top cover (page 3-5).  
Disconnect the ICM 4P, 8P and 6P black connectors.  
Remove the ICM from the holder.  
Installation is in the reverse order of removal.



## THROTTLE POSITION SENSOR

### INSPECTION

Disconnect the throttle position sensor 3P black 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)**

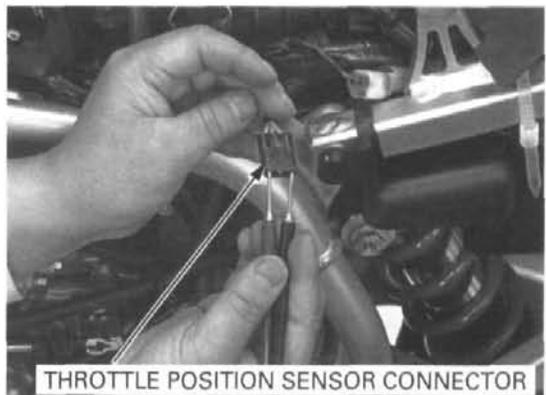
Check that the resistance between the Light green and Green/yellow wire terminals varies with the throttle position while operating the throttle lever.

**From fully closed position to fully open position:**

**Resistance increases**

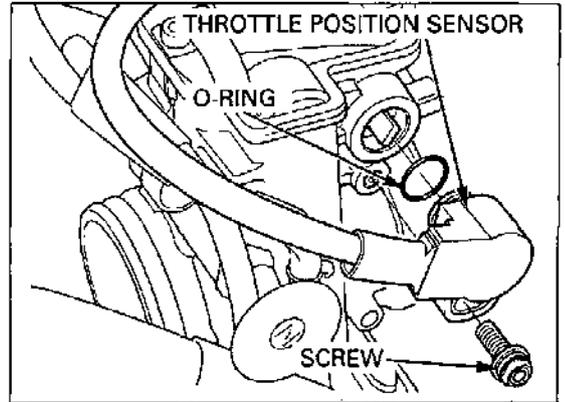
**From fully open position to fully closed position:**

**Resistance decreases**

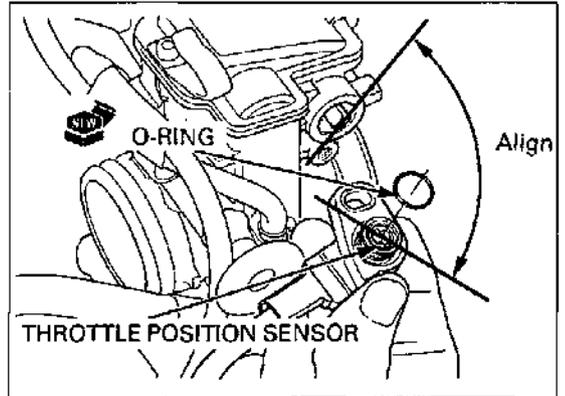


**REPLACEMENT**

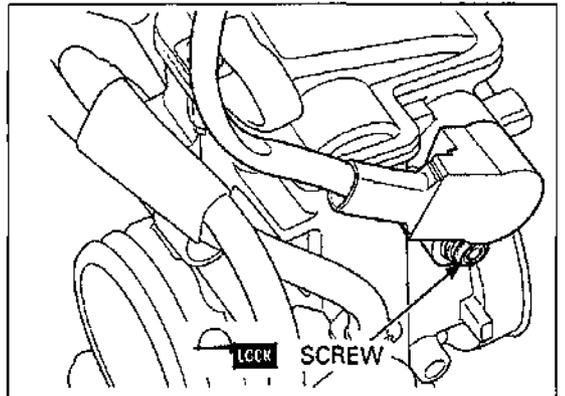
Remove the carburetor from the engine (page 8-7) .  
 Remove the screw, throttle position sensor and O-ring.



Install a new O-ring and the throttle position sensor by aligning the tabs of the throttle position sensor with the flat side of the shaft as shown.



Apply locking agent to the screw threads and loosely install the screw.



Measure the resistance between the Pink and Green/yellow wire terminal of the sensor side connector.

