

BATTERY	
Rating	12 VDC/12AH/200CCA
Type	Sealed

ALTERNATOR	
AC Voltage Output	19-26 VAC per 1000 engine RPM
Stator Coil Resistance	0.2-0.4 Ohms

REGULATOR	
Voltage Output @ 75°F	14.3-14.7 VDC
Amperes @ 3600 RPM	22 Amps

IGNITION TIMING SPARK OCCURRENCE		
RPM	TP Sensor	
	Low Voltage (PT)	High Voltage (WOT)
1200 RPM (Idle)	20° BTDC	18° BTDC
3000 RPM	30° BTDC	18° BTDC
6000 RPM	45° BTDC	35° BTDC
Curve Switch Point	TP Sensor Input 2.4V	
Rev Limit	6500 RPM	

IGNITION COIL RESISTANCE	
Primary Winding	0.4-0.6 ohms
Secondary Winding	7,720-9,440 ohms

SPARK PLUG CABLE RESISTANCE	
Spark Plug Cable	2,375-5,833 ohms

ELECTRICAL SYSTEM	AMPERES
Main Circuit Breaker	30
Ignition Fuse	7.5
Light Fuse	15
Accessory Fuse	7.5
System Fuse	15
Key Switch Fuse	15

LAMP DESCRIPTION		BULBS REQUIRED	WATTS	AMPS	PART NUMBER
Headlamp	High/Low	1	60/55	5.0/4.58	67713-86
Marker lamps	Tail/Stop Lamp	1	5/21	0.42/1.75	Y0401B.2U
	Turn Signal Lamp, Front and Rear (1 bulb each)	4	10	0.83	68968-99Y
Indicator lamps (in speedometer)	High Beam Indicator	Non-replacable LEDs			
	Turn Signal Indicator				
	Oil Pressure Indicator				
	Neutral Indicator				

## TORQUE VALUES

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ITEM	TORQUE		NOTES
Bank angle sensor	25-27 <b>in-lbs</b>	2.8-3.1 Nm	Page 7-13
Battery terminal bolts	60-96 <b>in-lbs</b>	7-11 Nm	Page 7-13
Circuit breaker bracket mounting screw	25-27 <b>in-lbs</b>	2.8-3.1 Nm	Page 7-31
Circuit breaker metal nuts	15-18 <b>in-lbs</b>	1.7-2.0 Nm	Page 7-31
Circuit breaker nylon acorn	1-3 <b>in-lbs</b>	0.1-0.3 Nm	Page 7-31
Headlamp adjusting screws	6-8 ft-lbs	8.1-10.8 Nm	metric, page 7-47
Headlamp housing mounting screws	12-14 ft-lbs	16-19 Nm	Page 7-15
Ignition coil mounting screws	4-6 ft-lbs	5-8 Nm	Page 7-24
Ignition key switch bolts	4-6 ft-lbs	5-8 Nm	Page 7-15
Ignition module plate screws	10-20 <b>in-lbs</b>	1-2 Nm	Page 7-20
Neutral indicator switch	3-5 ft-lbs	4-7 Nm	LOCTITE THREADLOCKER 243 (blue), Page 7-57
Rotor cup mounting fasteners	43-53 <b>in-lbs</b>	5-6 Nm	Page 7-20
Rotor mounting bolts	90-110 <b>in-lbs</b>	10-12 Nm	LOCTITE THREADLOCKER 242 (blue), Page 7-41
Sidestand switch fasteners	30-36 <b>in-lbs</b>	3-4 Nm	Page 7-28
Spark plug	11-18 ft-lbs	15-24 Nm	Page 7-3
Speedometer sensor screw	80-100 <b>in-lbs</b>	9-11 Nm	Page 7-61
Stator mounting screws	30-40 <b>in-lbs</b>	3-5 Nm	T-27 TORX with retaining compound, replace after removal, Page 7-41
Switchgear housing screws, left side	25-33 <b>in-lbs</b>	3-4 Nm	metric, Page 7-55
Switchgear housing screws, right side	25-33 <b>in-lbs</b>	2.8-3.7 Nm	metric, Page 7-54
Tail lamp mounting locknuts	25-28 <b>in-lbs</b>	2.6-3.2 Nm	metric, Page 7-50
Throttle position sensor fasteners	12-23 <b>in-lbs</b>	2-3 Nm	Page 7-12
Timing inspection hole plug	10-15 ft-lbs	14-20 Nm	Page 7-21
Voltage regulator mounting fasteners.	4-6 ft-lbs	5-8 Nm	Page 7-42

## GENERAL

The vehicle uses a breakerless inductive-discharge ignition system. The system has both a primary and secondary circuit. The primary circuit consists of the battery, ignition switch, primary coil winding, computerized ignition timer and associated wiring. The secondary circuit consists of the secondary coil, spark plug and associated wiring. See Figure 7-1.

The computerized ignition system contains five assemblies.

## Ignition Module

The ignition module is mounted in the gear case cover. The module has two functions. First, it computes the spark advance for proper ignition timing. Second, it opens and closes the low-voltage circuits between the battery and ignition coil to produce high-voltage discharge to the spark plug. The ignition module on the P3 Blast also contains an integrated cam position sensor.

Above 6500 rpm, the ignition module will automatically reduce power to prevent over revving.

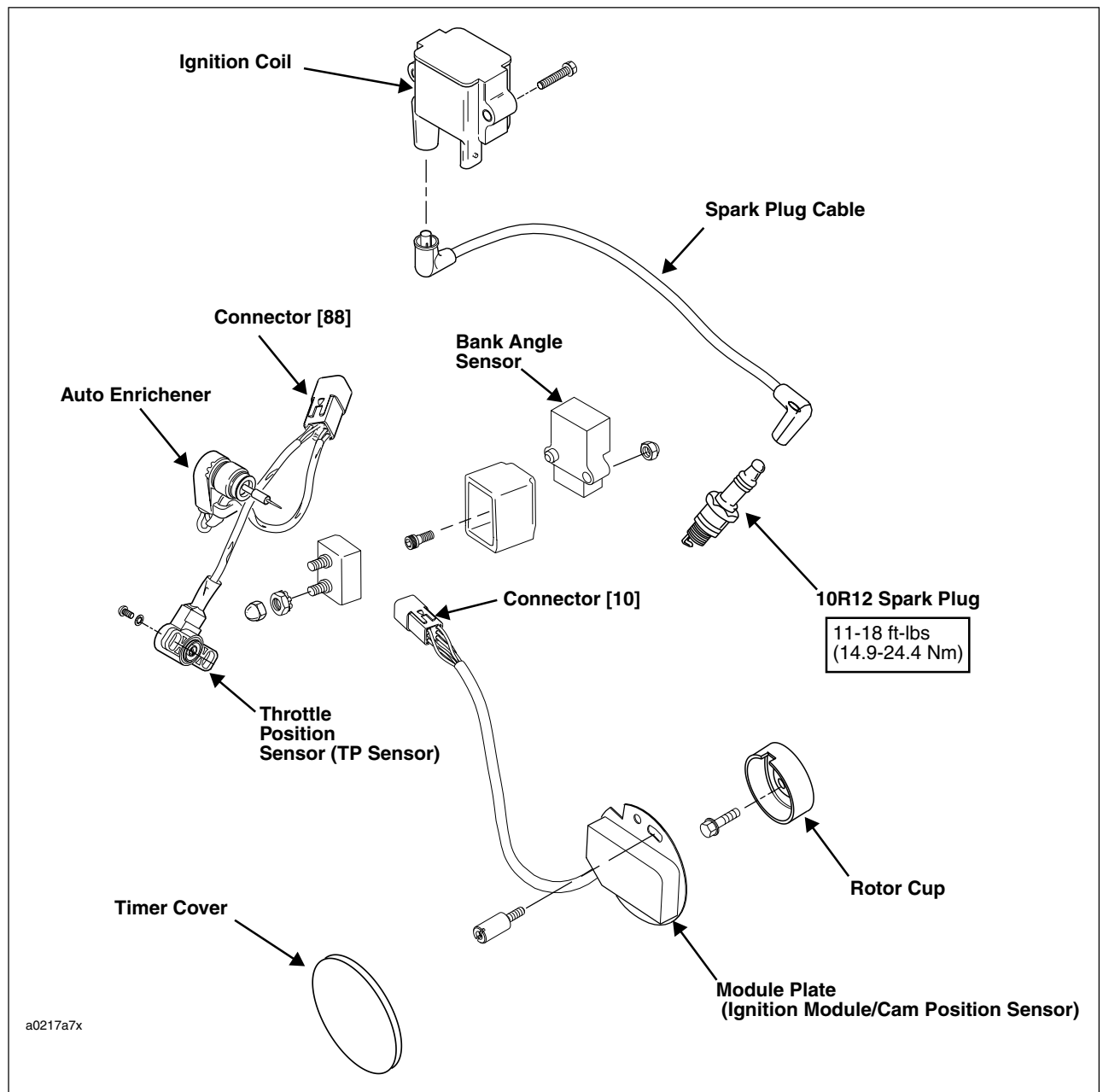


Figure 7-1. Ignition System Components

The ignition module contains all the solid-state components used in the ignition system. The dwell time is fixed. The ignition module has added protection against transient voltages, continuous reverse voltage protection and damage due to jump starts. The system will operate down to 6.0 VDC. The ignition module is fully enclosed to protect it from vibration, dust, water and oil. The module is not repairable. Replace the unit if it fails.

The ignition module is programmed with two spark advance curves to meet varying engine loads. The ignition module selects the proper curve based on TP Sensor output voltage which is continuously monitored. This system ensures correct timing to suit starting and high-speed requirements.

A single ignition coil fires the spark plug at the end of the compression stroke (no waste spark), thereby igniting the air/fuel mixture.

## Throttle Position Sensor (TP Sensor) and Auto Enrichener

The Throttle Position Sensor (TP Sensor) is attached to the throttle shaft on the carburetor. The TP Sensor voltage is high when the throttle is opening during acceleration and under high engine load conditions and the voltage is low during deceleration and under low engine load conditions. The high or low voltage signal from the TP Sensor is communicated to the Ignition Module which selects the correct spark advance curve (change between high and low curve takes place at TP Sensor input 2.4V).

The low voltage signal curve (throttle less than 1/2 open, <2.4V TP Sensor input), selected for maximum spark advance under normal light-load cruising conditions, provides improved fuel economy and performance. The high voltage signal curve (throttle more than 1/2 open, >2.4V TP Sensor input) minimizes spark knock while maintaining performance under high-load conditions (acceleration and highway driving).

The Auto Enrichener is located on the carburetor and controls the cold idle speed of the motorcycle and enriches the air/fuel mixture. The Auto Enrichener circuit is grounded and operative for 2-5 minutes after the motorcycle is started. The ground is completed by the ignition module.

## Bank Angle Sensor

The Bank Angle Sensor provides input to the ignition module on whether or not the vehicle lean angle is greater than 55 degrees. If vehicle lean angle exceeds 55 degrees, the Bank Angle Sensor will shut off power to the ignition.

## Rotor and Cam Position Sensor

The rotor and cam position sensor (cam position sensor is integrated with the ignition module) are located in the gear-case cover on the right side of the motorcycle. The rotor is mounted on the camshaft and operates at one-half crankshaft speed. As the rotor turns, a slot in its outside diameter breaks the magnetic field of a Hall-effect device mounted on the cam position sensor. The output of the Hall-effect device is a logic-type signal that corresponds to the timing information from the spinning rotor. This technique gives accurate timing information down to "0" speed.

The ignition system produces a spark near top dead center (TDC) for starting. At RPM's and loads above this, the system produces a spark 0°-45° before TDC. The whole timing program can be shifted by mechanical rotation of the integrated

ignition module plate. See [1.19 IGNITION TIMING AND IDLE SPEED ADJUSTMENT](#).

See the wiring diagrams at the end of this section for additional information on ignition system circuits.

## TROUBLESHOOTING

For poor performance, poor fuel economy or excessive ping-ing, see [DRIVABILITY TROUBLESHOOTING](#) on Page 7-10. Also refer to Table 4-1 in Section 4 for Fuel System Troubleshooting.

For incorrect idle speed, see [DRIVABILITY TROUBLESHOOTING](#) on page 7-15.

If the engine will not start, or if hard starting or missing indicates a faulty operating ignition system, perform the tests listed below.

### Check for Ignition Spark

1. Remove seat and fuel tank. See Sections 2 and 4.
2. Disconnect spark plug cable from spark plug. Check condition of plug and cable. Clean or replace as necessary. See [7.10 SPARK PLUG CABLE](#).
3. Install SPARK PLUG TESTER (HD-26792) to spark plug cable end.
4. Turn ignition key switch to IGN and engine stop switch to ON and pull in clutch lever.
5. With transmission in neutral, press electric starter button. Check for a spark across plug electrode gap.
  - a. If a spark is produced, problem is not in electronic system or coil. Check carburetion, enrichener and spark plug.
  - b. If no spark is produced, check battery voltage and battery connection. Battery voltage must be at least 12.6 VDC. Charge battery if voltage is low.
6. Verify that the ground strap from the front isolator to the frame is in good condition. If there is still no spark, then perform the tests under [No Ignition Spark](#).

### No Ignition Spark

See [Figure 7-2](#). To conduct the following tests, it will be necessary to assemble a set of jumper wires.

Cut two wires of ample length to reach from a good ground connection to the negative terminal of the coil primary. If a suitable capacitor is not available, use a condenser (such as the type used in earlier breaker point ignition systems).

When conducting Step 4 of the previous spark tests, use the SPARK PLUG TESTER (HD-26792). During the testing procedures, check for spark across the spark plug electrodes.

