SPECIFICATIONS

BATTERY	
Size	12 VDC
Type	Sealed

SPARK PLUGS		
Size	12 mm	
Style	6R12	
Gap	0.038-0.045 in.	0.96-1.14 mm
Torque value	11-18 ft-lbs	14.9-24.4 Nm

ALTERNATOR	
AC voltage output	19-26 VAC per 1000 engine RPM
Stator coil resistance	0.2-0.4 Ohms

REGULATOR	
Voltage output @ 75°F	13.8-15 VDC
Amperes @ 3600 RPM	22 Amps

IGNITION TIMING SPARK OCCURRENCE		
Idle	**V.O.E.S.**	
	Connected	**Disconnected**
World models 950-1050 RPM	20˚ BTDC	Approximately 7.5˚ BTDC
California models 1150-1250 RPM	20˚ BTDC	Approximately 7.5˚ BTDC

IGNITION COIL RESISTANCE	
Primary winding	2.5-3.1 Ohms
Secondary winding	10,000-12,500 Ohms

ELECTRICAL SYSTEM	AMPERES
Main circuit breaker	30
Ignition fuse	15
Light fuse	15
Accessory fuse	15
Instrument fuse	15

BULB CHART			
Lamp Description (All Lamps 12 V)		**Number Of Bulbs Required**	**Specifications**
Headlamp	High/low replaceable bulb	1	60 W/55 W
	Position lamp	1	14 W
Marker lamps	Tail/stop lamp	1	5 W/21 W
	Turn signal lamp-front and rear, 1 bulb per lamp	4	10 W
	License plate lamp	1	5 W
Indicator lamps on instrument support	High beam indicator	1	0.07 Amps/2 C.P.
	Turn signal indicator	2	0.07 Amps/2 C.P.
	Oil pressure indicator	1	0.07 Amps/4 C.P.
	Neutral indicator	1	0.07 Amps/4 C.P.
Instruments	Speedometer	2	0.22 Amps/2 C.P.
	Tachometer	1	0.22 Amps/2 C.P.

ITEM	TORQUE		NOTES
Headlamp housing screws	5-7 ft-lbs	6.8-9.5 Nm	metric, page 7-34, page 7-37
Ignition coil mounting screws	2-6 ft-lbs	2.7-8 Nm	page 7-17
Inner cover screws	12-20 **in-lbs**	1.4-2.3 Nm	page 7-15
Neutral indicator switch	3-5 ft-lbs	4.0-6.8 Nm	LOCTITE THREADLOCKER 242 (blue), page 7-42
Rotor mounting bolts	90-110 **in-lbs**	10.2-10.4 Nm	LOCTITE THREADLOCKER 242 (blue), page 7-30
Spark plugs	11-18 ft-lbs	14.9-24.4 Nm	page 7-1
Stator mounting screws	30-40 **in-lbs**	3.4-3.5 Nm	T-27 Torx with retaining compound, replace after removal, page 7-30
Switchgear housing screws, left side	25-33 in-lbs	2.8-3.7 Nm	metric, page 7-40
Switchgear housing screws, right side	12-17 **in-lbs**	1.4-1.9 Nm	metric, page 7-39
Timer plate studs	12-20 **in-lbs**	1.4-2.3 Nm	page 7-15
Trigger rotor bolt	75-80 **in-lbs**	8.5-9.0 Nm	LOCTITE THREADLOCKER 242 (blue), page 7-15

IGNITION SYSTEM

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 plugs and associated wiring. See Figure 7-1.

The computerized ignition system contains three assemblies.

Ignition Module

The ignition module is mounted to the vehicle frame under a protective cover; it is located to the right of the battery. The ignition 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 plugs.

1. Pop rivet (2)
2. Timer cover
3. Screw (2)
4. Inner cover
5. Ignition gasket
6. Timer plate stud (2)
7. Bolt
8. Sensor assembly
9. Trigger rotor
10. Seal
11. Gearcase cover
12. Spark plug (2)
13. Ignition coil
14. Front spark plug cable
15. Rear spark plug cable
16. V.O.E.S. connector [P7]
17. V.O.E.S.
18. Cable strap
19. Terminal pin
20. Timer connector [P16]
21. Secondary lock
22. Ignition module connector [P10]
23. Ignition module
24. Washer (2)
25. Screw (2)

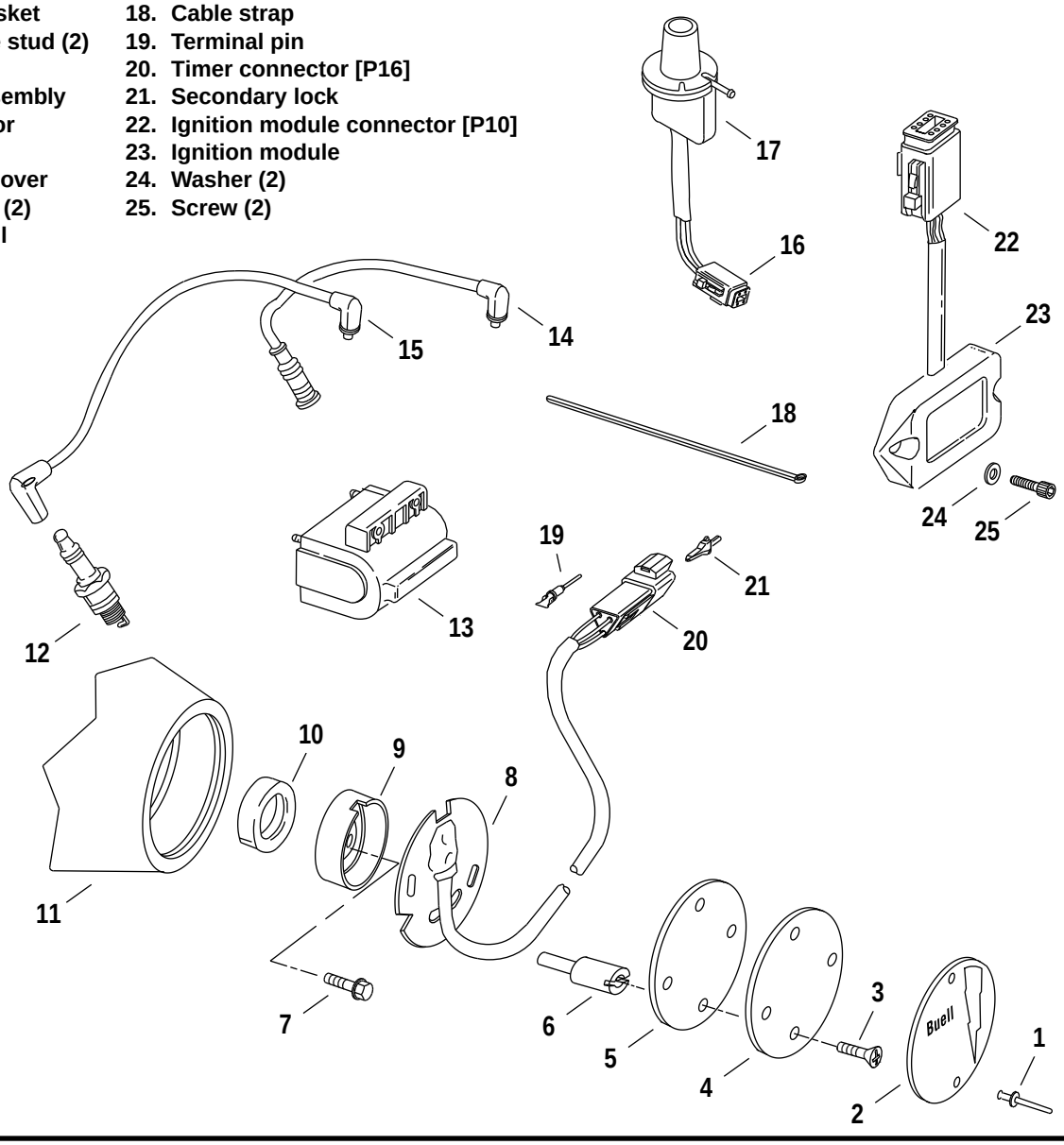

Figure 7-1. Ignition System Components

Vacuum-Operated Electric Switch

The vacuum-operated electric switch (V.O.E.S.) is attached to the carburetor. The V.O.E.S. senses intake passage vacuum through a carburetor hose connection. The switch is open during acceleration and high engine load conditions (low vacuum) and is closed during deceleration and low engine load conditions (high vacuum). The ignition module is programmed with two spark advance curves to meet varying engine loads.

The high-vacuum curve, selected for maximum spark advance under normal light-load cruising conditions, provides improved fuel economy and performance. The low-vacuum curve (retarded spark) minimizes spark knock while maintaining performance under high-load conditions (acceleration and highway driving).

The ignition module selects the proper curve when it receives an open or closed electrical signal from the V.O.E.S. This system ensures correct timing to suit starting and high-speed requirements.

A single ignition coil fires both spark plugs simultaneously. The spark plug in the front cylinder fires at the end of that cylinder's compression stroke, thereby igniting the air/fuel mixture. At the same instant, the spark in the rear cylinder fires ineffectually during the end of that cylinder's exhaust stroke. During the next engine revolution, the simultaneous firing of the spark plugs will occur during the middle of the front cylinder's exhaust stroke and at the end of the rear cylinder's compression stroke (thereby igniting the air/fuel mixture in the rear cylinder).