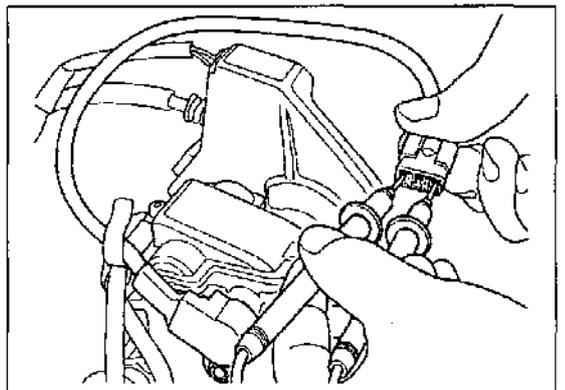
**STANDARD: 4 – 6 kΩ at 20°C (68°F)**

Calculate the throttle position sensor resistance at idle speed using the equation below.  
 $A \times (0.13 - 0.15) = B$

A: Pink and Green/yellow wire terminals resistance.  
 B: Throttle position sensor (Light green – Green/yellow) resistance at idle speed.

(Ex.)

If the Pink and Green/yellow wire terminal resistance is 5kΩ, then throttle position sensor (Light green – Green/yellow) resistance at idle speed is :  
 $5k\Omega \times (0.13 - 0.15) = 650 - 750 \Omega$

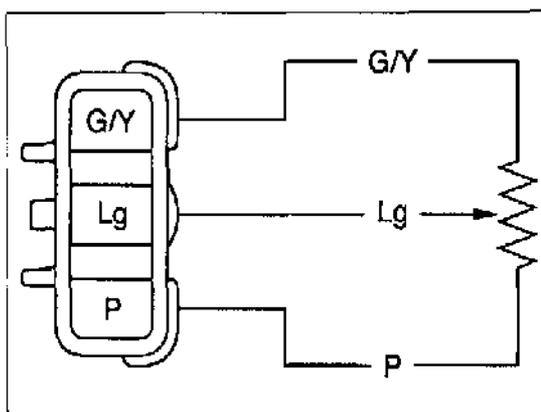


## IGNITION SYSTEM (After '05)

Adjust the throttle position sensor position so the resistance between the terminals (Light green - Green/yellow) is calculated, and tighten the screw to the specified torque.

**TORQUE: 3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)**

Install the removed parts in the reverse order of removal.



## CLOSED THROTTLE POSITION DETECTION SYSTEM

### OUTLINE (OPERATING PRINCIPLE)

The closed throttle position detection system is an ignition cut-off system that will prevent the engine from running at any speed beyond idle while the throttle lever is fully closed.

Both the throttle lever and carburetor throttle drum have a position switch to detect their fully closed position.

If the throttle drum "sticks" in an open position (carburetor switch OFF) and the throttle lever is fully closed (throttle lever switch OFF) the ICM will cut off the ignition to prevent engine damage or an accident.

Based upon the throttle lever and the throttle drum positions, and their corresponding switch status, the ICM will stop the engine from running (see following chart).

Throttle Lever Position	Throttle Lever Switch Status	Throttle Drum Position	Carburetor Switch Status	Ignition Status
Closed	OFF	Open	OFF	OFF (fail mode)
Open	ON	Open	OFF	ON (cruise, accelerate)
Closed	OFF	Closed	ON	ON (starting, idle)
Open	ON	Closed	ON	ON (initial takeup of throttle lever free play)

**OPERATION INSPECTION**

If the engine does not start, check for the following.

Remove the throttle housing cover (page 17-9).  
Remove the throttle drum cover (page 8-7).

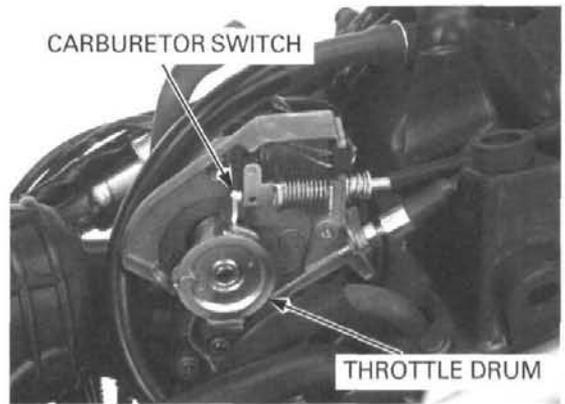
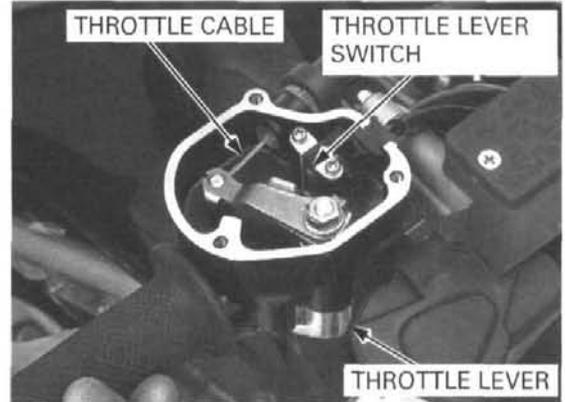
Operate the throttle lever and check for smooth operation of the throttle drum in all steering position. If the throttle drum operation is not smooth, lubricate or replace the throttle cable.