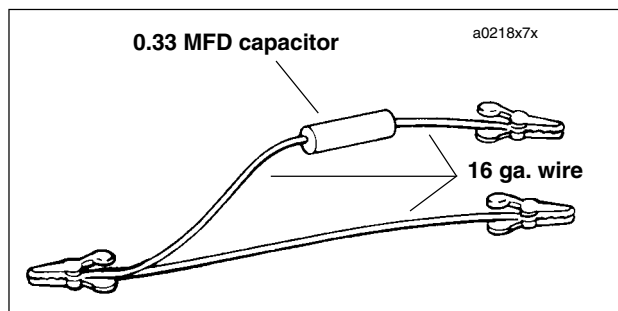


Figure 7-2. Test Jumper

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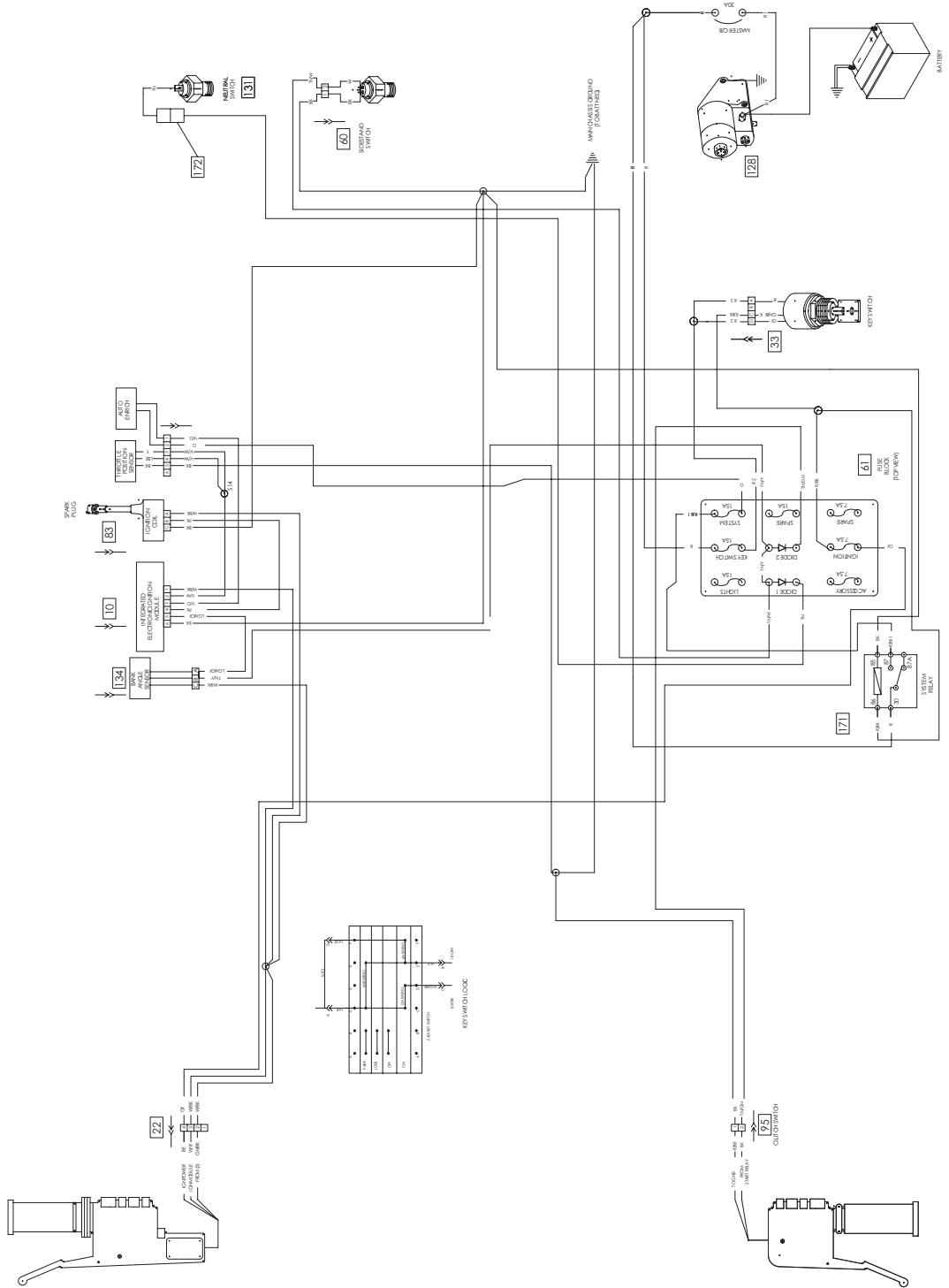


Figure 7-3. Ignition System Circuit

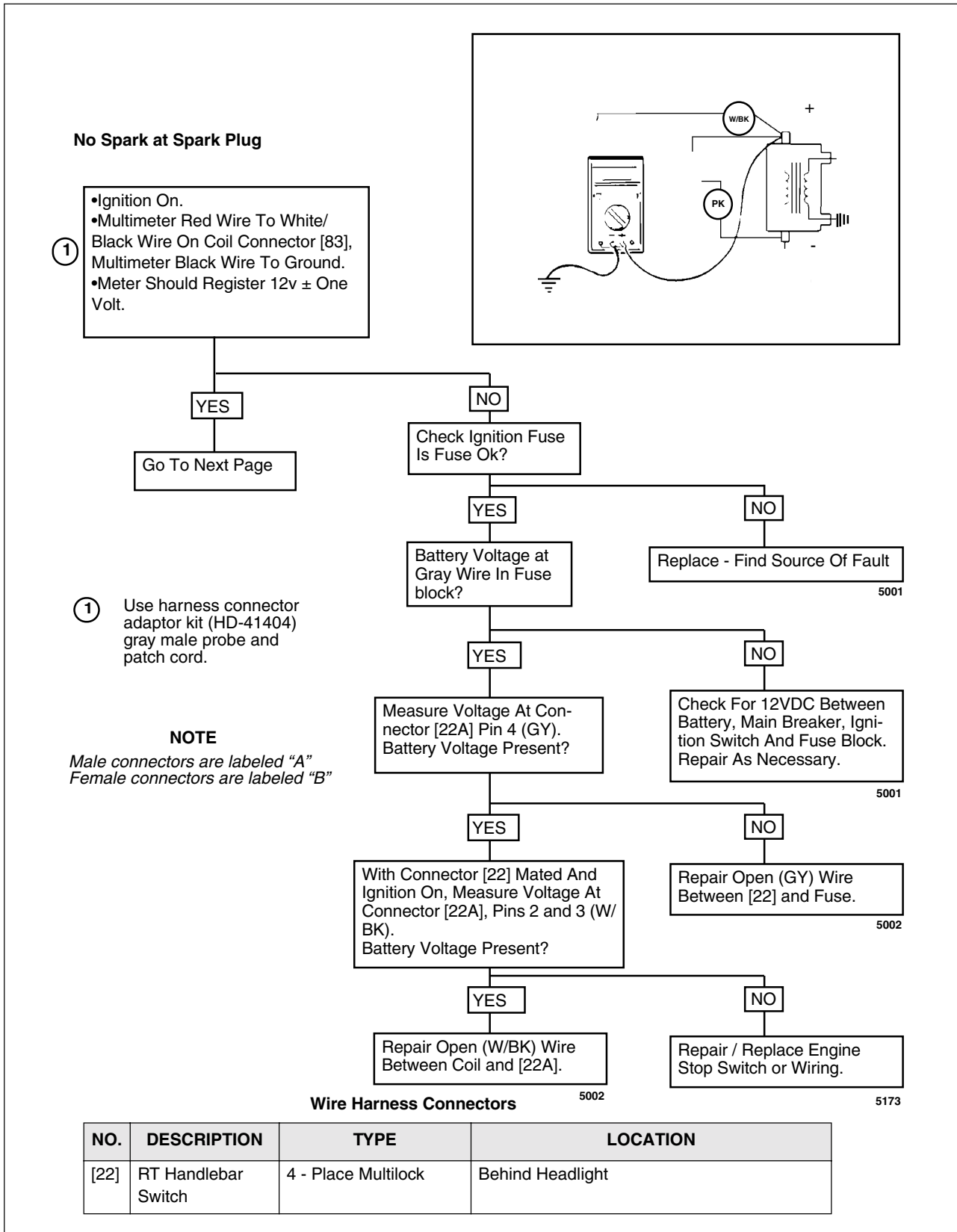
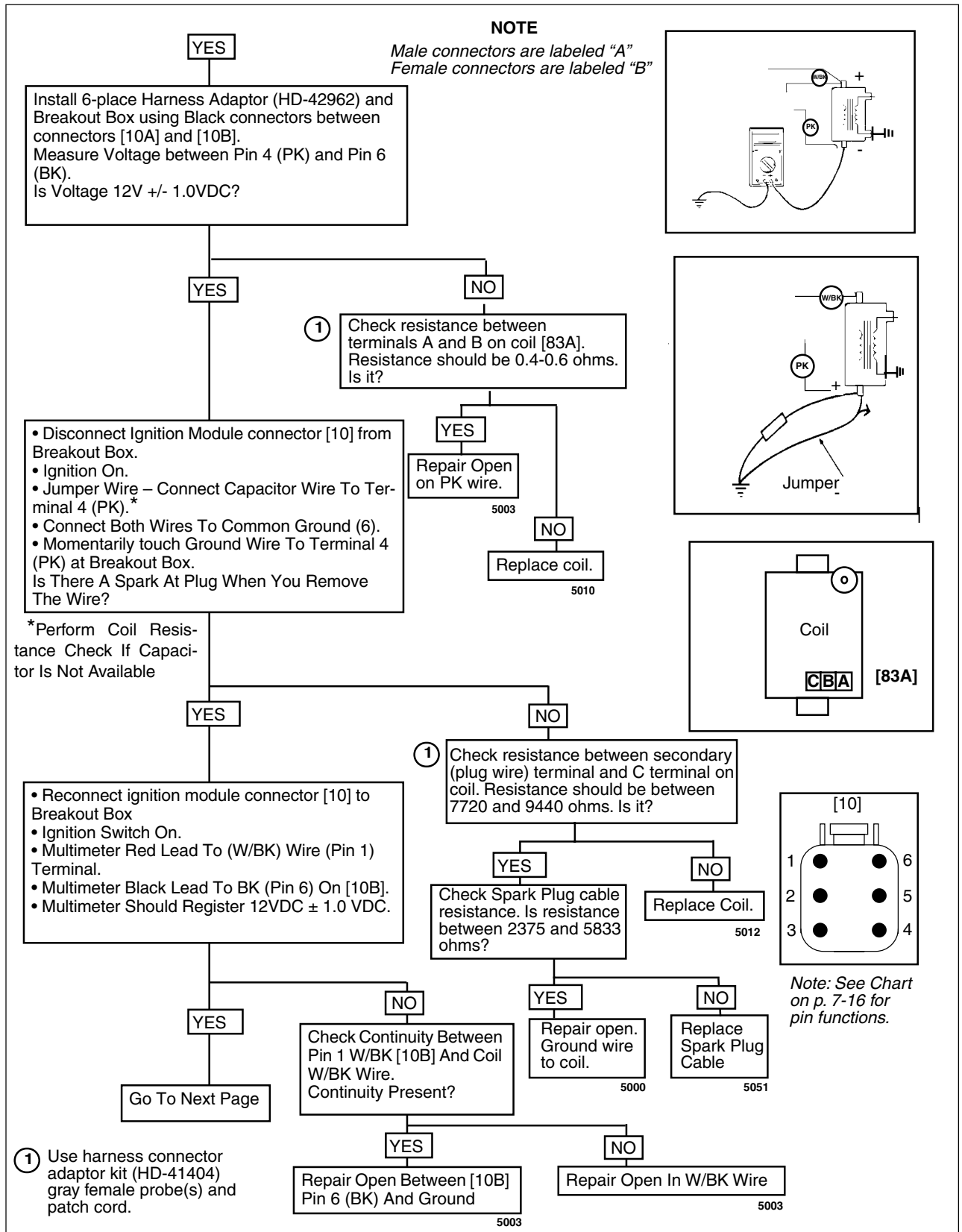
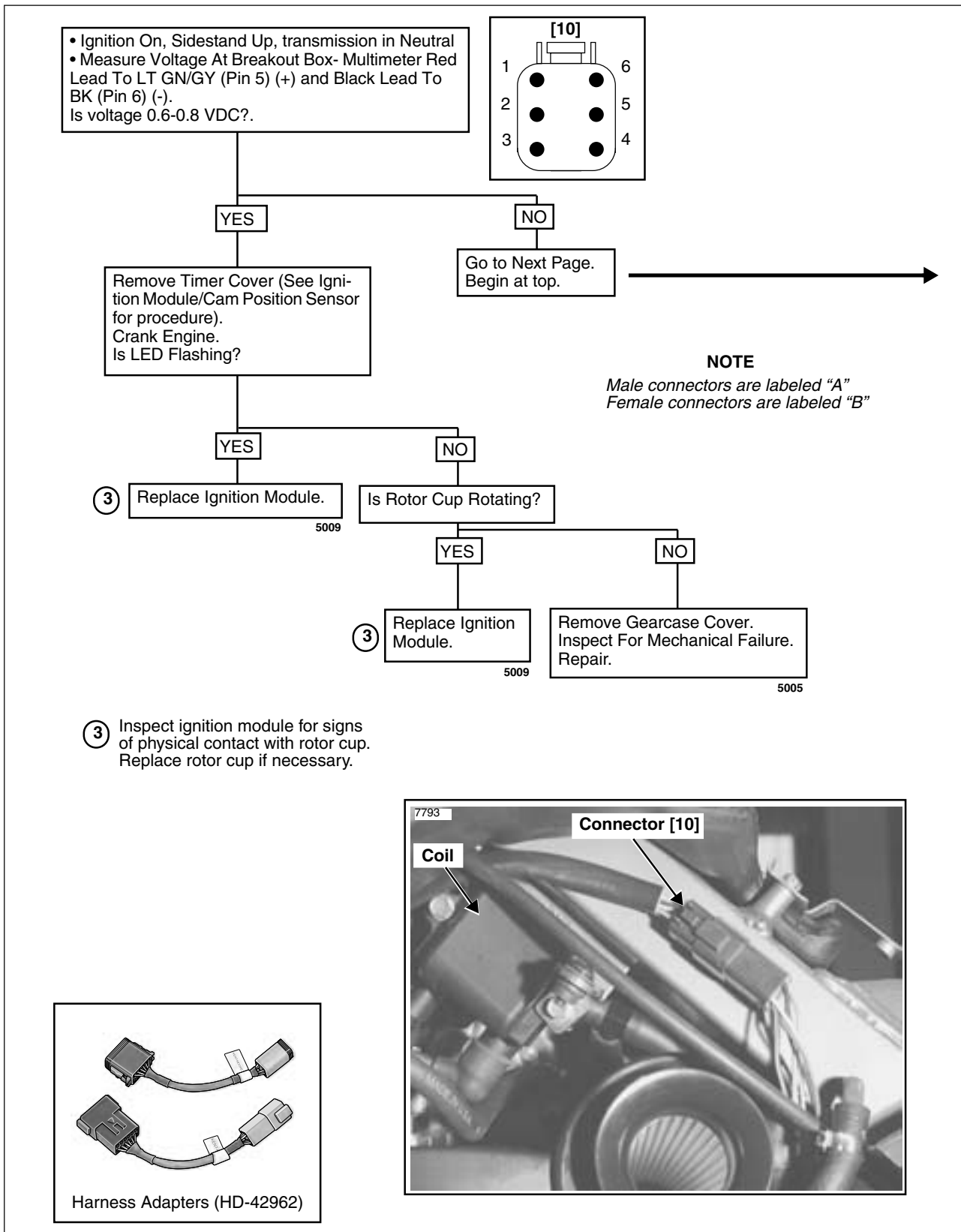