Rotor and Sensor Plate

The rotor and sensor plate are located in the gearcase 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, slots in its outside diameter break the magnetic field of a Hall-effect device mounted on the sensor plate. 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 5˚-40˚ before TDC. The whole timing program can be shifted by mechanical rotation of the sensor plate. See IGNITION TIMING in Section 1.

The ignition module contains all the solid-state components used in the ignition system. The dwell time for the ignition coil is also calculated by the microprocessor and is dependent upon engine speed. The programmed dwell is an added feature to keep battery drain to a minimum and to adequately charge the coil at all speeds. 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 5.7 VDC. The ignition module is fully enclosed to protect it from vibration, dust, water and oil. The unit is not repairable–it must be replaced if it fails.

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

TROUBLESHOOTING

Perform the following tests if the engine will not start, or if hard starting or missing indicates a faulty operating ignition system.

Check for Ignition Spark

1. Disconnect spark plug cables from spark plugs. Check condition of plugs and cables. Clean or replace as necessary.

2. Insert a conductive adapter into spark plug cable end and establish a 3/16 in. (4.8 mm) gap between adapter and cylinder head. Turn on ignition and "engine stop" switches. With transmission in neutral, press "engine start" button. Check for a spark across plug electrode gap. If a spark is produced, problem is not in electronic system or coil – check carburetion, enrichener and spark plugs. If no spark is produced, check battery voltage and battery connection condition. Battery voltage must be 11-13 VDC. Charge battery if voltage is low.

3. Verify that the ground strap from swingarm mount block to below the circuit breakers is in good condition. If there is still no spark, then perform the tests under NO IGNITION SPARK below.

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 Steps 3 and 5 of the following spark tests, connect a spare spark plug to one of the plug wires and lay the spark plug on the engine cylinder head. During the testing procedures, check for spark across the spark plug electrodes.

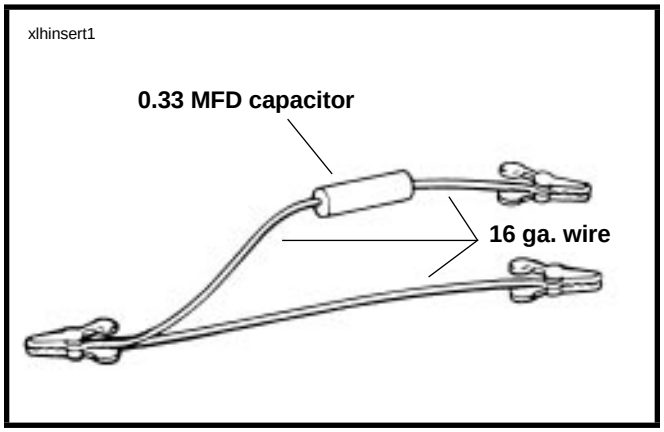

Figure 7-2. Test Jumper

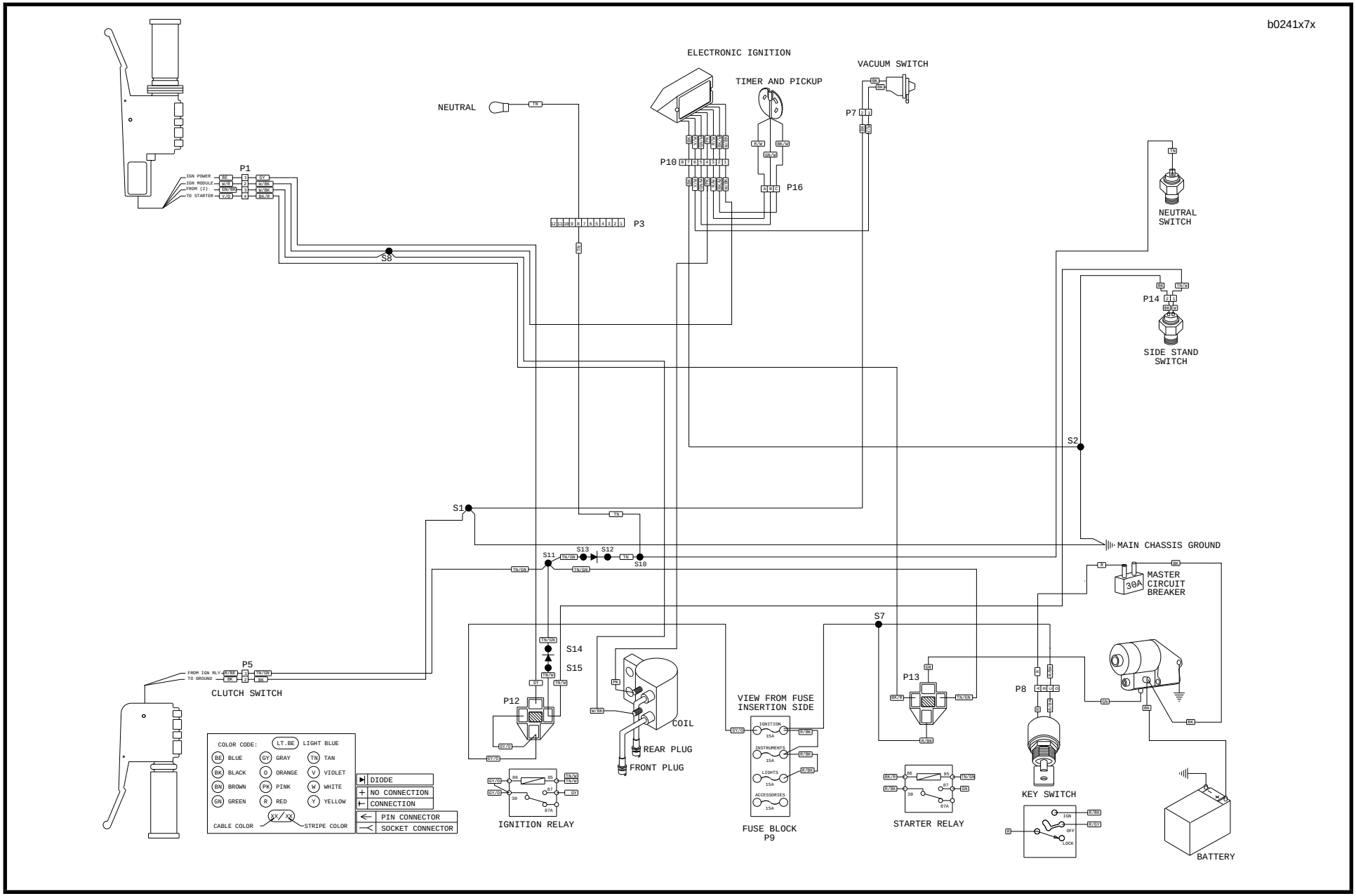

Figure 7-3. Ignition System Circuit

Continuous or No Spark at Plug

STEP 1

1. Ignition switch on.
2. Multimeter red wire to white wire terminal, black wire to ground.
3. Meter should register 12 VDC ± 1.0 volt. If meter is correct, proceed to STEP 2.

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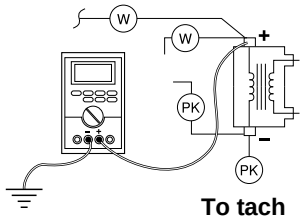

To tach

IF NO POWER

Check circuit breaker, ignition relay, loose wires, switches.

STEP 2

1. Remove pink (module) wire from coil terminal.
2. Ignition switch on.
3. Multimeter red wire alternately to white wire terminal and to pink wire terminal.
4. Meter should register 12 VDC at both terminals. If meter is correct, proceed to STEP 3.

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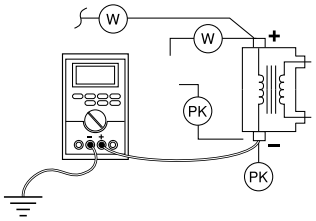

IF NO POWER

Check coil resistance. See COIL later in this section.
If resistance is OK check spark. See STEP 3.

STEP 3

1. Pink (module) wire disconnected.
2. Ignition switch on.
3. Jumper wire – connect capacitor wire to pink wire terminal.
4. Connect both wires to common ground.
5. Momentarily touch ground wire to pink wire terminal. When you remove the wire, there should be a spark at plug. If spark occurs, proceed to STEP 4.

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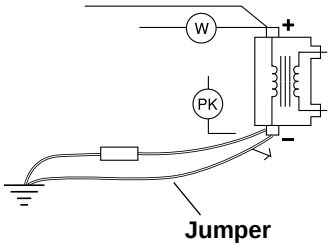

Jumper

IF NO SPARK

Replace coil.

STEP 4

1. Reconnect pink wire to coil.
2. Ignition switch on.
3. Disconnect sensor.
4. Connector from module–multimeter red wire to red wire socket and multimeter black wire to black/white pin. Should register 12 VDC ± 0.5 volts. If meter is correct, proceed to STEP 5.

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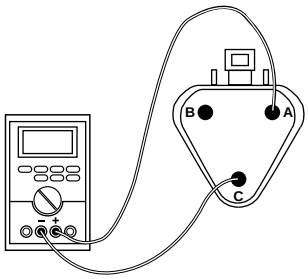

A. Green
B. Black/white pin
C. Red from module

IF NO POWER

Check module ground and power wire to module for loose connections. See Resistance Test which follows. Check spark, STEP 5.

STEP 5

1. Ignition on.
2. Momentarily place screwdriver across black/white and green connector pins. Since the ignition module ignores the first four sensor inputs, repeat this step six to ten times.
3. Strong evidence of spark at spark plug when screwdriver is removed. If there is a spark, sensor is suspect. Install known, good sensor and test again.