Check the throttle lever free play (page 4-6).

**NOTICE**

*The ICM will cut-off the ignition when the throttle lever free play is adjusted to less than 5 mm (7/32 in). If the engine does not start, check the throttle lever free play and readjust it.*

If the throttle drum operation is normal and the engine still does not start, check the throttle lever switch and carburetor switch (page 22-13).



**SYSTEM INSPECTION**

Check the throttle cable operation.

**THROTTLE LEVER SWITCH**

Remove the front fender (page 3-6).

Disconnect the ICM 4P black connector.  
Check for continuity between the terminals of the connector.

**TERMINALS:**

**Gray/red terminal (+) – Green terminal (-)**

There should be no continuity when the throttle lever is fully closed and continuity when the throttle lever is open.

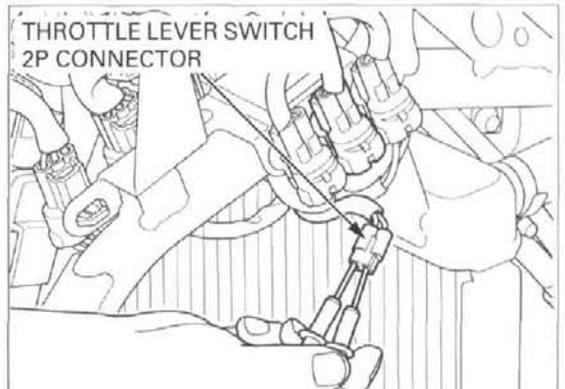
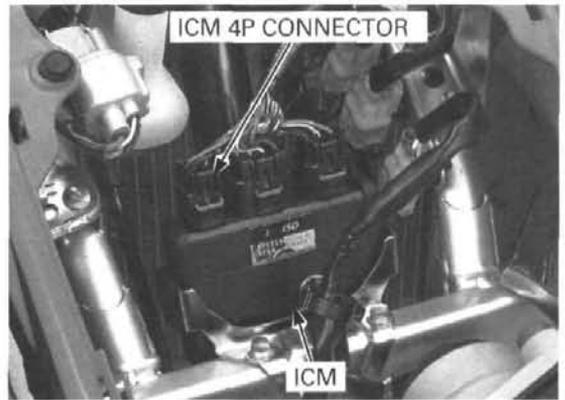
If the throttle lever switch operation is incorrect, disconnect the throttle lever switch 2P green connector and check for continuity between the terminals of the switch side.

**THROTTLE LEVER CLOSED: NO CONTINUITY**  
**THROTTLE LEVER OPEN: CONTINUITY**

If the throttle lever switch operation is still incorrect, replace the throttle lever switch assembly (page 17-9).

If the throttle lever switch is OK, check for open or short circuit in wire harness.

If both the throttle lever switch and wire harness are normal, replace the ICM and inspect again.



## IGNITION SYSTEM (After '05)

### CARBURETOR SWITCH

Remove the top cover (page 3-5).  
Remove the rear fender (page 3-7).

Disconnect the ICM 4P black connector.  
Check for continuity between the terminals of the connector.

#### TERMINALS:

**Pink/black terminal (+) – Green terminal (-)**

There should be continuity when the throttle drum is fully closed and no continuity when the throttle drum is open.



If the carburetor switch operation is incorrect, disconnect the carburetor switch 2P natural connector and check for continuity between the terminals of the switch side.

**THROTTLE DRUM CLOSED: CONTINUITY**  
**THROTTLE DRUM OPEN: NO CONTINUITY**

If the carburetor switch operation is still incorrect, replace the carburetor switch assembly (page 8-11).  
If the carburetor switch is OK, check for open or short circuit in wire harness.  
If both the carburetor switch and wire harness are normal, replace the ICM and inspect again.