Figure 7-4. No Spark At Spark Plug







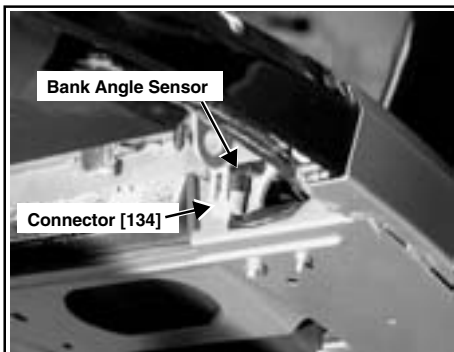
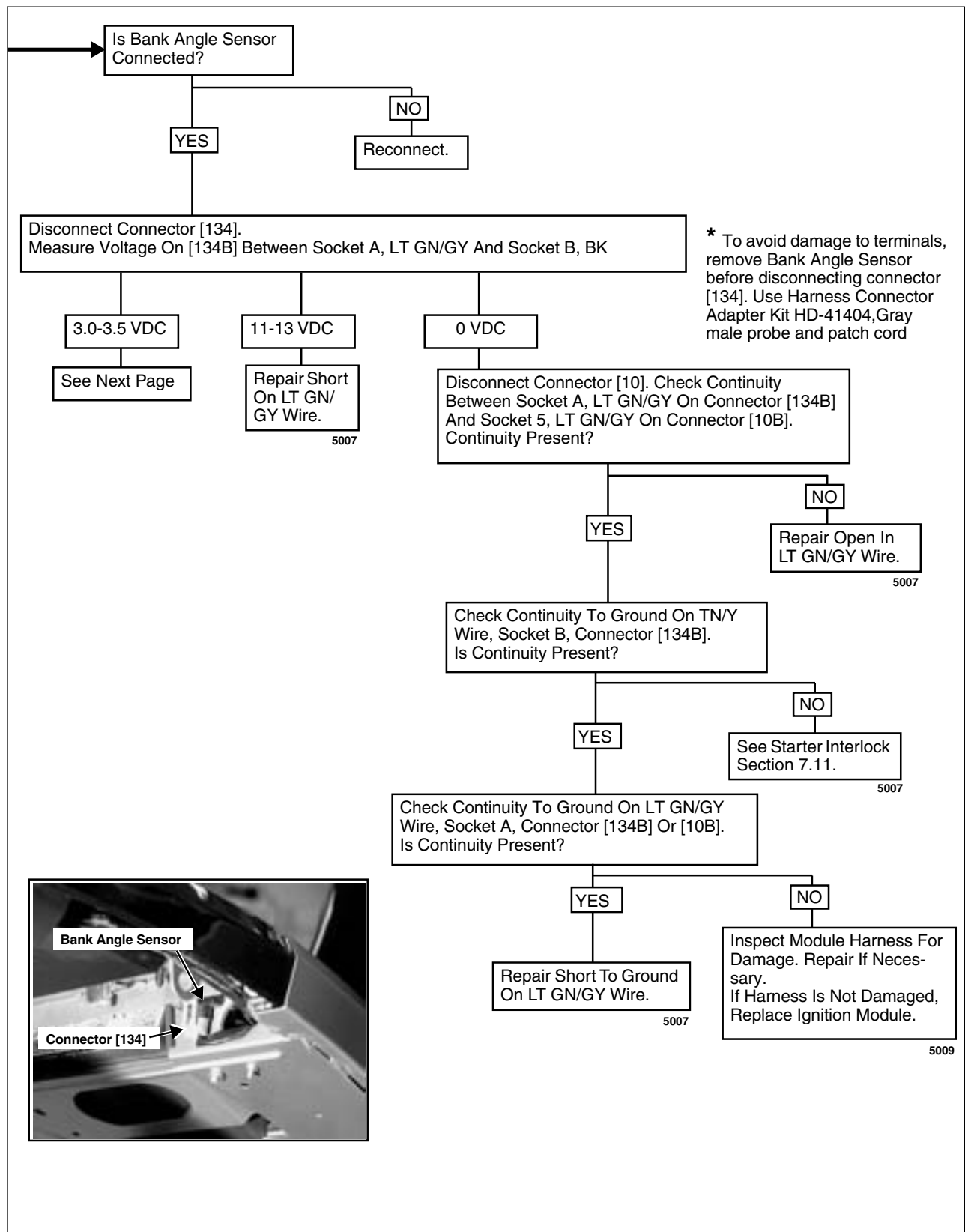


Figure 7-7. Continuous or No Spark At Spark Plug

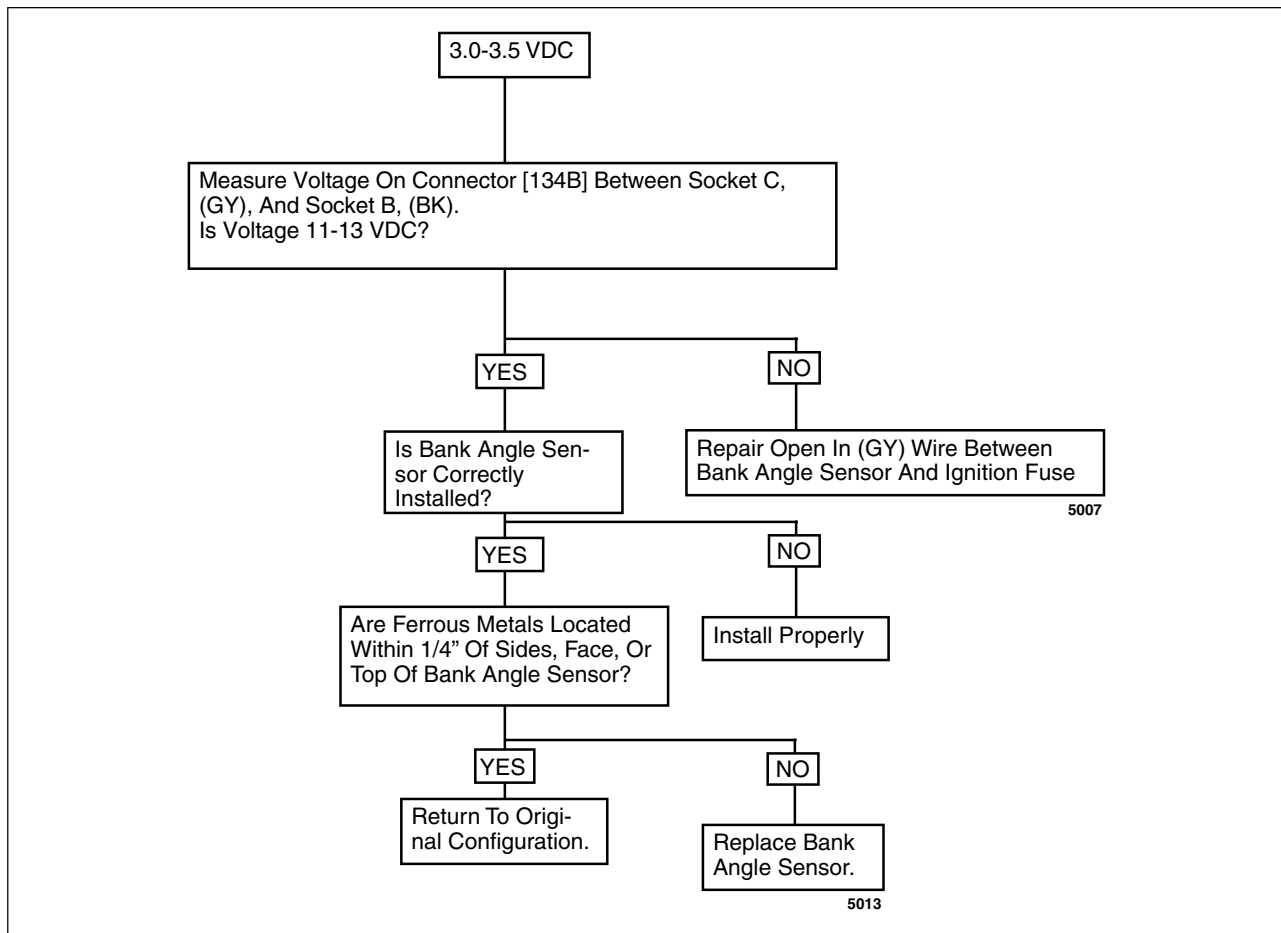


Figure 7-8. Continuous or No Spark At Spark Plug

# DRIVABILITY TROUBLESHOOTING

## Poor Performance, Poor Fuel Economy, Excessive Pinging

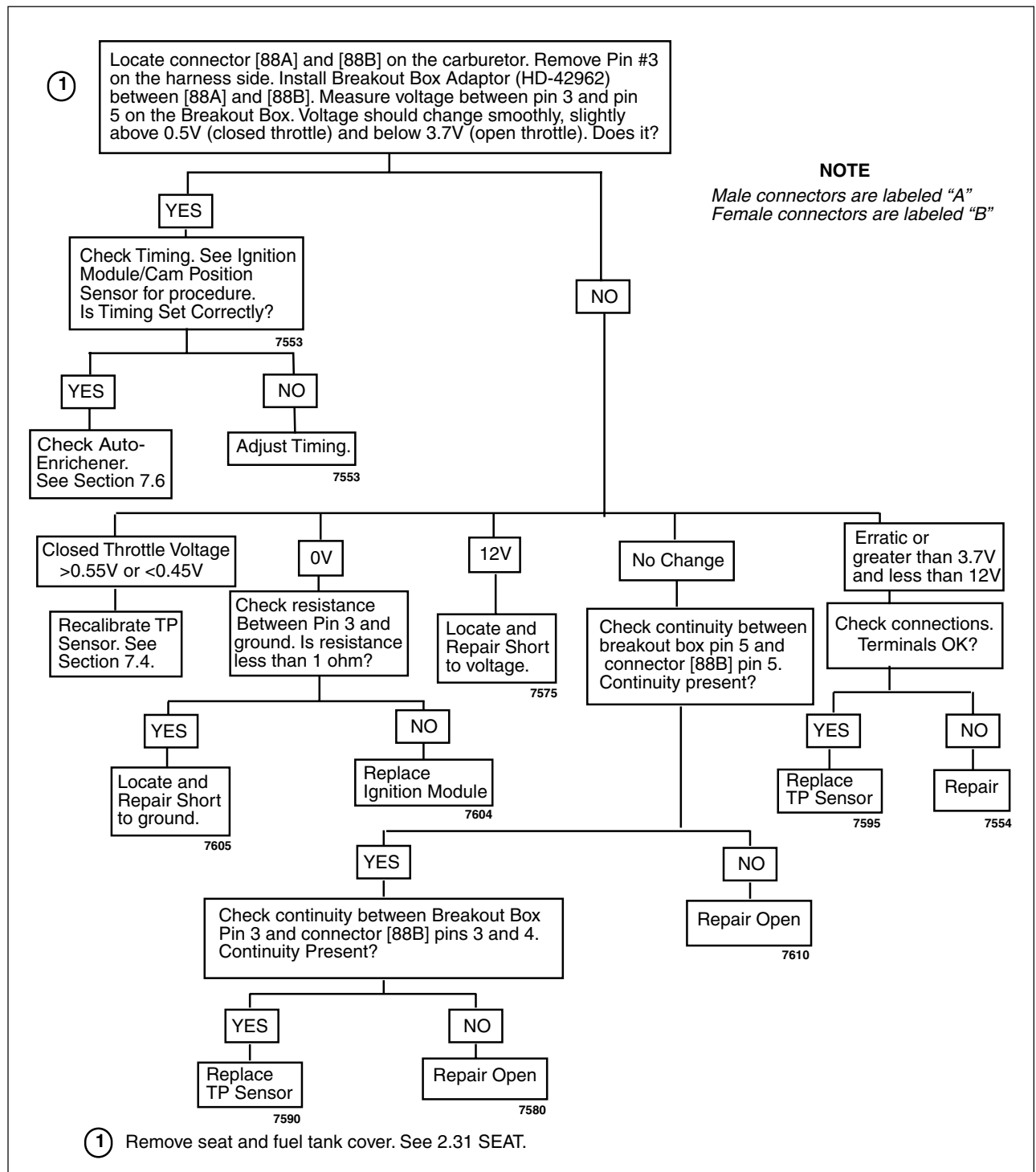


Figure 9. Drivability Troubleshooting

## GENERAL

See [Figure 7-10](#). The throttle position sensor voltage determines which spark advance curve the ignition module selects. The throttle position sensor (TP Sensor) is located on the carburetor. The TP Sensor is not repairable. Replace the unit if it fails.

See [4.6 THROTTLE POSITION SENSOR](#) for information on replacing the throttle position sensor.

See diagnostic chart on previous page for troubleshooting information.

## CALIBRATION/TESTING

### NOTE

To gain access to the Throttle Position Sensor, remove the carburetor and air cleaner as an assembly. See [4.4 CARBURETOR](#) and [4.3 AIR CLEANER](#).

1. Adjust throttle position sensor as follows:
  - a. Back off idle adjustment screw so throttle plate is fully closed.
  - b. Completely open and close the throttle by rotating the throttle control through its full range of motion.
  - c. Using special TORX bit (Snap-on® TTXR20E), loosen the two tamper-resistant T20 TORX screws just enough to allow sensor to rotate.
  - d. Disconnect pin 3 in connector [88B] (main wire harness).
  - e. Install Breakout Box Adaptors (HD-42962) and Breakout Box (HD-42682) using black connectors between connector halves [88A] and [88B].
  - f. Turn ignition switch to ON. Using a multimeter, measure voltage between pin 3 (V/W) and pin 5 (BK).
  - g. Adjust (rotate) throttle position sensor (TPS) until voltage reading is 0.5V +/- 0.05V.
  - h. Completely open and close the throttle by rotating the throttle control through its full range of motion. Wide Open Throttle (WOT) should not exceed 3.7V and reading should increase consistently as throttle is opened. If the voltage reading is erratic or the voltage reading at WOT exceeds 3.7V see [Figure 7-10](#) for diagnostic testing.

### NOTE

After WOT, the TPS reading may not return back to exactly 0.5V +/- 0.05V. To re-check exact TPS voltage reading, turn cycle key off and on.

- i. Tighten TP Sensor mounting screws to 13-23 in-lbs (2-3 Nm).

2. Install carburetor and air cleaner. See [4.3 AIR CLEANER](#) and [4.3 AIR CLEANER](#).
3. Adjust idle speed. See [1.19 IGNITION TIMING AND IDLE SPEED ADJUSTMENT](#).

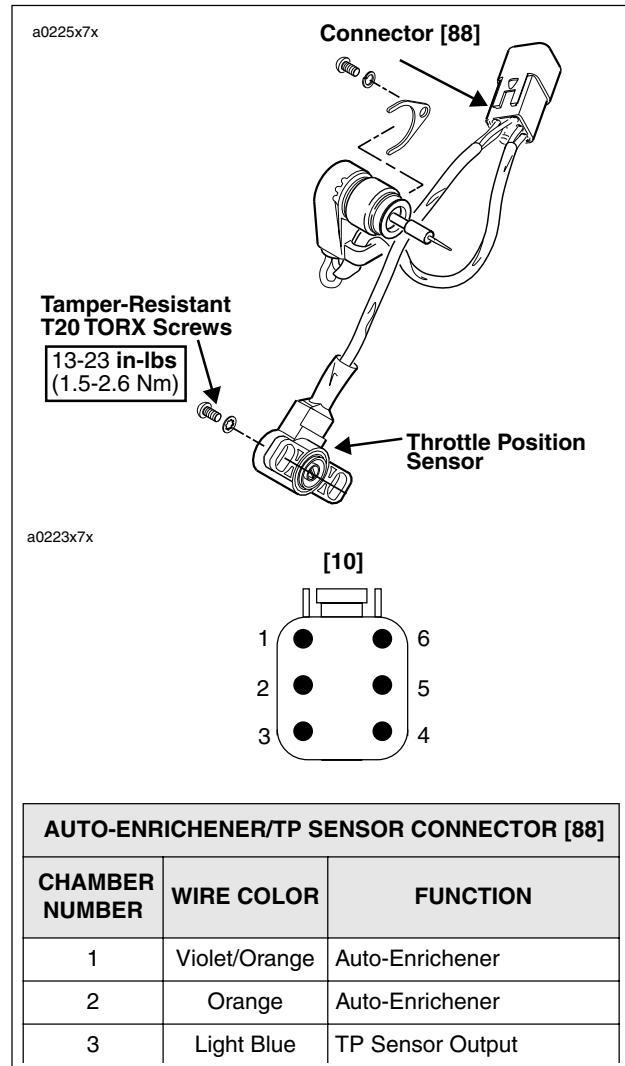


Figure 7-10. Throttle Position Sensor

## REMOVAL

1. Remove seat. See [2.28 SEAT](#).

### ⚠ WARNING

To protect against shock and accidental start-up of vehicle, disconnect the negative battery cable before proceeding. Inadequate safety precautions could result in death or serious injury.