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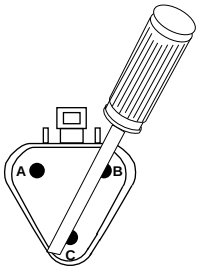

A. Red from module
B. Green
C. Black/white pin

→ **IF NO SPARK**

Check module resistance. See IGNITION RESISTANCE TEST-IGNITION MODULE. Replace module if resistance is bad.

Intermittent Ignition Problem–Vibration

1. Check battery connections. Disconnect module ground (scrape paint, add star washer).
2. Disconnect white wire at coil terminal (not module feed).
3. Connect 16 ga. jumper wire from battery positive terminal to white wire.
4. Operate vehicle to see if problem is eliminated.

NOTE

Vehicle no longer has an engine stop switch. Engine must be stopped by removing jumper wire.

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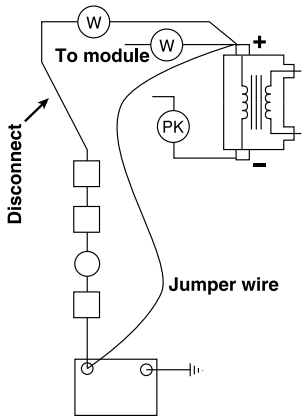

→ **PROBLEM NOT ELIMINATED**

Problem is vibration, possibly loose connections at safety switches or defective ignition relay in starter circuit.

Intermittent Ignition Problem–Temperature

1. Remove outer timing cover.
2. Remove inner timing cover and gasket.
3. Start engine.
4. Spray sensor plate with refrigerant (obtainable at electronic supply houses) to see if engine kills.
5. With engine hot, at operating temperature and cover off, apply heat (blow dryer) to nose of sensor and see if engine kills.
6. Apply heat (blow dryer) to module and see if engine kills.

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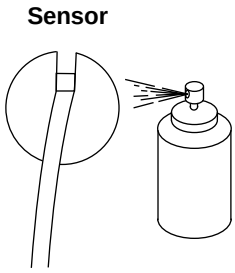


→ **IF ENGINE KILLS**

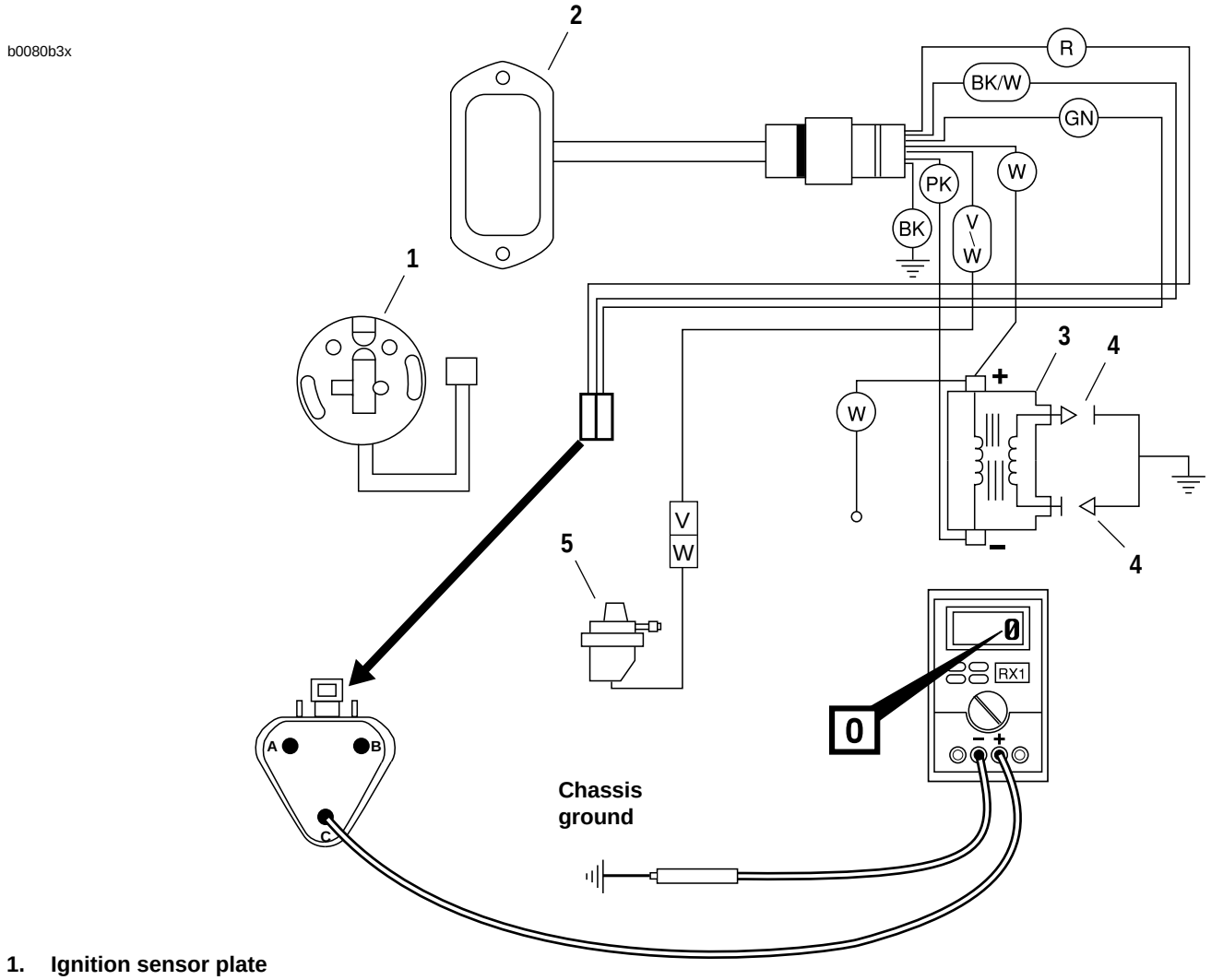
Problem is temperature sensitive sensor or module. Replace sensor or module.

Ignition Resistance Test-Ignition Module

⚠CAUTION

If a resistance test is performed on a "live" circuit, the multimeter will be damaged. Turn off ignition and disconnect the battery before doing a resistance test.

TEST	METER SETTING	PROBE 1	PROBE 2	METER READING AT MODULE	
Check for grounds	RX1	To black/white wire in harness	To chassis ground	0-1 Ohm	Good
				More than 1 Ohm	Check harness for opens. See next page. If harness checks OK, replace module.



1. **Ignition sensor plate**
2. **Ignition module**
3. **Ignition coil**
4. **Spark plug (2)**
5. **Vacuum-operated electric switch (V.O.E.S.)**

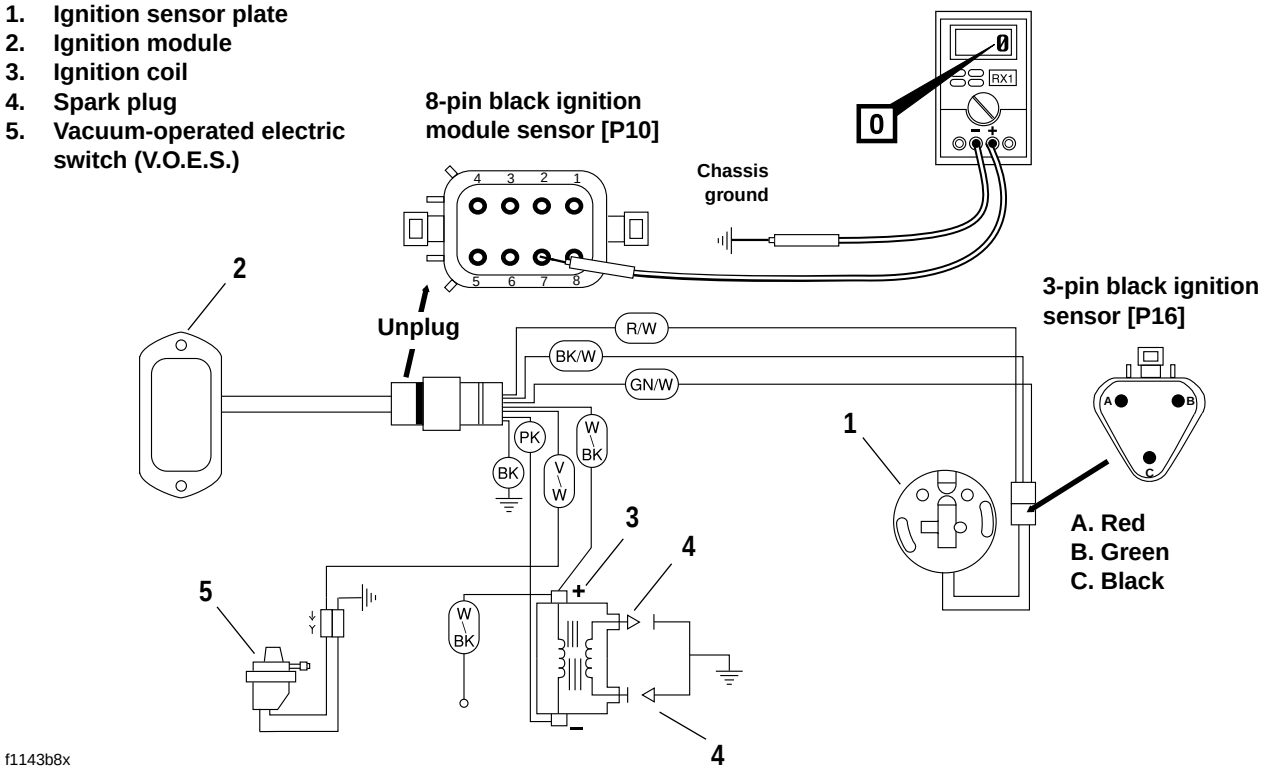
Ignition Resistance Test-Ignition Module Harness

TEST CONDITIONS: Engine stop switch on right handlebar must be in OFF position and 8-place ignition module connector [P10] and 3-place sensor connector [P16] must be disconnected for these tests. Shake or wiggle the harness to detect any breaks in the wiring.

TEST	METER SETTING	PROBE 1	PROBE 2	METER READING AT HARNESS	
Check for grounds	RX1	To pin 8 on connector [P10]	To chassis ground	0-1 Ohm	Good.
				More than 1 Ohm	Repair/clean ground connection.
Check for grounds	RX1	All pins except pin 8 on connector [P10]	To chassis ground	Infinity	Good.
				Any resistance	Locate and repair short to ground.
Continuity	RX1	All pins except pin 8 on connector [P10]	Opposite end of each of the 6 leads	0-1 Ohm	Good.
				More than 1 Ohm	Repair broken wire or loose/dirty connection

IGNITION MODULE CONNECTOR [P10]								
PIN NO.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
COLOR CODE	W	BK/W	R	PK	GN	V/W	BK	open

1. **Ignition sensor plate**
2. **Ignition module**
3. **Ignition coil**
4. **Spark plug**
5. **Vacuum-operated electric switch (V.O.E.S.)**



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VACUUM-OPERATED ELECTRIC SWITCH (V.O.E.S)

ADJUSTMENT/TESTING

See VACUUM-OPERATED ELECTRIC SWITCH (V.O.E.S) in Section 1.

REMOVAL

1. Remove seat and fuel tank. See FUEL TANK, REMOVAL in Section 4.
2. See Figure 7-4. Disconnect V.O.E.S. connector [P7] from main wiring harness.
3. Remove V.O.E.S. from carburetor.

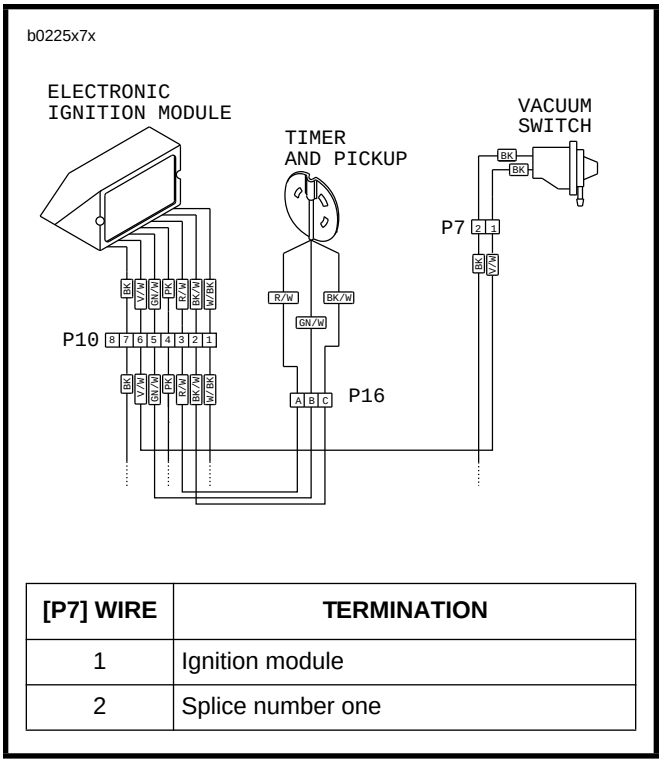
INSTALLATION

1. See Figure 7-4. Place a **new** V.O.E.S. on carburetor.
2. Attach V.O.E.S. connector [P7] to main wiring harness.

⚠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 and personal injury.

3. Install fuel tank and seat. See FUEL TANK, INSTALLATION in Section 4.



[P7] WIRE	TERMINATION
1	Ignition module
2	Splice number one

Figure 7-4. V.O.E.S. Connector [P7]

IGNITION/HEADLAMP SWITCH

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 lead to personal injury.

See Figure 7-5. The three-position combination ignition/headlamp switch is not repairable. Replace the unit if it fails.

Switch positions are explained in Table 7-1.

⚠CAUTION

When turning off the ignition, verify that the key is removed in the LOCK position or that the lights are not left on. If the rider stops the engine and inadvertently removes the key in the OFF 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 LOCK and OFF positions. The OFF position is located between the LOCK and IGNITION positions and allows the rider to remove the key while leaving the lights on. When the key is placed in the OFF position, several indicator markers are or can be activated. See Table 7-2.

REMOVAL

1. Remove seat and fuel tank. See FUEL TANK, REMOVAL in Section 4.

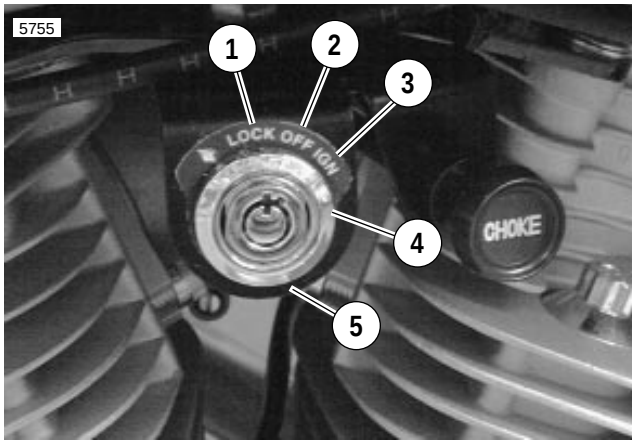
⚠WARNING

To avoid accidental start-up of vehicle and possible personal injury, disconnect the battery cables before proceeding. Always disconnect the negative cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion producing personal injury.

⚠CAUTION

Hold battery cable when loosening battery terminal hardware. Failure to hold cable may cause battery damage.

2. Disconnect battery cables, negative cable first.
3. Cut cable strap securing main wiring harness to frame.
4. See Figure 7-6. Disconnect ignition connector [P8] from main wiring harness.
5. See Figure 7-5. Remove ignition switch face nut.
6. Remove ignition switch.



1. LOCK position
2. OFF position
3. IGNITION position
4. Switch face nut
5. Ignition switch bracket

Figure 7-5. Ignition/Headlamp Switch

Table 7-1. Ignition Positions

LABEL	NAME	IGN.	LAMPS	REMOVE KEY
LOCK	locked	off	off	yes
OFF	markers	off	See note & Table 7-2.	yes
IGN	ignition	on		no

Table 7-2. Indicator Markers

ITEM	OFF	IGN
Headlamp position marker	on	on
Headlamp high/low beam	off	on
License plate lamp	on	on
Speedometer illumination lamp	on	on
Tachometer illumination lamp	off	on
Stop lamp	can be activated	
Front and rear turn signals	can be activated	
Horn	can be activated	

INSTALLATION

1. Insert ignition switch into hole of switch bracket. The word “TOP” stamped on the switch body should face upward toward the lettering on the switch position decal. Loosely install face nut.

2. See Figure 7-6. Attach ignition switch connector [P8] to main wiring harness.

3. Tighten face nut to secure switch within cover.

4. Secure main wiring harness to frame with a **new** cable strap.

⚠WARNING

Always connect the positive battery cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion producing personal injury.

⚠CAUTION

Hold battery cable when tightening battery terminal hardware. Failure to hold cable may cause battery damage.

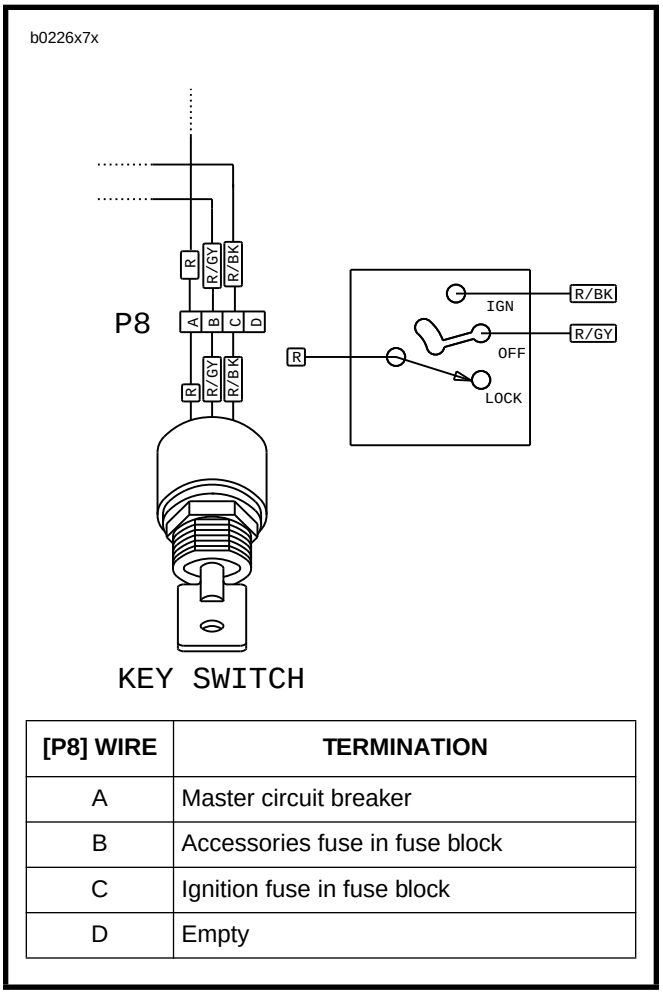
5. Install battery cables, positive cable first.