2. Disconnect negative battery cable from battery.
3. See [Figure 7-11](#). Remove circuit breaker from mounting bracket.
4. Remove allen head screw from mounting bracket while holding locknut on Bank Angle Sensor side.
5. Remove Bank Angle Sensor from it's mounting location.
6. Disconnect connector [134] from Bank Angle Sensor.
7. Remove Bank Angle Sensor.

## INSTALLATION

1. Connect connector [134] to **new** Bank Angle Sensor.
2. See [Figure 7-12](#). Position Bank Angle Sensor in mounting position on circuit breaker bracket mounting screw. Make sure sensor locating post engages hole in trunk to ensure proper alignment of sensor.
3. Install Bank Angle Sensor with allen screw and locknut. Tighten screw to **25-27 in-lbs (2.8-3.1 Nm)**.
4. Install circuit breaker to circuit breaker mounting bracket.
5. Install negative battery cable to battery terminal. Tighten fastener to **60-96 in-lbs (7-11 Nm)**.
6. Install seat. See [2.28 SEAT](#).

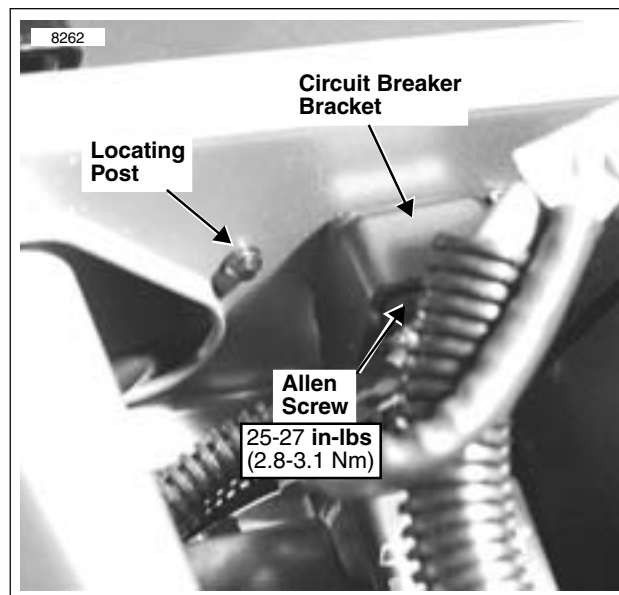


Figure 7-12. Bank Angle Sensor Installation

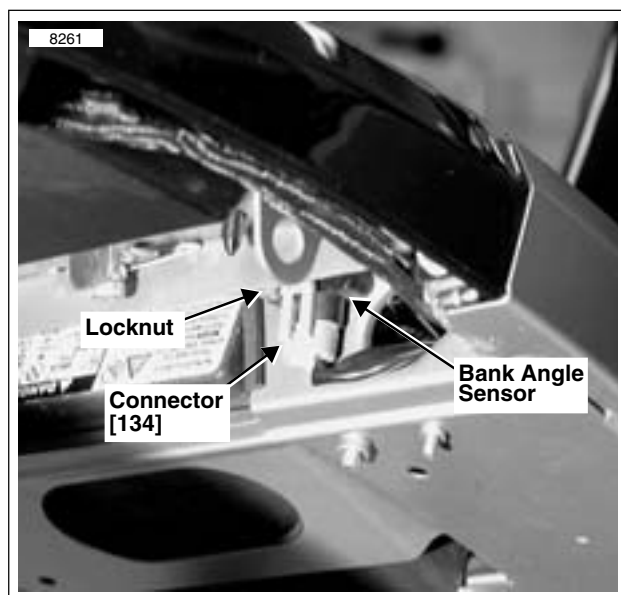


Figure 7-11. Bank Angle Sensor Removal

## GENERAL

**WARNING**

**DO NOT** modify the ignition/headlamp switch wiring to circumvent the automatic-on headlamp feature. Visibility is a major concern for motorcyclists. Failure to have proper headlamp operation could result in death or serious injury.

See [Figure 7-13](#). The four-position combination ignition/headlamp key switch is not repairable. Replace the unit if it fails.

Switch positions are explained in the table below.

**CAUTION**

When turning off the ignition, verify that the key is removed in the OFF or FORK LOCK position and that the lights are not left on. If the rider stops the engine and inadvertently removes the key in the PARK position, the battery will be drained of its charge if the vehicle is left standing too long.

**NOTE**

The key locks the ignition system and is removable in both the OFF, FORK LOCK and P (PARK) positions. The PARK position is located between the OFF and IGNITION positions and allows the rider to remove the key while leaving the lights on. When the key is placed in the PARK position, several indicator markers are or can be activated. See the table to the right

## REMOVAL

1. Remove seat. See [2.28 SEAT](#).

**WARNING**

**To protect against shock and accidental start-up of vehicle, disconnect the negative battery cable before proceeding. Inadequate safety precautions could result in death or serious injury.**

2. Disconnect negative battery cable from battery terminal.
3. Remove four screws and washers to detach windscreen from mounting brackets. See [2.26 WINDSCREEN](#).
4. See [Figure 7-14](#). Cut cable tie and disconnect ignition key switch connector [33] from main wiring harness. Note location of cable tie.
5. Remove two headlight bucket bolts and headlamp bucket. See [7.17 HEADLAMP](#).
6. Remove two bolts and ignition key switch.

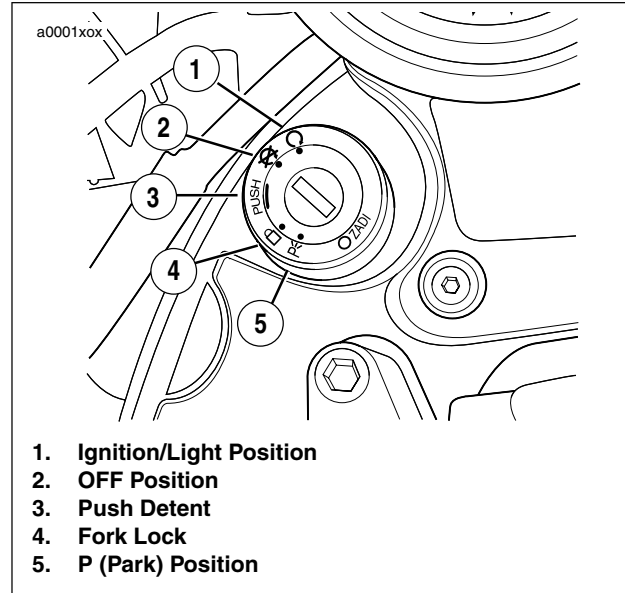


Figure 7-13. Ignition/Headlamp Key Switch

LABEL	NAME	IGN.	LAMPS	REMOVE KEY
OFF	Off	off	off	yes
	ForkLock	off	off	yes
P	Park	off	See note & the table below.	yes
IGN	Ignition	on		no

ITEM	P	IGN
Headlamp High/Low Beam	off	on
Speedometer Illumination Lamp	on	on
Stop Lamp	can be activated	
Front and Rear Turn Signals	can be activated	
Horn	can be activated	

## INSTALLATION

1. Apply LOCTITE THREADLOCKER 243 (Blue) to threads of two ignition key switch bolts.
2. Install ignition key switch into hole and secure with two bolts. Tighten bolts to 4-6 ft-lbs (5-8 Nm).
3. See [Figure 7-14](#). Attach ignition key switch connector [33] to main wiring harness. Secure harness with cable tie.
4. Install headlight bucket with two bolts. Tighten bolts to 12-14 ft-lbs (16-19 Nm).
5. Cable tie ignition key switch connector [33] to main wiring harness.
6. Install four screws and washers to attach windscreen to mounting brackets. See [2.26 WINDSCREEN](#).
7. Install negative battery cable to battery terminal. Tighten fastener to 60-96 **in-lbs** (67-11 Nm).

### **⚠ WARNING**

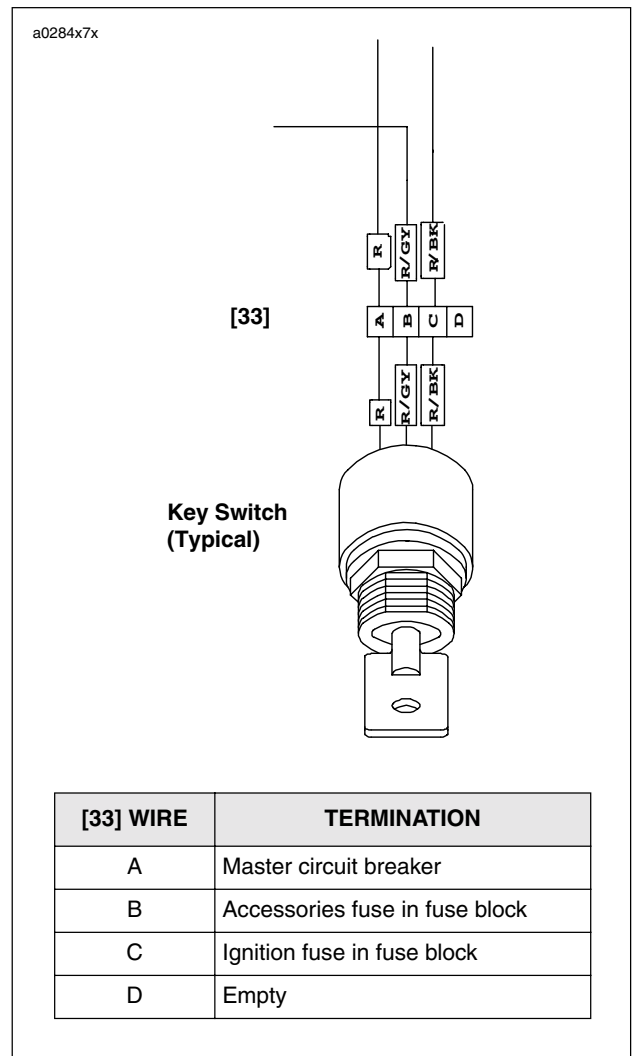
After installing seat, pull upward on front of seat to be sure it is locked in position. If seat is loose, it could shift during vehicle operation and startle the rider, causing loss of control of vehicle and result in death or serious injury.

8. Install seat. See [2.28 SEAT](#).

### **⚠ WARNING**

Check for proper headlamp operation before riding motorcycle. Visibility is a major concern for motorcyclists. Failure to have proper headlamp operation could result in death or serious injury.

9. Check ignition key switch for proper operation. If operation fails, reread procedure and verify that all steps were performed.
  - a. Turn ignition key switch to OFF. Check all functions listed in the table on [page 5-14](#).
  - b. Turn ignition key switch to IGN. Start motorcycle. See Section 4.
  - c. Turn ignition key switch to LOCK.



**Figure 7-14. Ignition Key Switch Connector [33]**

## GENERAL

See [Figure 7-15](#). The auto enrichener controls the cold idle speed of the motorcycle at startup and enriches the air/fuel mixture. It is located on the carburetor. The auto enrichener is not repairable. Replace the unit if it fails.

**NOTE**

*In extreme cold ambient conditions, auto-enrichener may remain on for longer periods of time.*

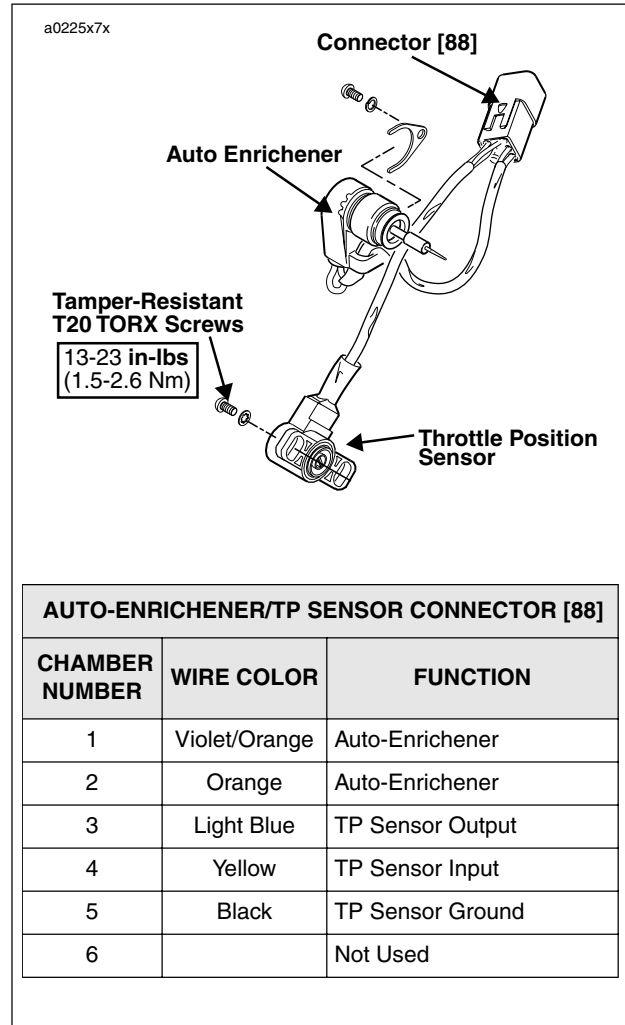
Normal function of the auto enrichener is typically 2-5 minute fast idle speed enrichment cycle, even after hot restart. If enrichment cycle exceeds 5 minutes, see diagnostic chart on following page.

See [4.5 AUTO-ENRICHENER](#) for information on replacing the auto enrichener.

See diagnostic chart on next page for troubleshooting information.