6. Install fuel tank and seat. See FUEL TANK, INSTALLATION in Section 4.

⚠WARNING

Check for proper headlamp operation before riding motorcycle. Visibility is a major concern for motorcyclists. Failure to have proper headlamp operation could lead to personal injury.

7. Check ignition/headlamp switch for proper operation.



[P8] WIRE	TERMINATION
A	Master circuit breaker
B	Accessories fuse in fuse block
C	Ignition fuse in fuse block
D	Empty

Figure 7-6. Ignition Switch Connector [P8]

IGNITION MODULE

GENERAL

See Figure 7-7. The ignition module is located on a plate which is a portion of the frame. The ignition module is not repairable. Replace the unit if it fails.

See IGNITION SYSTEM on page 7-3 for information on the function and testing of the ignition module.

REMOVAL

1. Remove seat and tail section. See TAIL SECTION, REMOVAL in Section 2.

⚠WARNING

To avoid accidental start-up of vehicle and possible personal injury, disconnect the battery cables before proceeding. Always disconnect the negative cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion producing personal injury.

⚠CAUTION

Hold battery cable when loosening battery terminal hardware. Failure to hold cable may cause battery damage.

2. Disconnect battery cables, negative cable first.
3. Cut cable strap which secures main wire harness to side frame member.
4. See Figure 7-8. Disconnect ignition module connector [P10] from main wiring harness.
5. See Figure 7-7. Remove screws and washers to detach module from frame.

INSTALLATION

1. See Figure 7-7. Fasten module to frame using screws and washers.
2. See Figure 7-8. Attach ignition module connector [P10] to main wiring harness.
3. Secure main wiring harness to frame member with a **new** cable strap.

⚠WARNING

Always connect the positive battery cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion producing personal injury and/or property damage.

⚠CAUTION

Hold battery cable when tightening battery terminal hardware. Failure to hold cable may cause battery damage.

4. Install battery cables, positive cable first.

⚠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 and personal injury.

5. Install tail section and seat. See TAIL SECTION, INSTALLATION in Section 2.
6. Test engine for proper ignition system operation.

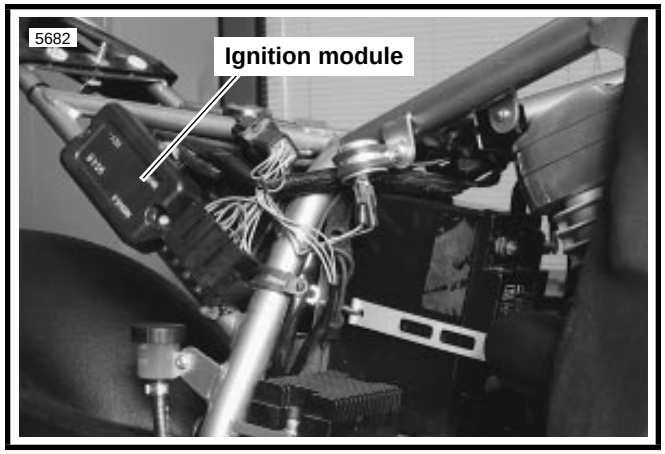
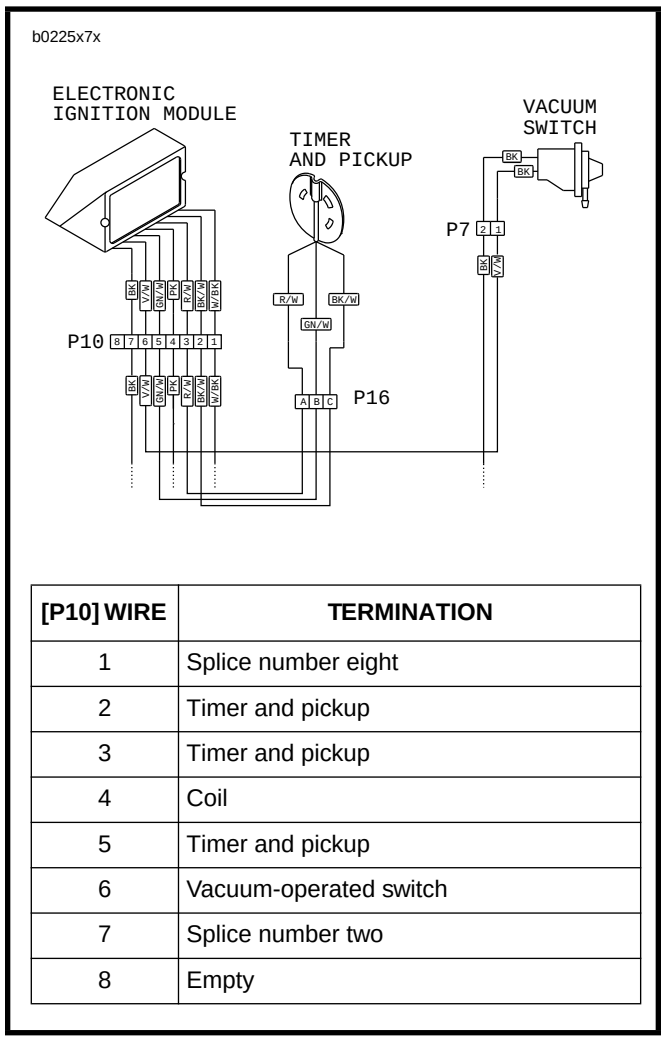


Figure 7-7. Ignition Module



[P10] WIRE	TERMINATION
1	Splice number eight
2	Timer and pickup
3	Timer and pickup
4	Coil
5	Timer and pickup
6	Vacuum-operated switch
7	Splice number two
8	Empty

Figure 7-8. Ignition Module Connector [P10]

IGNITION SENSOR PLATE AND ROTOR

GENERAL

See Figure 7-9. The ignition sensor plate assembly (8) and trigger rotor (9) are located in the gearcase cover (11) on the right side of the vehicle. The rotor is mounted on the camshaft and operates at one-half crankshaft speed. The sensor plate wiring is connected to the ignition module (23) wiring harness. See IGNITION SYSTEM on page 7-3 for information on the function, testing and adjustment of the ignition sensor plate and trigger rotor assembly.

REMOVAL

⚠WARNING

To avoid accidental start-up of vehicle and possible personal injury, disconnect the battery cables before proceeding. Always disconnect the negative cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion producing personal injury.

⚠CAUTION

Hold battery cable when loosening battery terminal hardware. Failure to hold cable may cause battery damage.

1. Disconnect battery cables, negative cable first.

1. Pop rivet (2)
2. Timer cover
3. Screw (2)
4. Inner cover
5. Ignition gasket
6. Timer plate stud (2)
7. Bolt
8. Sensor assembly
9. Trigger rotor
10. Seal
11. Gearcase cover
12. Spark plug (2)
13. Ignition coil
14. Front spark plug cable
15. Rear spark plug cable
16. V.O.E.S. connector [P7]
17. V.O.E.S.
18. Cable strap
19. Terminal pin
20. Timer connector [P16]
21. Secondary lock
22. Ignition module connector [P10]
23. Ignition module
24. Washer (2)
25. Screw (2)

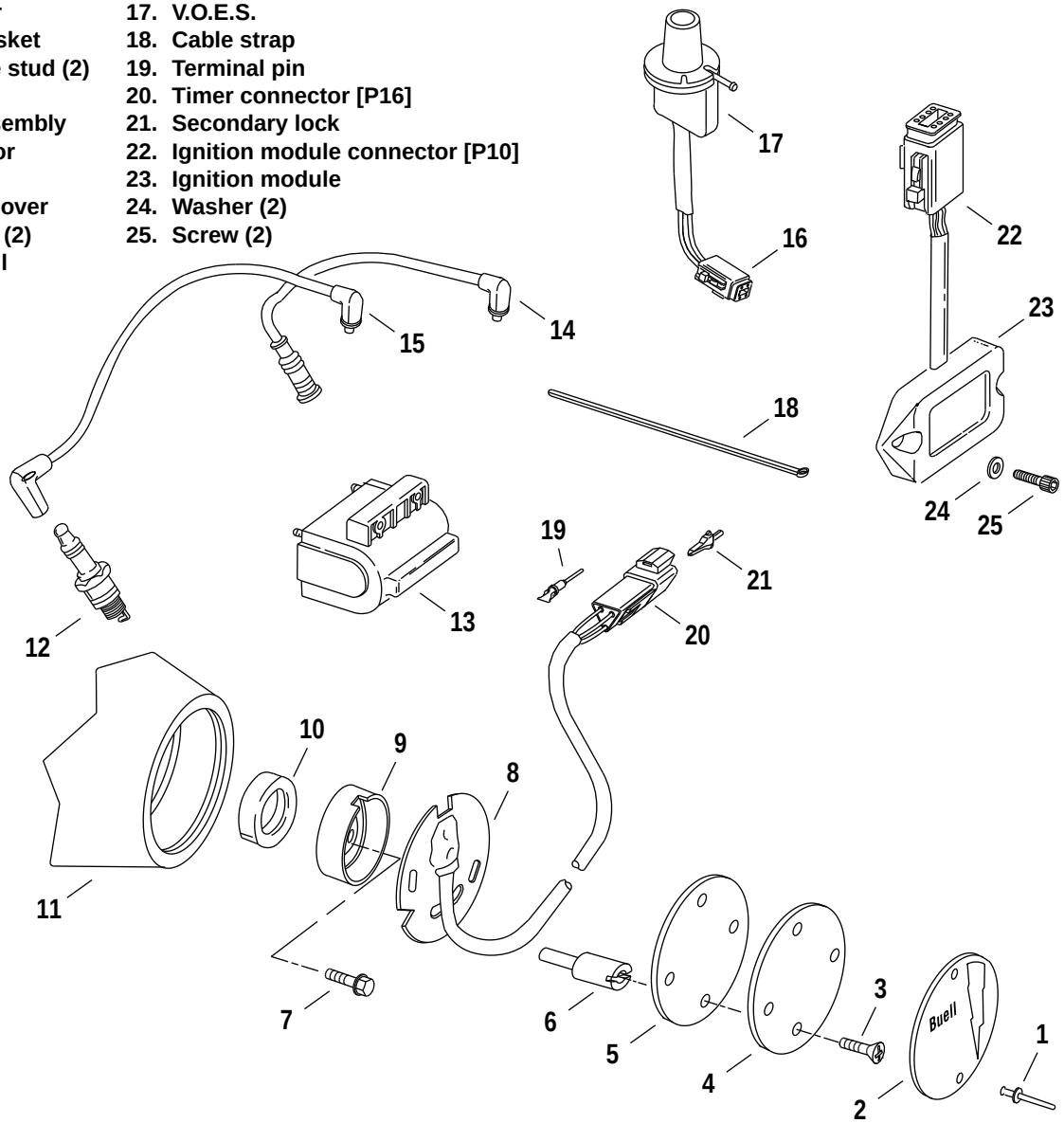


Figure 7-9. Ignition Components

2. Remove sprocket cover. See SPROCKET COVER in Section 2.
3. Cut cable straps holding sensor plate wiring at the following locations:
   a. Top of starter.
   b. Edge of gearcase cover.
   c. Oil line.
4. See Figure 7-9. Disconnect sensor plate (8) wiring at connector (20) [P16] located below the starter motor.
5. Note position of each sensor plate wiring terminal in plug end of connector (20).
6. Remove terminals. See DEUTSCH ELECTRICAL CONNECTORS on page 7-46.
7. Drill off heads of outer timer cover pop rivets (1) using a 3/8 in. (9.525 mm) drill bit. Tap remaining rivet shafts inboard through holes in timer cover (2) and inner cover (4). Remove timer cover.
8. Remove inner cover screws (3), inner cover (4) and ignition gasket (5). Carefully remove any remaining pieces of rivets from gearcase cover timer bore.
9. See Figure 7-10. To obtain approximate ignition timing during installation, mark position of timer plate studs on sensor plate.
10. See Figure 7-9. Remove timer plate studs. Carefully remove sensor plate. Remove bolt (7) and trigger rotor (9).
11. Carefully remove camshaft oil seal (10) if damaged or if there is any evidence of oil leakage past the seal.

INSTALLATION

1. See Figure 7-9. With the lipped side facing inboard, install **new** camshaft oil seal (10) into gearcase cover (11), if removed. Press seal into position until flush with surface of timer bore.
2. Position trigger rotor (9) onto end of camshaft aligning notch with camshaft slot. Apply LOCTITE THREADLOCKER 242 (blue) to bolt (7). Install bolt to secure rotor. Tighten bolt to 75-80 **in-lbs** (8.5-9.0 Nm).
3. Install sensor plate (8) and timer plate studs (6). Rotate sensor plate to its previously marked position to obtain approximate ignition timing.

CAUTION

Route sensor plate wires about 1-1/2 in. (38 mm) forward of gearcase cover rear edge. If wires are routed too far to the rear of this position, they could contact the moving secondary drive belt and/or sprocket resulting in damage to sensor plate wiring.

4. Route sensor plate wiring leads.
   a. Downward through hole (7 o'clock position) in timer bore of gearcase cover (11).
   b. Upward through bottom opening between right crankcase half and rear of gearcase cover.
   c. Route wiring around tower shaft behind gearcase cover. Route wires upward to starter motor.
   d. Cable strap sensor plate wiring. See Step 3 of REMOVAL.

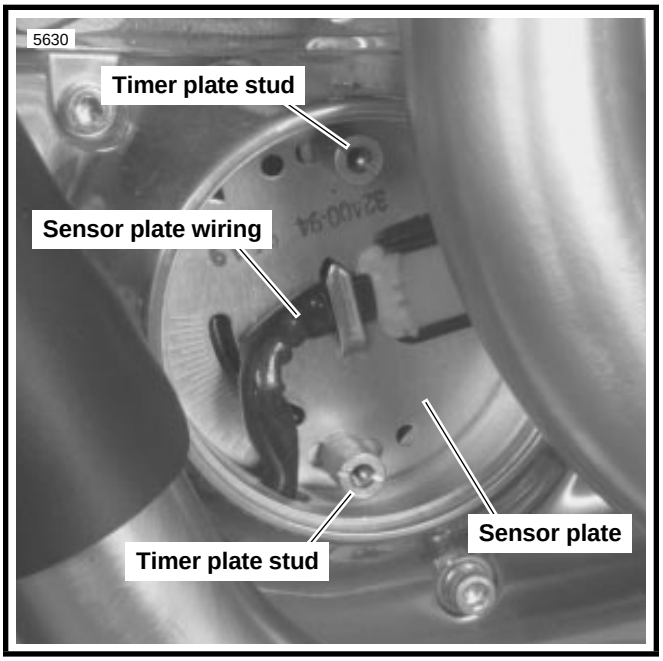


Figure 7-10. Marking Ignition Timing

5. Install sensor plate wiring terminals into correct positions in plug end of connector (20) [P16]. Red, green and black wires of plug end (from sensor plate) must match same color wires in receptacle end of connector (from ignition module wiring harness). See Figure 7-4. Install terminals following procedure outlined under DEUTSCH ELECTRICAL CONNECTORS on page 7-46.
6. Connect sensor plate (8) wiring to wiring harness connector (20) [P16].
7. Check ignition timing. See IGNITION TIMING in Section 1.
8. Final tighten timer plate studs (6) to 12-20 **in-lbs** (1.4-2.3 Nm).
9. Install gasket (5) and inner cover (4) using screws (3). Tighten screws to 12-20 **in-lbs** (1.4-2.3 Nm).

CAUTION

Use only H-D Part No. 8699 rivets to secure outer timing cover. These rivets are specially designed so that no rivet end falls off into the timing compartment. Use of regular rivets can damage ignition system components and may allow water to enter the timing compartment.

10. Secure timer cover (2) to inner cover using **new** rivets.

WARNING

Always connect the positive battery cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion producing personal injury.

CAUTION

Hold battery cable when tightening battery terminal hardware. Failure to hold cable may cause battery damage.

11. Install battery cables, positive cable first.

IGNITION COIL

GENERAL

The ignition coil is mounted on the frame underneath the fuel tank and behind the steering neck.

See Figure 7-9. The ignition coil (13) 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 (23) 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 ignition sensor plate (8) and trigger rotor (9), the ignition module interrupts (opens) the ignition primary circuit, which causes the magnetic field in the coil core to collapse suddenly.

The collapsing magnetic field induces a high-voltage electrical discharge in the ignition secondary circuit, which consists of the coil secondary winding, spark plug cables and spark plugs (12). The high-voltage discharge produces a spark to bridge the electrode gap of each spark plug.

The ignition coil fires both spark plugs simultaneously. In one spark plug, the spark jumps from the center electrode to the outer electrode, but on the other plug, the spark jumps in the reverse direction (from the outer electrode to the center electrode).

TROUBLESHOOTING

Follow the troubleshooting procedures listed under IGNITION SYSTEM if the engine will not start, is difficult to start or runs roughly. Also check condition of spark plug cables. Insulation on cables may be cracked or damaged allowing high tension current to short to metal parts. This problem is most noticeable when cables are wet.

If poor starting/running condition persists, check resistance of ignition coil primary and secondary windings using an ohmmeter. See Figure 7-11. Resistance values should be within the limits shown in Table 7-3.

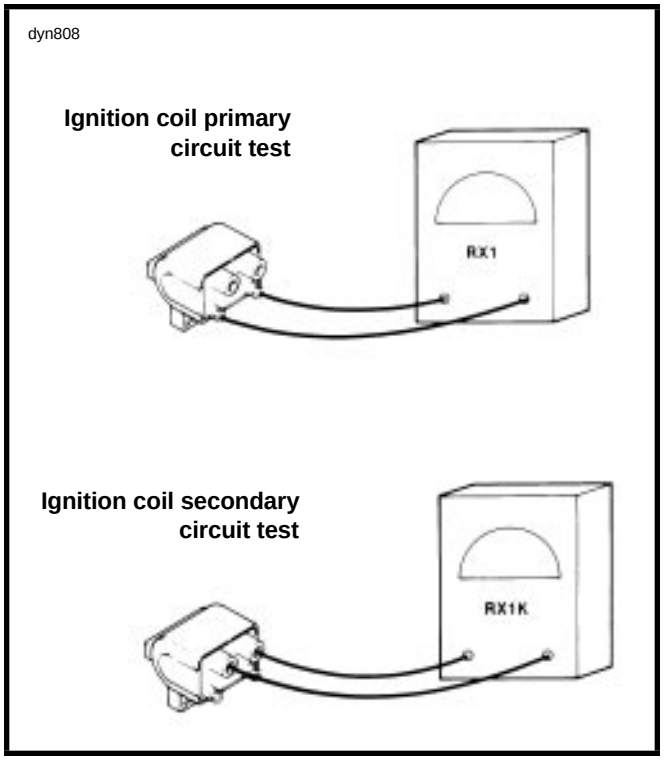


Figure 7-11. Test Ignition Coil Resistance Tests

Table 7-3. Ignition Coil Winding Resistance

IGNITION COIL WINDING	OHMMETER SCALE	NORMAL RESISTANCE RANGE (IN OHMS)
Primary	RX1	2.5-3.1
Secondary	RX1K	10,000-12,500

NOTE

- *A low resistance value indicates a short in the coil winding-replace coil.*
- *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.*
- *An infinite ohms (∞ or no continuity) resistance value indicates an open circuit (a break in the coil winding)-replace coil.*

REMOVAL

⚠WARNING

To avoid accidental start-up of vehicle and possible personal injury, disconnect the battery cables before proceeding. Always disconnect the negative cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion producing personal injury.