**NOTE**

*Auto-Enrichener wire colors may vary from those listed in [Figure 7-15](#).*



**Figure 7-15. TP Sensor/Auto-Enrichener Connector [88]**



# DRIVABILITY TROUBLESHOOTING

## Idle Speed Incorrect

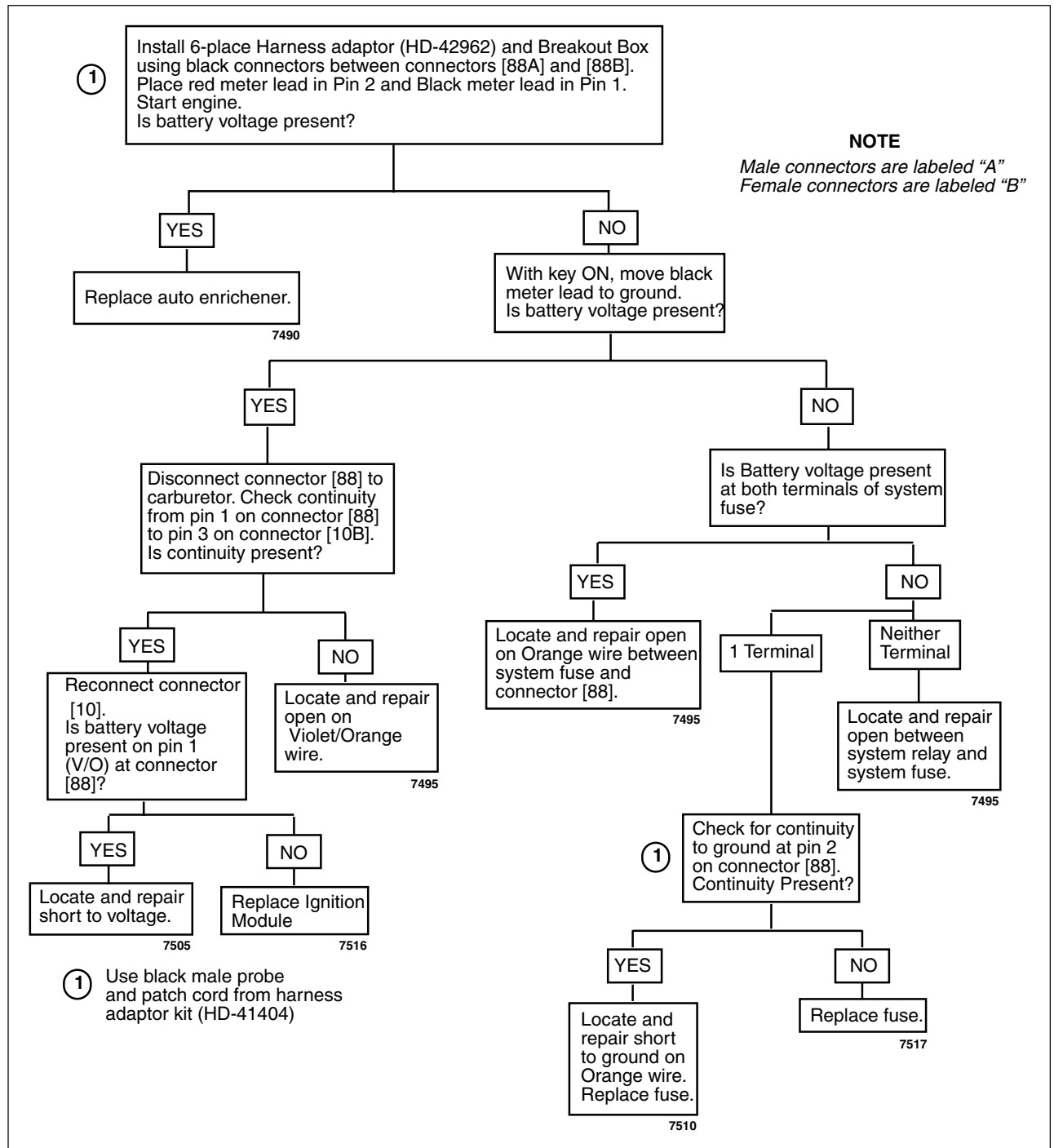


Figure 7-16. Driveability Troubleshooting

## GENERAL

See [Figure 7-17](#). The ignition module is integrated with the cam position sensor on the module plate in the gearcase cover located on the right side of the motorcycle. The integrated ignition module is not repairable. Replace the unit if it fails.

See [7.2 IGNITION SYSTEM](#) for information on the function and testing of the integrated ignition module.

See [Figure 7-18](#). The rotor cup is located in the gearcase cover on the right side of the vehicle behind the integrated ignition module. The rotor is mounted on the camshaft and operates at one-half crankshaft speed. See [IGNITION TIMING](#) for information on the function, testing and adjustment of the integrated ignition module and trigger rotor assembly.

## REMOVAL

1. Remove seat. See [2.28 SEAT](#).

### WARNING

**To protect against shock and accidental start-up of vehicle, disconnect the negative battery cable before proceeding. Inadequate safety precautions could result in death or serious injury.**

2. Disconnect negative battery cable from battery terminal.
3. Remove locknut and clamp that secures wire harness and hoses on right side of motorcycle.
4. See [Figure 7-17](#). Disconnect connector [10] located on the left side of the frame backbone.
5. Note position of each wiring terminal in plug end of connector.
6. Remove connector terminal pins. See [B.2 DEUTSCH ELECTRICAL CONNECTORS](#).

### WARNING

**Always wear proper eye protection when drilling. Flying debris could result in serious eye injury.**

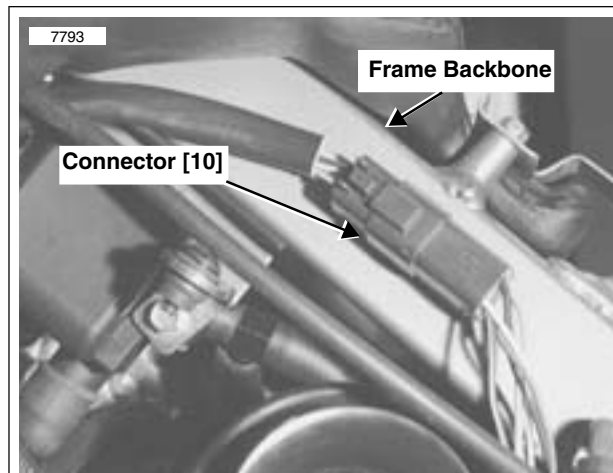
### CAUTION

**Drilling hole in cover in location other than that specified may result in module plate damage. Drill carefully only where indicated to avoid damaging module plate behind cover.**

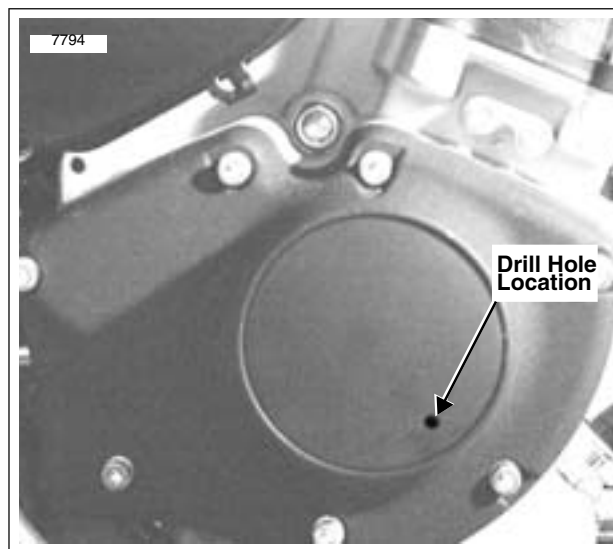
### CAUTION

**Do not pry timer cover from bore or damage to gearcase or ignition module may result.**

7. See [Figure 7-18](#). Drill hole in outer timer cover at 5:00 position approximately 1/2 inch (13 mm) in from outside edge. Pull out outer timer cover using 90 degree pick or other suitable tool.



**Figure 7-17. Integrated Ignition Module Connector [10]**



**Figure 7-18. Drilling/Removing Timer Cover**

8. To obtain approximate ignition timing during installation, scribe alignment marks across module plate and bore in two places.
9. See [Figure 7-19](#). Remove two module plate mounting screws. Carefully remove module plate. Remove screw and rotor cup.
10. Carefully remove camshaft oil seal if damaged or if there is any evidence of oil leakage past the seal.

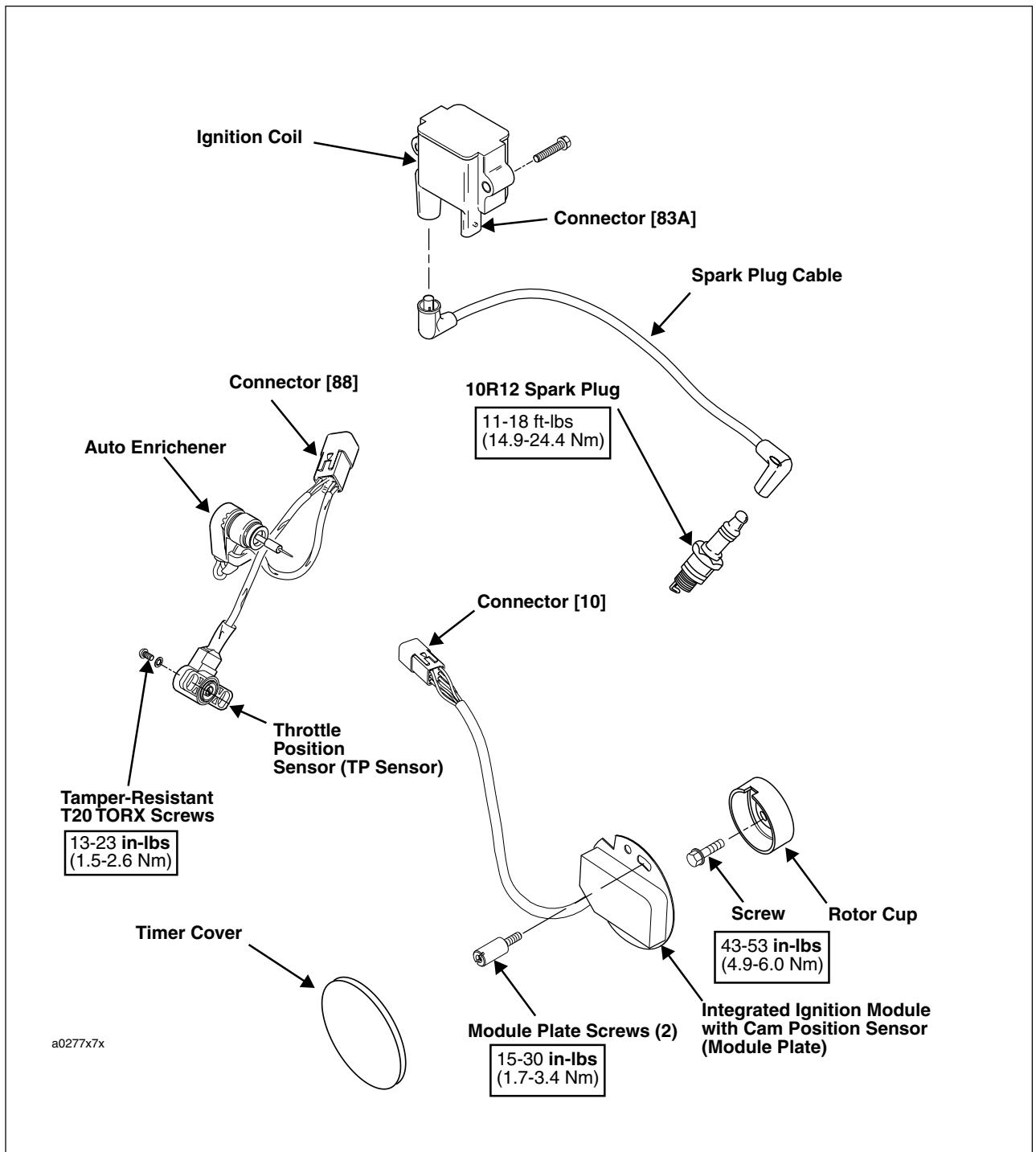


Figure 7-19. Ignition Module/Cam Position Sensor

## INSTALLATION

1. With the lipped side facing inboard, install **new** camshaft oil seal into gearcase cover, if removed. Press seal into position until lightly bottomed.
2. Install rotor cup.
  - a. Apply LOCTITE THREADLOCKER 243 (blue) to threads of screw.
  - b. Position rotor cup onto end of camshaft aligning notch with camshaft slot.
  - c. Install screw to secure rotor cup. Tighten screw to 43-53 **in-lbs** (5-6 Nm).
3. Install module plate with two screws.
4. Install ignition module wiring terminals into correct positions in plug end of connector [10]. See Wiring Diagram. Install pin terminals. See [B.2 DEUTSCH ELECTRICAL CONNECTORS](#).
5. See [Figure 7-17](#). Mate connector [10] and install to T-stud on frame backbone.
6. Install locknut to clamp that secures hoses and wire harness on right side of motorcycle.
7. Install module plate with two screws. Do not tighten screws.
8. Install negative battery cable to battery terminal. Tighten fastener to 60-96 **in-lbs** (7-11 Nm).
9. Check ignition timing. See [IGNITION TIMING](#).
10. Tighten module plate screws to 10-20 **in-lbs** (1-2 Nm).
11. Install **new** outer timer cover.

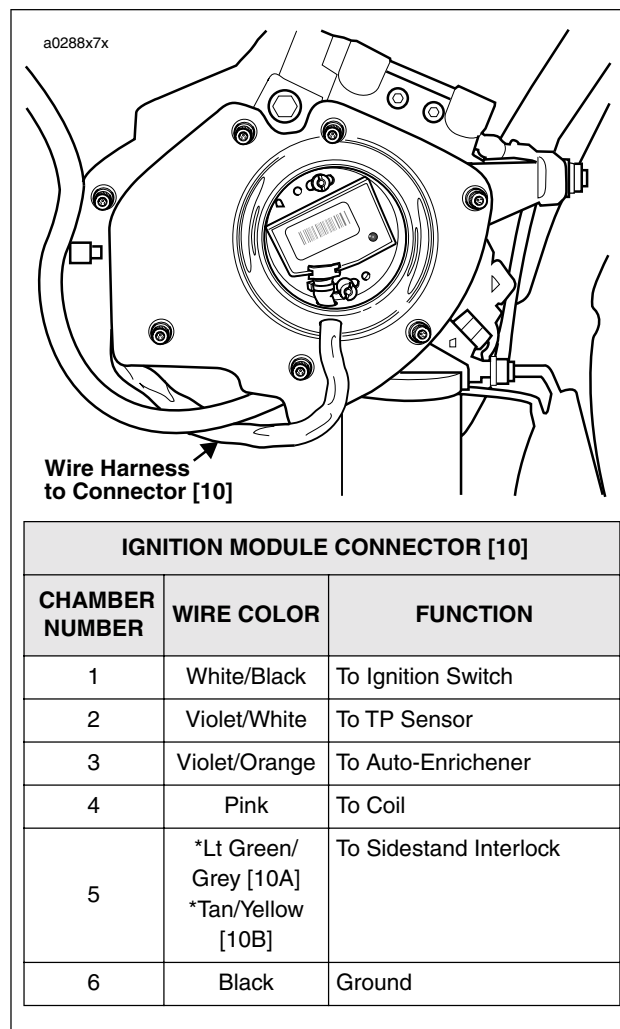


Figure 7-20. Ignition Connector [10]

## IGNITION TIMING

### NOTE

Use static timing method if inductive timing light is not available.

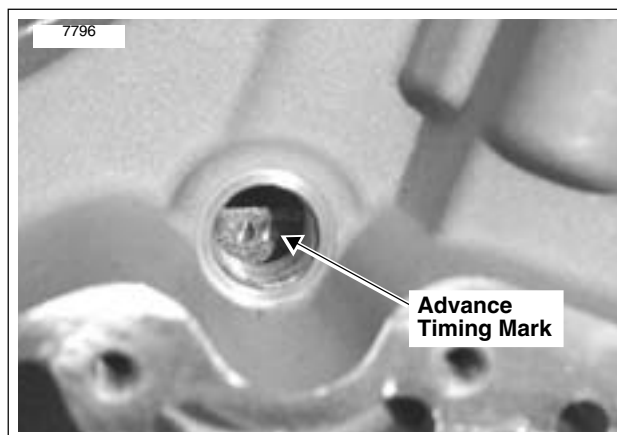
### Dynamic Timing

1. Remove hex socket timing plug from timing inspection hole, which is located on right crankcase half and centered below engine cylinders. Install TIMING MARK VIEW PLUG (Part No. HD-96295-65D) into timing inspection hole. Make sure view plug does not touch flywheel.
2. Connect leads of INDUCTIVE TIMING LIGHT (Part No. HD-33813) to spark plug cable, battery positive (+) terminal, and suitable ground.
3. Make sure vacuum hose is properly installed at carburetor. Start engine.
4. Make sure sidestand is up and transmission is in NEUTRAL.
5. Set engine speed to 1200 rpm.

### CAUTION

**When checking ignition timing, always check at the rpm listed. Failure to do so may result in running engine with too much spark advance, and may cause extreme engine knock and engine failure.**

6. See [Figure 7-21](#). Timing light will flash each time an ignition system spark occurs. Aim timing light into timing inspection hole. The advance timing mark (two dots) should be centered in timing inspection hole. If this is the case, ignition timing is properly adjusted. Go to Step 11. If timing mark is not centered or is not visible in the timing inspection hole, see to Steps 7-12.
7. See [Figure 7-18](#). Drill hole in location shown and remove outer timer cover, if not removed.
8. Loosen module plate screws just enough to allow sensor plate to be rotated using a screwdriver in the plate's notch.
9. With timing light aimed into inspection hole, rotate module plate until advance timing mark is centered in timing inspection hole (as shown in [Figure 7-21](#)).
10. See [Figure 7-18](#). Tighten module plate screws to 10-20 **in-lbs** (1-2 Nm)
11. Install **new** outer cover, if removed.
12. Remove TIMING MARK VIEW PLUG from timing inspection hole. Install hex socket timing plug. Torque timing plug to 10-15 ft. lbs (14-20 Nm).



**Figure 7-21. Dynamic Ignition Timing**

## Static Timing

### NOTE

The outer timer cover is tamper-resistant and must be drilled out. A **new** outer timer cover will be required when doing this procedure. Do not reuse timer cover after hole has been drilled in it.

1. See Figure 7-22. Locate outer timer cover at bottom of gearcase cover on right side of vehicle.

### WARNING

Always wear proper eye protection when drilling. Flying debris could result in serious eye injury.

2. See Figure 7-18. Drill hole in outer timer cover at 5:00 position approximately 1/2 inch (13 mm) in from edge. Pull out outer timer cover using 90 degree pick or other suitable tool.
3. Remove the timing plug from the timing inspection hole centered below the cylinder on the right side of the crankcase.
4. Remove the spark plug.
5. Jack up or hoist vehicle to allow rotation of the rear wheel.

### NOTE

To check for intake valve closing place a finger over the spark plug hole opening. While engine is on compression stroke, air will be expelled from hole. When air is no longer expelled from hole, both valves are closed and engine should be close to TDC and between compression and power stroke.

6. Shift transmission into fifth gear, and standing on **left** side of vehicle, slowly rotate rear wheel in direction of forward motion (counter-clockwise) until front intake valve opens and closes.
7. See Figure 7-22. Rotate rear wheel from **right** side of vehicle in direction of forward motion (clockwise) until TDC mark (vertical line) is centered in timing inspection hole.
8. Turn ignition switch to ON position, make sure side stand is up and place transmission in NEUTRAL.
9. See Figure 7-23. Loosen two screws and slowly rotate module plate until red LED illuminates. Tighten module plate screws to 10-20 **in-lbs** (1-2 Nm) when complete.
10. Install **new** outer cover.
11. Install timing plug. Tighten plug to 10-15 ft-lbs (14-21 Nm).
12. If possible, dynamically time engine as well to verify that system is functioning properly. See DYNAMIC TIMING. Begin at step 2.

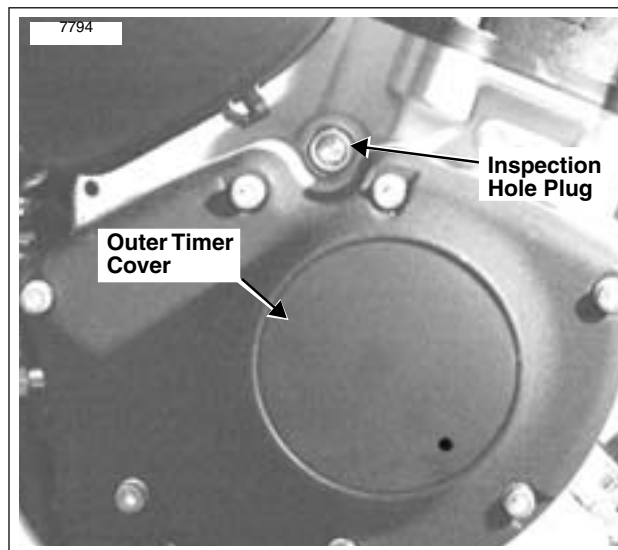


Figure 7-22. Timer Cover and Inspection Hole

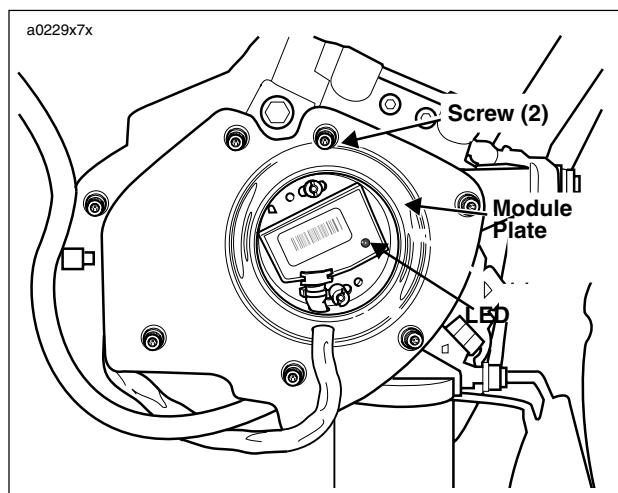


Figure 7-23. Static Ignition Timing (Typical)

## GENERAL

See [Figure 7-24](#). The ignition coil is mounted on the frame underneath the fuel tank on left side above airbox.

See [Figure 7-18](#). The ignition coil is a pulse-type transformer. Internally, the coil consists of primary and secondary windings with a laminated iron core. The contents are sealed in a waterproof insulating compound. The ignition coil is not repairable. Replace the unit if it fails.

The low-voltage ignition primary circuit consists of the coil primary winding, ignition module and battery. When the circuit is closed, current flows through the coil primary winding creating a strong magnetic field in the iron core of the ignition coil.

When the ignition module receives a signal from the cam position sensor and trigger rotor, the ignition module interrupts (opens) the ignition primary circuit, which causes the magnetic field in the coil core to collapse.

The collapsing magnetic field induces a high-voltage electrical discharge in the ignition secondary circuit, which consists of the coil secondary winding, spark plug cable and spark plug. The high-voltage discharge produces a spark to bridge the electrode gap of the spark plug.

The ignition coil fires the spark plug at the end of the compression stroke (no-waste spark).

## TROUBLESHOOTING

Follow the troubleshooting procedures listed under [7.8 IGNITION MODULE/ CAM POSITION SENSOR](#) if the engine will not start, is difficult to start or runs roughly. Also check condition of the spark plug cable. Insulation on cable may be cracked or damaged allowing high tension current to short to metal parts. This problem is most noticeable when cable is wet.

If poor starting/running condition persists, check resistance of ignition coil primary and secondary winding using an ohmmeter.

### Ignition Coil Primary Circuit Test

1. Remove ignition coil.
2. Set ohmmeter scale to RX1.
3. See [Figure 7-25](#). Using harness connector adaptor kit (HD-41404) gray female probes and patch cord, place multimeter wires on primary coil windings. See Page 7-7.
4. Check for primary coil winding resistance.
  - a. Normal resistance range is 0.4-0.6 ohms.
  - b. See [TEST RESULTS](#) on the next page if resistance is not within normal operating range.

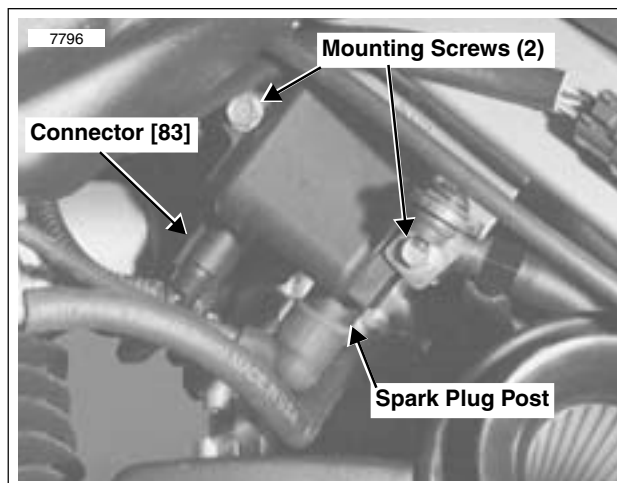


Figure 7-24. Ignition Coil (Left Side)

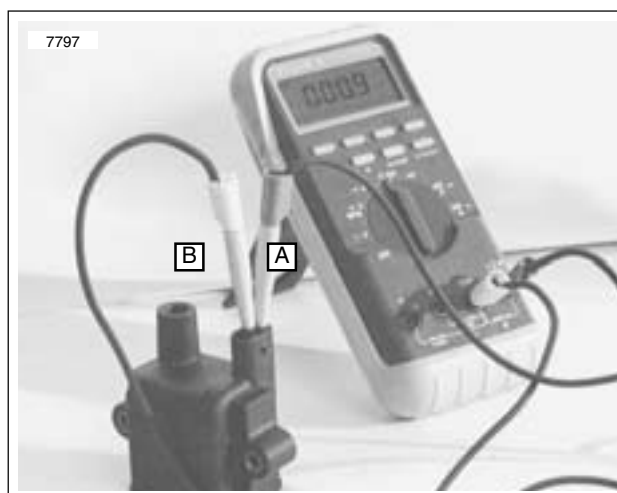


Figure 7-25. Ignition Coil Primary Resistance Test

### Ignition Coil Secondary Circuit Test

1. Remove ignition coil.
2. Set ohmmeter scale to RX1K.
3. See [Figure 7-26](#). Using harness connector adaptor kit (HD-41404) gray female probes and patch cord, place multimeter wires on secondary coil windings. See Page 7-7.
4. Check for secondary coil winding resistance.
  - a. Normal resistance range is 7,720-9,440 ohms.
  - b. See [TEST RESULTS](#) on the next page if resistance is not within normal operating range.

## Test Results

1. A low resistance value indicates a short in the coil winding. Replace coil.
2. A high resistance value might indicate that there is some corrosion/oxidation of the coil terminals. Clean the terminals and repeat resistance test. If resistance is still high after cleaning terminals, replace coil.
3. An infinite ohms ( $\infty$  or no continuity) resistance value indicates an open circuit (a break in the coil winding). Replace coil.

## REMOVAL

1. Remove seat. See [2.28 SEAT](#).

### WARNING

**To protect against shock and accidental start-up of vehicle, disconnect the negative battery cable before proceeding. Inadequate safety precautions could result in death or serious injury.**

2. Disconnect negative battery cable from battery terminal.
3. Remove fuel tank cover. See [4.2 FUEL TANK COVER/ FUEL TANK](#).
4. Remove left fascia.
5. See [Figure 7-24](#). Disconnect spark plug cable from coil plug post.
6. See [Figure 7-27](#). Disconnect coil connector [83].
7. Remove two screws and washers and coil.

## INSTALLATION

1. See [Figure 7-24](#). Apply LOCTITE THREADLOCKER 243 (Blue) to threads of two mounting screws.
2. Attach coil to frame with screws and washers (1). Tighten to 4-6 ft-lbs (5-8 Nm).
3. Attach coil connector [83].
4. Connect spark plug cable to ignition coil.
5. Attach left fascia.
6. Install negative battery cable to battery terminal. Tighten fastener to 60-96 **in-lbs** (7-11 Nm).
7. Install fuel tank cover. See [4.2 FUEL TANK COVER/ FUEL TANK](#).

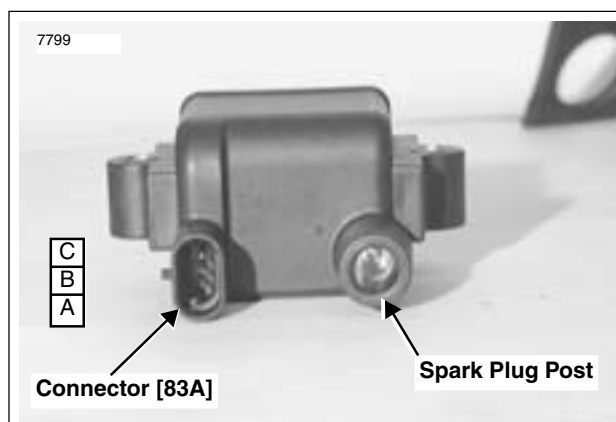
### WARNING

**After installing seat, pull upward on front of seat to be sure it is locked in position. If seat is loose, it could shift during vehicle operation and startle the rider, causing loss of control of vehicle and death or serious injury.**

8. Install seat. See [2.28 SEAT](#).



Figure 7-26. Ignition Coil Secondary Resistance Test



COIL CONNECTOR [83]		
CHAMBER NUMBER	WIRE COLOR	FUNCTION
A	White/Black	(+) To Right Handlebar Switch
B	Pink	(-) To Ignition Module
C	Black	Ground

Figure 7-27. Coil Viewed From Bottom



## GENERAL

Resistor-type high-tension spark plug cables have a carbon-impregnated fabric core, instead of solid wire, for radio noise suppression and improved reliability of electronic components. Use the exact replacement cable for best results.

## REMOVAL

### ⚠ WARNING

Never disconnect the spark plug cable with the engine running. If you disconnect the spark plug cable with the engine running, you may receive a severe electric shock from the ignition system which could result in death or serious injury.

### CAUTION

When disconnecting the spark plug cable from its spark plug terminal, always grasp and pull on the rubber boot at the end of the cable assembly (as close as possible to the spark plug terminal). Do not pull on the cable portion itself. Pulling on the cable will damage the cable's carbon core.

Disconnect spark plug cable from ignition coil and spark plug terminal. Inspect removed cable for damage.

## INSPECTION

- See [Figure 7-28](#). Inspect spark plug cable. Replace cable if worn or damaged.
  - Check for cracks or loose terminals.
  - Check for loose fit on ignition coil and spark plug.
- Check cable boot/cap for cracks or tears. Replace boot/cap if worn or damaged.
- See [Figure 7-29](#). Check spark plug cable resistance with an ohmmeter. Replace cables not meeting resistance specifications.
  - 2,375-5,833 ohms

## INSTALLATION

- Connect spark plug cable to ignition coil and spark plug.
- Fasten boot/cap securely. Tight connections provide the necessary moisture-proof environment for the ignition coil and spark plug terminals.