⚠CAUTION

Hold battery cable when loosening battery terminal hardware. Failure to hold cable may cause battery damage.

1. Disconnect battery cables, negative cable first.
2. Remove seat and fuel tank. See FUEL TANK, REMOVAL in Section 4.
3. See Figure 7-12. Disconnect spark plug cables from ignition coil.
4. Remove nuts and lockwashers to detach pink and white wires from coil posts.
5. Remove two screws (2). Mounting plate (3), coil (1), horn bracket (4) and washer (7) will drop from frame.

INSTALLATION

1. See Figure 7-12. Place horn mounting bracket (4) on top of coil. Attach coil to frame with screws (2), washer (7) and mounting plate (3). Tighten screws (1) to 4-6 ft-lbs (5.4-8 Nm).
2. Connect ring terminal of pink wires to forward post. Connect ring terminals of white wires to rear post. Secure wires with nuts and lockwashers.
3. Connect spark plug cables to ignition coil. Longer cable attaches to rear post and rear cylinder spark plug.

⚠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 and personal injury.

4. Install fuel tank and seat. See FUEL TANK, INSTALLATION in Section 4.

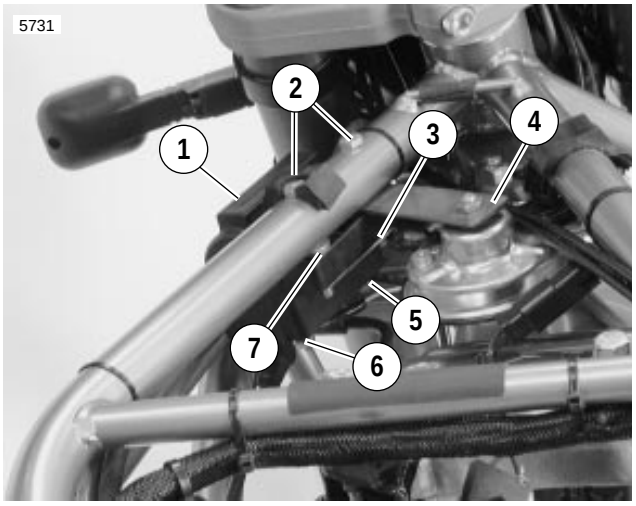
⚠WARNING

Always connect the positive battery cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion producing personal injury.

⚠CAUTION

Hold battery cable when tightening battery terminal hardware. Failure to hold cable may cause battery damage.

5. Install battery cables, positive cable first.



1.	**Ignition coil**	**5.**	**Pink wire coil post**
2.	**Screws (2)**	**6.**	**White wire coil post**
3.	**Mounting plate**	**7.**	**Washer**
4.	**Horn bracket**		

Figure 7-12. Ignition Coil

SPARK PLUG CABLES

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 a spark plug cable with the engine running. If you disconnect a spark plug cable with the engine running, you may receive a potentially fatal electric shock from the ignition system.

⚠CAUTION

When disconnecting each 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 cables from ignition coil and spark plug terminals.

INSPECTION

1. Inspect spark plug cables. Replace cables that are worn or damaged.
   a. Check for cracks or loose terminals.
   b. Check for loose fit on ignition coil and spark plugs.
2. Check cable boots/caps for cracks or tears. Replace boots/caps that are worn or damaged.
3. Check spark plug cable resistance with an ohmmeter.

   Resistance must be 1625-3796 ohms for 6-1/2 in. (165 mm) cable, and 5000-11,680 ohms for 20 in. (508 mm) cable. Replace cables that do not meet resistance specifications.

INSTALLATION

Connect spark plug cables to ignition coil and spark plugs. Make sure boots/caps are secured properly; this will provide the necessary moisture-proof environment for the ignition coil and spark plug terminals.

NOTE

See Section 1 for spark plug information.

STARTER INTERLOCK

GENERAL

The starter interlock system is designed to prevent unintended start-up and/or forward motion of the motorcycle with the vehicle's side stand not retracted.

Two circuits make up the starter interlock system.

Starter Circuit

The starter circuit prevents the motorcycle from being started unless a ground has been established at the starter relay. This ground may come from one of two sources.

a. By placing the motorcycle in neutral and grounding through the neutral switch.

b. By disengaging the clutch 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 permits the starter motor to crank the engine.

Ignition Circuit

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

a. By retracting the side stand and grounding through the side stand switch.

b. By placing the motorcycle in neutral and grounding through the neutral switch.

c. By disengaging the clutch and grounding through the clutch lever switch.

Note that the ignition circuit allows operation in gear with the side stand extended if the clutch is disengaged. However, if the motorcycle is in gear with the side stand extended, and the clutch is released, the ignition ground is lost and the ignition system is turned off. This system will prevent operation of the vehicle if forward motion is attempted with the side stand down.

See Figure 7-13.

Table 7-4. Starter Interlock Troubleshooting

PROBLEM	CHECK FOR	CORRECTION
Electric starter will not crank.	Battery problems.	See BATTERY in Section 1.
	Inappropriate gear selected.	Place vehicle in neutral.
	Clutch lever not disengaged.	Pull in clutch lever.
	Starter relay problems.	Listen for starter relay "click". If click is not heard, perform starter relay tests.
		Follow starter troubleshooting in Section 5.
Electric starter cranks, but vehicle will not start.	Side stand not retracted.	Retract side stand.
Motorcycle will not start with side stand retracted.	Clutch lever not disengaged.	Pull in clutch lever.
Motorcycle will not start with side stand retracted or clutch disengaged.	Ignition relay problems.	Listen for relay "click". If click is not heard, perform ignition system tests.
Motorcycle will not start after starter relay tests.	No spark at spark plug.	Check for 12 VDC at coil white/black wire.
		Follow ignition system troubleshooting on page 7-6.

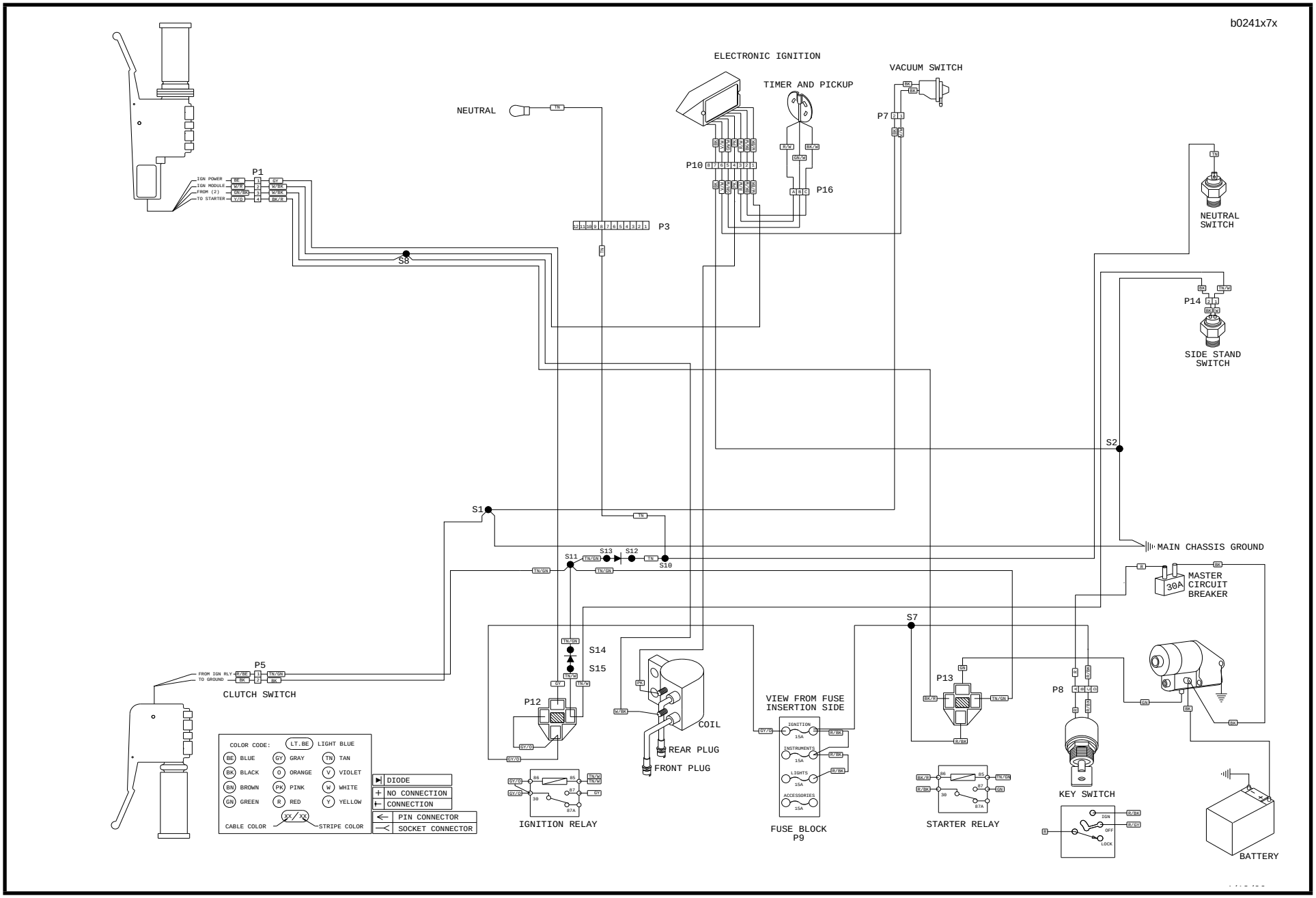


Figure 7-13. Starter Interlock System

TESTING/REPLACEMENT

Side Stand Switch

See Figure 7-14. 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 [P14].
2. Test the switch using an ohmmeter.
   a. When the switch is open (side stand down), the switch should show ∞ ohms (infinite ohms).
   b. When the switch is closed (side stand up), the switch should show 0 ohms or little resistance.
3. Replace the assembly with a **new** switch if necessary. Remove side stand switch from frame by turning counterclockwise.

Clutch Switch

See Figure 7-15. 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 [P5].
2. Test the switch using an ohm meter.
   a. When the switch is open (clutch engaged), the switch should show ∞ ohms (infinite ohms).
   b. When the switch is closed (clutch disengaged), 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.

Diodes

The main wiring harness contains two diodes along the left side frame tube. The harness sheath has a white mark showing the location of the diodes. A diode acts as a one way switch which permits current flow in one direction, but not in the other. Test the diodes as follows.

TESTING DIODE S12/S13

1. Disconnect the following connectors:
   a. Instruments and indicator lamps [P3].
   b. Clutch switch [P5].
   c. Ignition relay [P12].
2. Test for continuity in both directions between wire 1 (TN/GN) on [P5] and wire 8 (TN) on [P3]. Ohmmeter should show continuity in one direction, but not the other. Replace the diode with a **new** diode if necessary.
3. Attach connectors separated in Step 1.

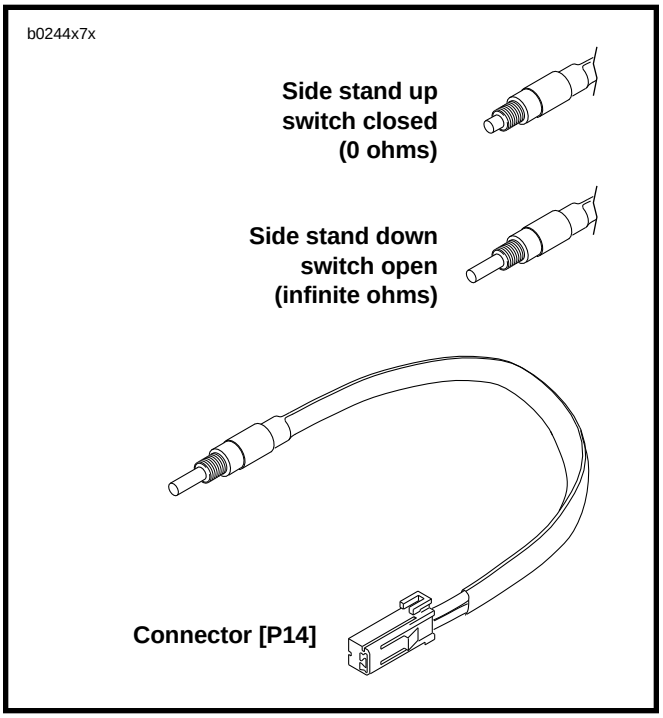


Figure 7-14. Side Stand Switch

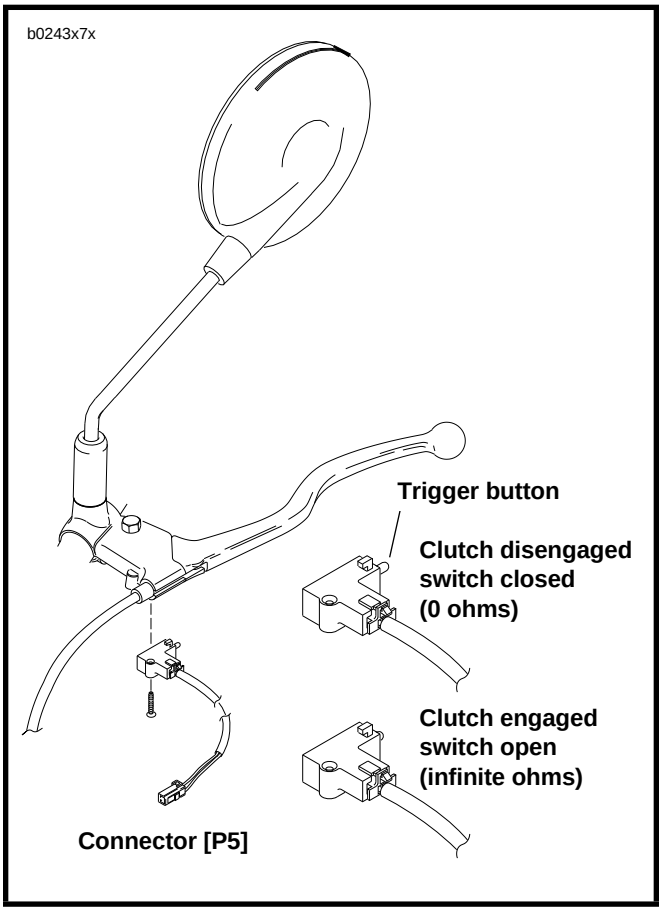


Figure 7-15. Clutch Switch

TESTING DIODE S14/S15

1. Disconnect the following connectors:
   a. Instruments and indicator lamps [P3].
   b. Clutch switch [P5].
   c. Ignition relay [P12].
2. Test for continuity in both directions between ignition relay [P12] wire 85 (TN/W) and clutch switch [P5] wire 1 (TN/GN). Ohmmeter should show continuity in one direction, but not the other. Replace the diode with a **new** diode if necessary.
3. Attach connectors separated in Step 1.

Ignition Relay

See Figure 7-16. The ignition relay is under the tail section along the right side frame tube. Test the relay as follows.

1. Remove seat and fuel tank. See FUEL TANK, REMOVAL in Section 4.
2. Remove mounting bolt to detach relay from frame.
3. Disconnect the 4-place connector [P12].
4. Test the relay in the same fashion as the starter relay. See Section 5.
5. Replace the relay with a **new** relay if necessary.

Starter Relay

The starter relay is on the left side forward of the oil tank. See STARTER SYSTEM TESTING in Section 5.

Main Circuit Breaker

See Figure 7-16. Attached to the frame above the battery, the main circuit breaker is between the ignition key switch and the battery. The main circuit breaker can be removed as follows.

1. Remove seat and fuel tank. See FUEL TANK, REMOVAL in Section 4.
2. Remove battery negative terminal from frame.
3. Remove nuts and wire leads from circuit breaker studs.
4. Remove circuit breaker from circuit breaker clip.

Ignition Fuse

See Figure 7-17. The ignition fuse is in the fuse block under the right side of the tail section. Always replace the fuse with another 15 ampere fuse.

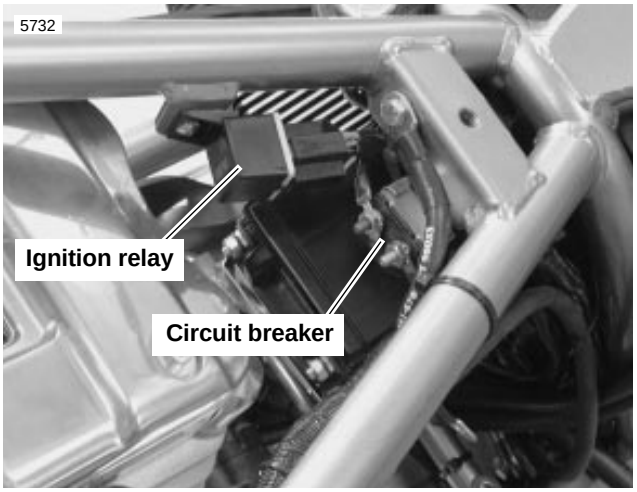
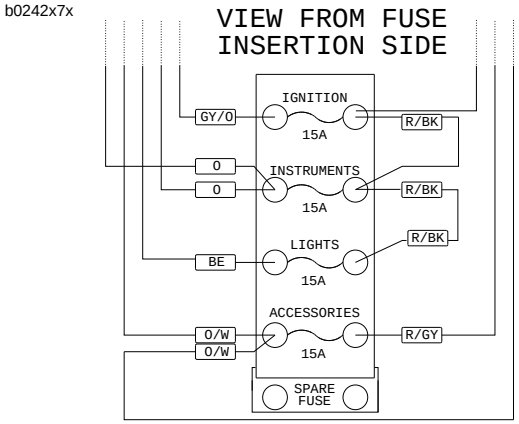


Figure 7-16. Ignition Relay and Circuit Breaker



NOTE

Depending upon vehicle production date, there may be one or two blue wires exiting the LIGHTS socket of the fuse block. Early 1996 vehicles have a blue wire without a terminating connection.

Figure 7-17. Fuse Block