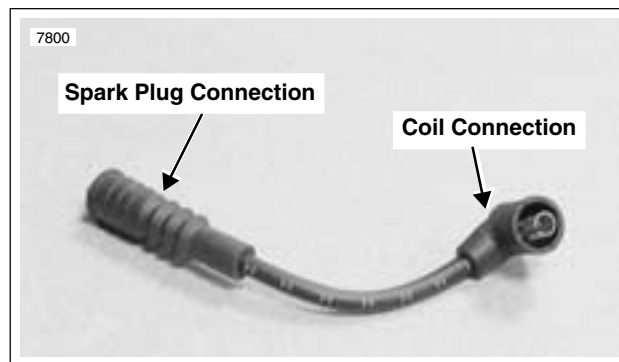
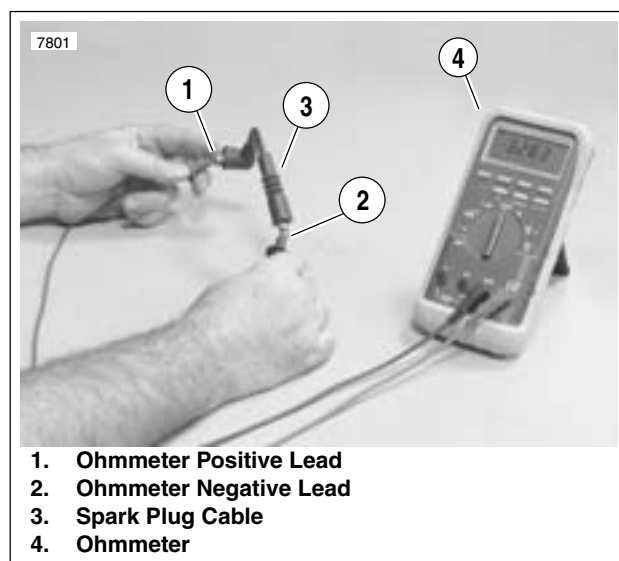


Figure 7-28. Spark Plug Cable (Typical)



- Ohmmeter Positive Lead
- Ohmmeter Negative Lead
- Spark Plug Cable
- Ohmmeter

Figure 7-29. Testing Resistance

## GENERAL

The starter/ignition interlock system is designed to prevent unintended start-up and/or forward motion of the motorcycle. One of three conditions must exist to allow operation of the vehicle:

- Clutch disengaged (lever pulled in)
- Transmission in Neutral
- Sidestand retracted

VOLTAGE AT TN/Y WIRE AT CONNECTOR [10B]		
CONDITION	SIDESTAND DOWN	SIDESTAND UP
Clutch Engaged Transmission in Gear	<1.0V	12V (Battery Voltage)
Neutral	Battery Voltage minus 0.7V +/- 0.1V	12V (Battery Voltage)
Clutch Disengaged	Battery Voltage minus 0.7V +/- 0.1V	12V (Battery Voltage)

## Starter Circuit

The starter circuit prevents the motorcycle from being started unless a ground has been established at the starter relay. This ground comes from one source.

- By disengaging the clutch (pulling in the clutch lever) and grounding through the clutch lever switch.

Once the starter circuit is grounded and the starter button pushed, the starter relay can be energized. The energized relay then allows the starter motor to crank the engine.

## Ignition Circuit

The ignition circuit prevents the motorcycle from operating unless a ground is established at the system relay. If this ground is not established, the ignition system will not be turned on and the motorcycle will not run. Grounds may be established three ways.

- By retracting the side stand and grounding through the **side stand switch**. See Ignition Test 1 on following page to check sidestand switch function.
- By placing the motorcycle in neutral and grounding through the **neutral switch**. See Ignition Test 2 on following page to check neutral switch function.
- By disengaging the clutch and grounding through the **clutch lever switch**. See Ignition Test 3 on page 7-28 to check clutch switch function.

Note that the ignition circuit is enabled when the transmission is in gear with the side stand extended if the clutch is disengaged (clutch lever pulled in). However, if the motorcycle is in gear with the side stand extended, and the clutch lever is released, the ignition ground is lost and the ignition system is turned off. This system will prevent vehicle operation if forward motion is attempted with the side stand down.

See Ignition Tests on following pages.

Use harness connector adaptor kit (HD-41404) gray male probe and patch cord.

# DIAGNOSTICS

## Ignition Test 1 - Sidestand Switch Function

CONDITION: Sidestand up and key ON, transmission in neutral and clutch engaged

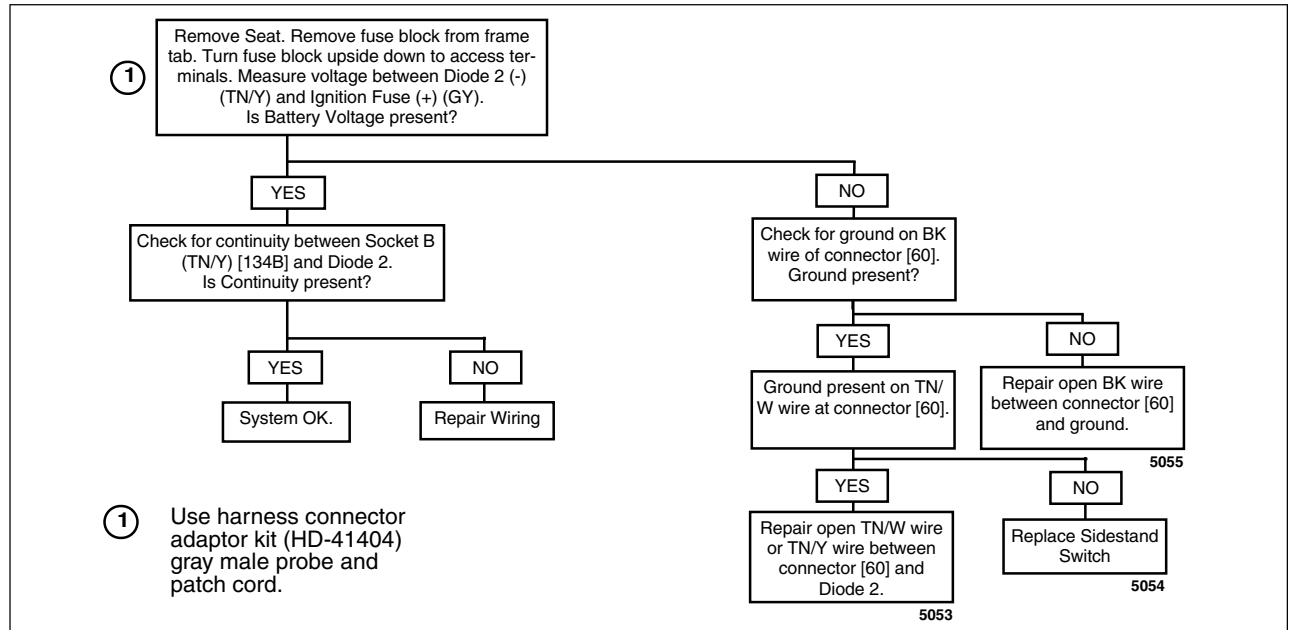


Figure 7-30. Ignition Test 1

## Ignition Test 2 - Neutral Switch Function

CONDITION: Sidestand down, key ON, transmission in neutral and clutch engaged

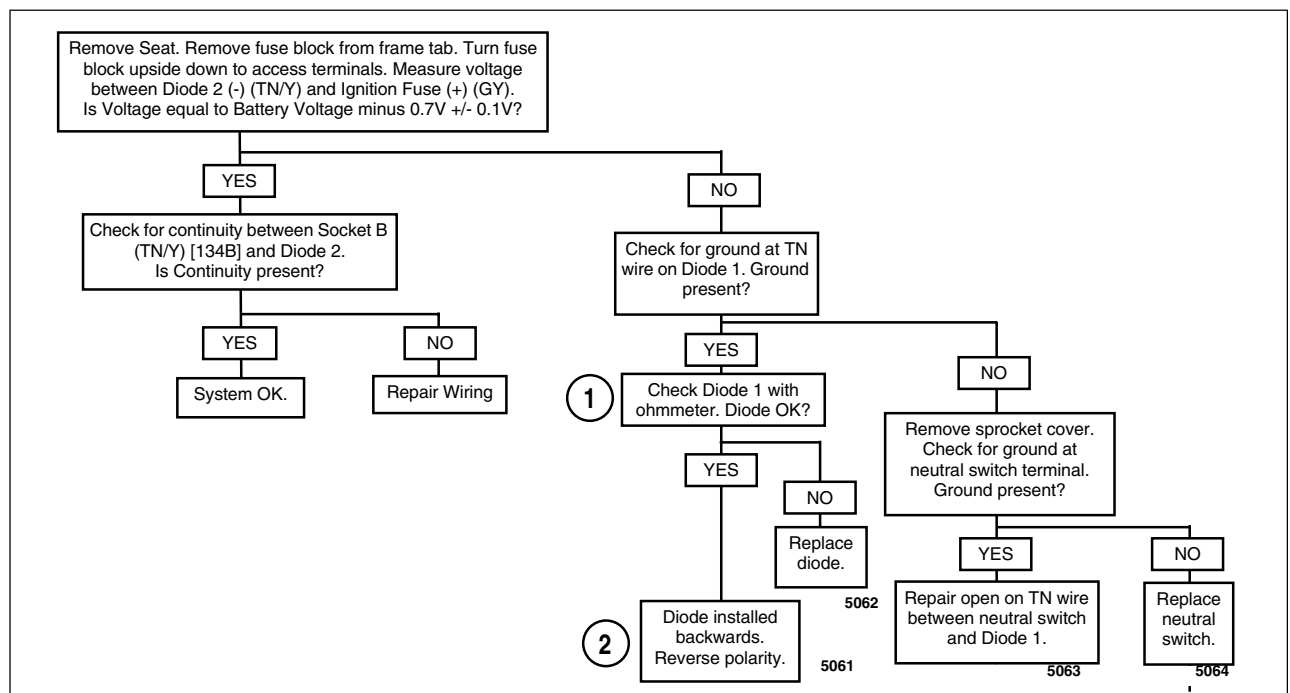


Figure 7-31. Ignition Test 2

## Ignition Test 3 - Clutch Switch Function

CONDITION: Sidestand down, key ON, transmission in gear and clutch disengaged

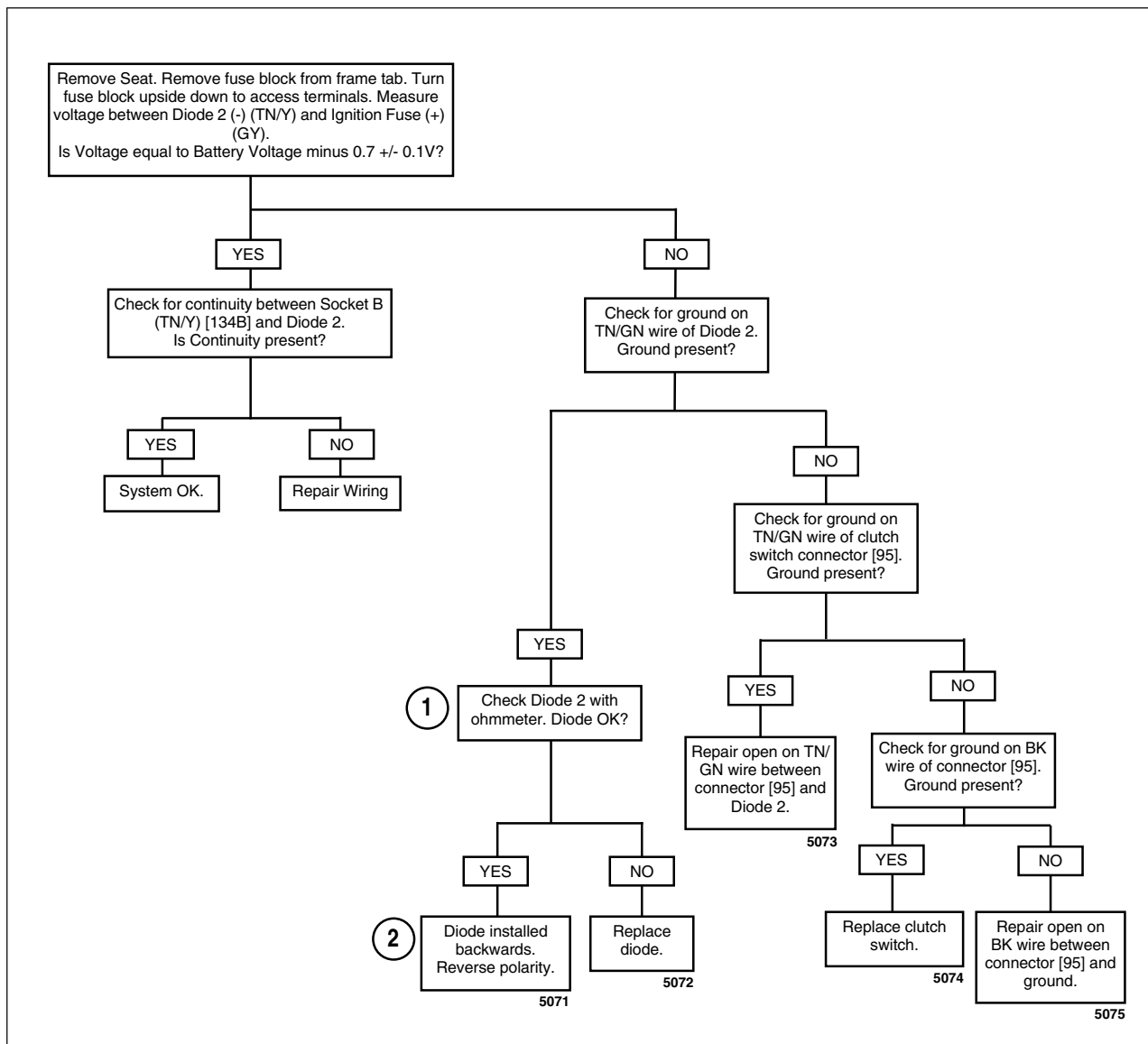


Figure 7-32. Ignition Test 3

## TESTING/REPLACEMENT

### Side Stand Switch

See Figure 7-33. The side stand switch is a simple spring loaded plunger. The switch completes a path to ground for the ignition relay when the side stand is in the retracted position. Test the switch as follows:

1. Unplug the 2-place side stand switch connector [60].
2. Test the switch using an ohmmeter.
  - a. With side stand down (switch open), the switch should show  $\infty$  ohms (infinite ohms).

- b. With side stand up (switch closed), the switch should show 0 ohms or little resistance.
3. Replace the assembly with a **new** switch if necessary.
  - a. Remove side stand switch from Sidestand by removing two bolts and nuts.
  - b. Apply LOCTITE THREADLOCKER 243 (Blue) to threads of two bolts.
  - c. Install **new** sidestand switch with two bolts and nuts. Tighten bolts to 30-36 **in-lbs** (3-4 Nm).

### Clutch Switch

See Figure 7-34. The clutch switch attaches to the clutch control lever bracket. The switch completes a path to ground for the ignition relay and the starter relay when the clutch is disengaged. Test the switch as follows:

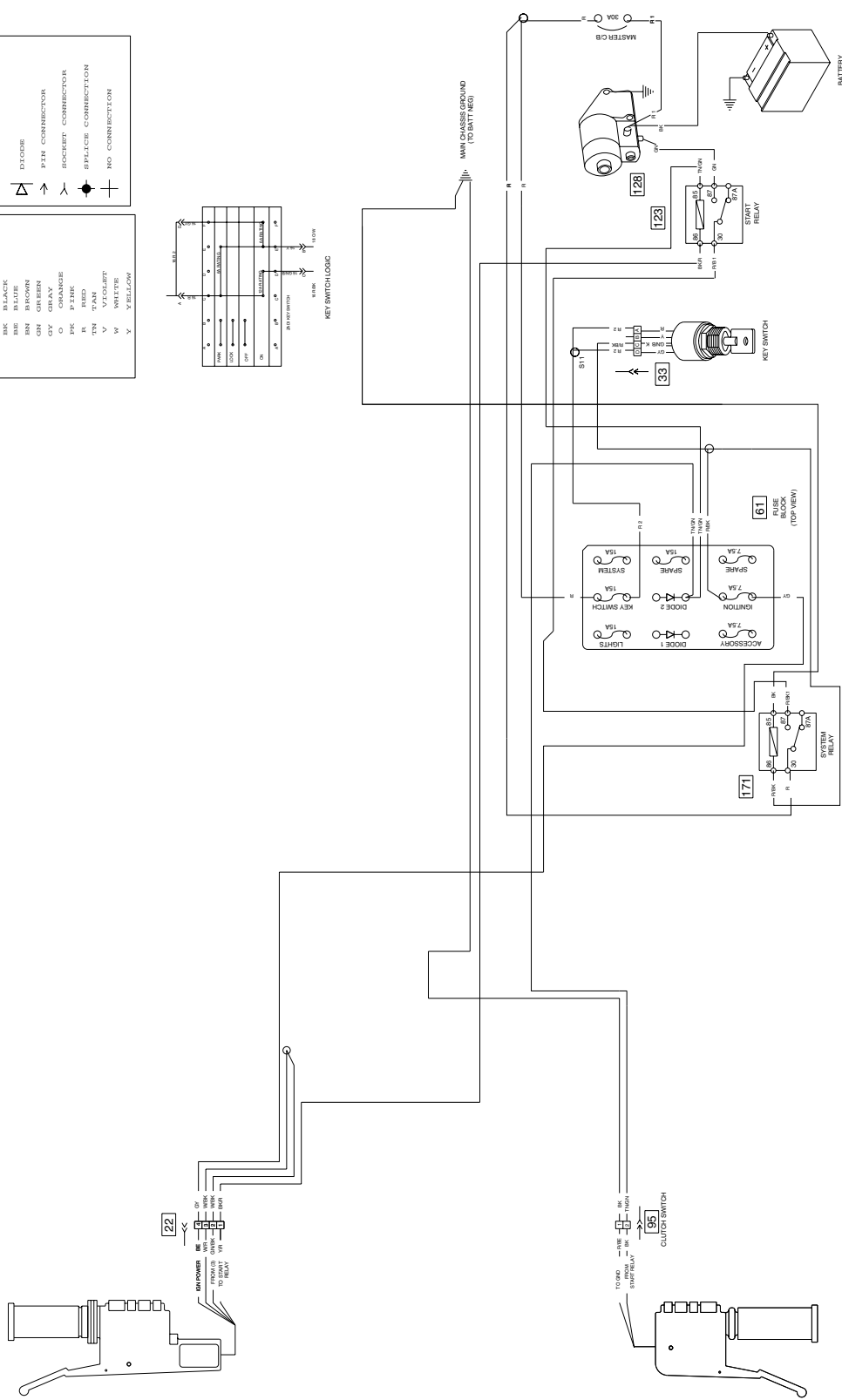
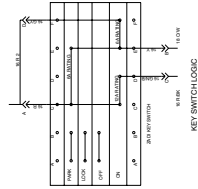
1. Unplug the 2-place clutch switch connector [95].

a0194x5x

COLOR CODES:	
BK	BLACK
BL	BLUE
BR	BROWN
GN	GREEN
OR	ORANGE
PK	PINK
RD	RED
TR	TAN
WH	WHITE
YL	YELLOW

CONNECTOR CODES:	
□	DIODE
→	PIN CONNECTOR
↘	SOCKET CONNECTOR
●	SPLICE CONNECTION
+	NO CONNECTION



2. Test the switch using an ohmmeter.
  - a. With clutch engaged (1) (switch open), the switch should show  $\infty$  ohms (infinite ohms).
  - b. With clutch disengaged (2) (switch closed), the switch should show 0 ohms or little resistance.
3. Replace the assembly with a **new** switch if necessary.
  - a. Remove small Phillips screw.
  - b. Depress clutch lever and hold.
  - c. Detach switch by depressing switch trigger button and pulling switch towards the end of the handlebar.
  - d. Install **new** switch.

**NOTE**

To test/replace the neutral switch, see 7.23 NEUTRAL INDICATOR SWITCH.

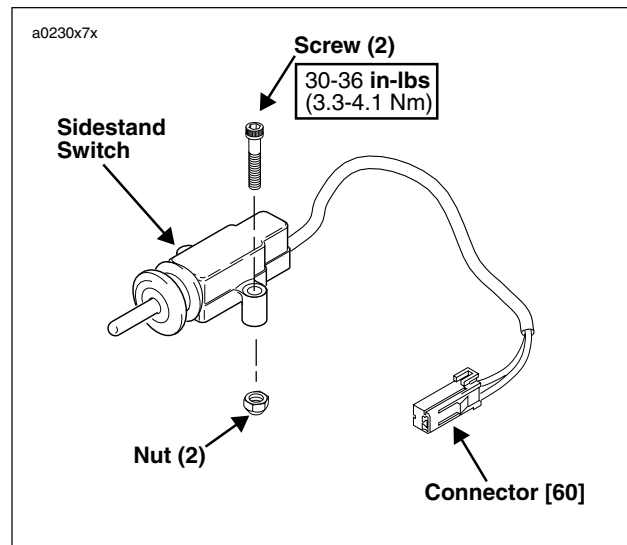


Figure 7-33. Side Stand Switch

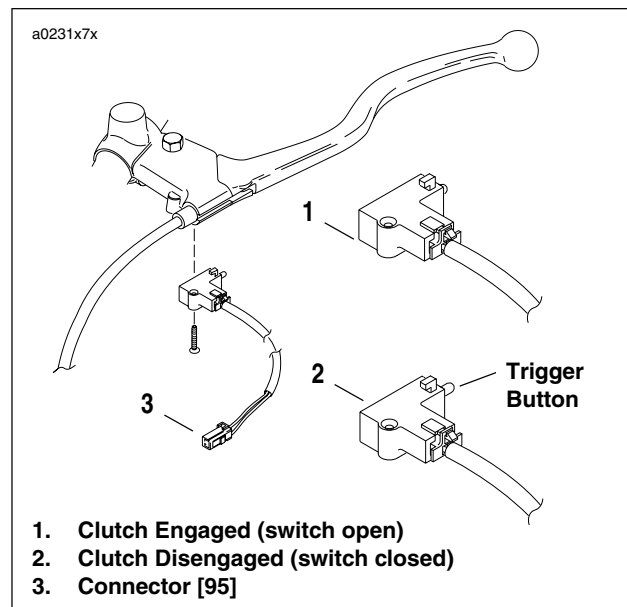


Figure 7-34. Clutch Switch

## System Relay

See [Figure 7-35](#). The system relay is in the relay block which is located on the left side under the seat. Test the relay as follows:

1. Remove seat. See [2.28 SEAT](#).
2. Unplug relay from connector. See ["ON-MOTORCYCLE" TESTS](#).
3. Test the relay in the same fashion as the starter relay. See [5.6 STARTER SYSTEM TESTING](#).
4. Replace the relay with a **new** relay if necessary. Install relay to frame with new rivet and washer.

## Starter Relay

The starter relay is located on the right side of the motorcycle, underneath the seat by the flasher relay.

## Main Circuit Breaker

See [Figure 7-36](#). Attached to the frame above the battery, the main circuit breaker is between the ignition key switch and the battery. Remove the main circuit breaker as follows:

1. Remove seat. See [2.28 SEAT](#).
2. Disconnect battery negative cable from battery.
3. See [Figure 7-37](#). Remove acorn nuts, nuts with lock washers and wire leads from circuit breaker studs. Tag wire leads for ease of assembly.
4. See [Figure 7-36](#). Remove circuit breaker from circuit breaker bracket by carefully prying tab, located on left side, open and sliding circuit breaker out. NOTE: Bank Angle Sensor will require reinstallation if bracket is removed. See [7.5 BANK ANGLE SENSOR](#).
5. Install in the reverse order. Tighten screw (if bracket was removed) to 25-27 in-lbs (2.8-3.1 Nm). Tighten metal nut to 15-18 in-lbs (1.7-2 Nm). Tighten plastic acorn nuts to 1-3 in-lbs (0.1-0.3 Nm).

## Ignition Fuse

See [Figure 7-38](#). The ignition fuse is in the fuse block under the seat. Always replace the fuse with another 7.5 ampere fuse.

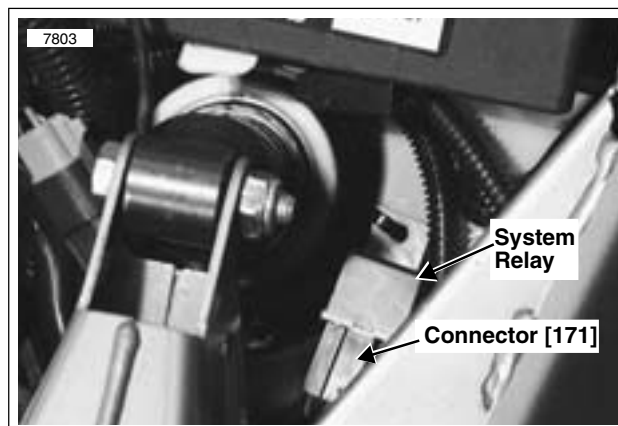


Figure 7-35. System Relay

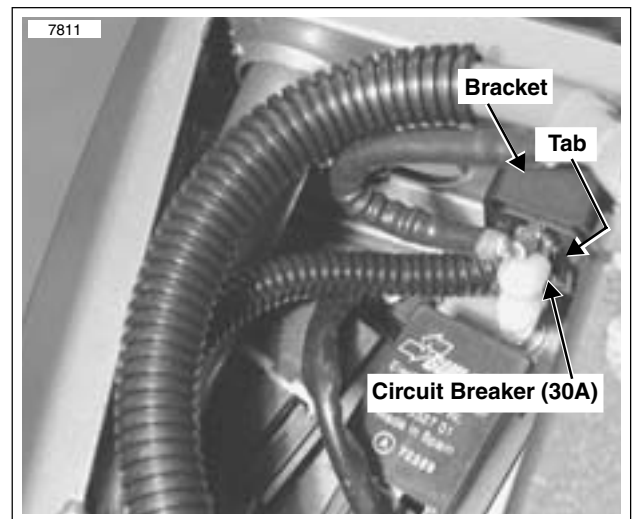


Figure 7-36. Circuit Breaker

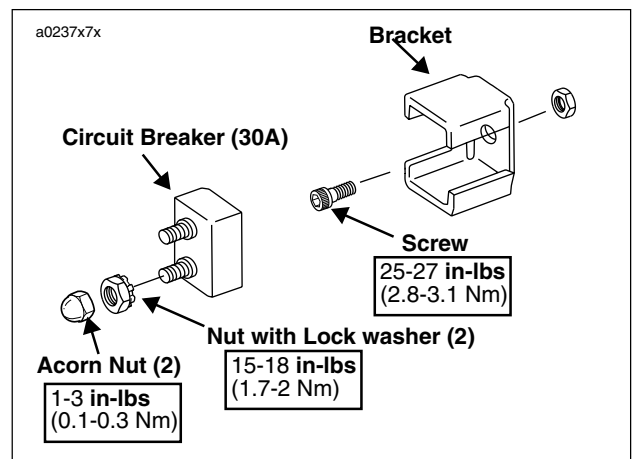


Figure 7-37. Circuit Breaker Installation

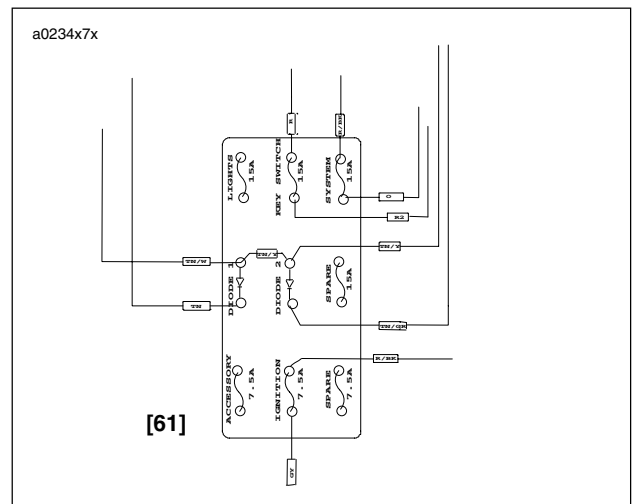


Figure 7-38. Fuse Block

## Diodes

The relay block contains two diodes. A diode acts as a one way switch which permits current flow in one direction, but not in the other.

The reference numbers below correlate with the circled numbers in the 7.11 STARTER/IGNITION INTERLOCK flow charts.

1. Check diode with an ohmmeter as shown in Figure 7-39.
2. Check diode polarity as shown in Figure 7-40.
3. Replace diodes as necessary.

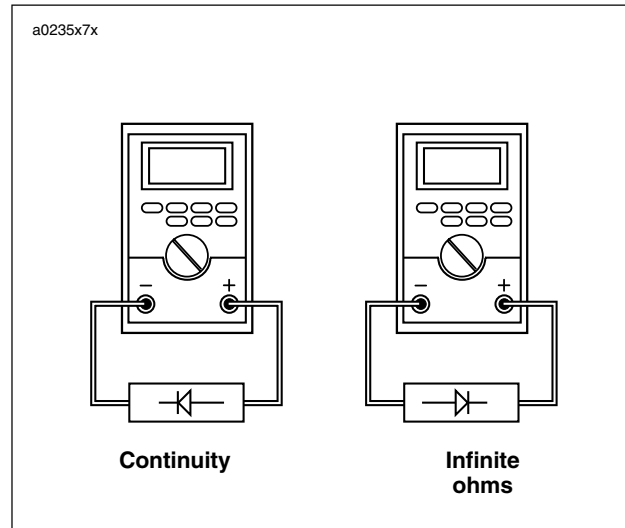


Figure 7-39. Ohmmeter Diode Test

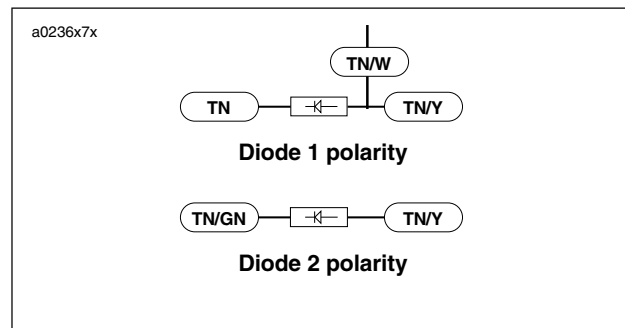


Figure 7-40. Diode Polarity