DIODES 7.12

REMOVAL

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.

1. Disconnect negative battery cable from battery.
2. Remove seat and tail section. Move fuel tank aside. See 2.34 TAIL SECTION.
3. See Figure 7-34. Both user replaceable diodes (1, 2) are mounted on the relay block under the tail section. One spare diode (3) is attached to the relay block.
4. Remove faulty diode by pulling it straight up off the relay block.

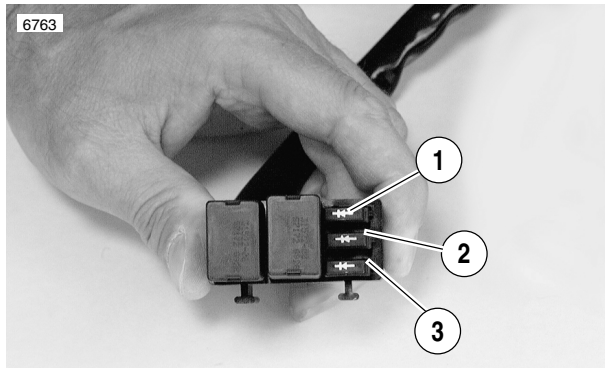
INSTALLATION

1. See Figure 7-34. Install the new diodes into position on the relay block.

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 which could result in death or serious injury.

2. Replace fuel tank, tail section and seat. See 2.34 TAIL SECTION.
3. Connect negative battery cable to the battery. Tighten battery terminal hardware to 60-96 **in-lbs** (7-11 Nm).



1. **Starter Circuit Diode**
2. **Ignition Circuit Diode**
3. **Spare Diode**

Figure 7-34. Diodes

GENERAL

The charging system consists of the alternator and regulator. Charging system circuits are shown in Figure 7-36.

Alternator

The alternator consists of two main components:

- The rotor which mounts to the engine sprocket shaft.
- The stator which bolts to the engine crankcase.

Voltage Regulator

See Figure 7-35. The voltage regulator is a series regulator with shunt control. The circuit combines the functions of rectifying and regulating.

TROUBLESHOOTING

When the charging system fails to charge or does not charge at a satisfactory rate, make the following recommended checks.

Battery

Check for a weak or dead battery. See 7.17 BATTERY. Battery must be fully charged in order to perform any electrical tests.

Wiring

Check for corroded or loose connections in the charging circuit. See Figure 7-36.

Voltage Regulator Inspection

See Figure 7-35. The voltage regulator base must have a clean, tight connection for proper grounding. Check by using an ohmmeter with one lead on a known good ground, such as battery ground cable, and the other on the regulator base.

Connector plug to stator must be clean and tight.

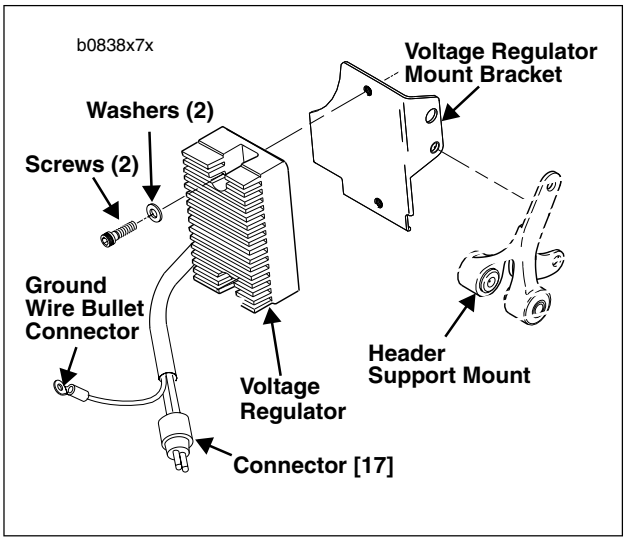


Figure 7-35. Voltage Regulator

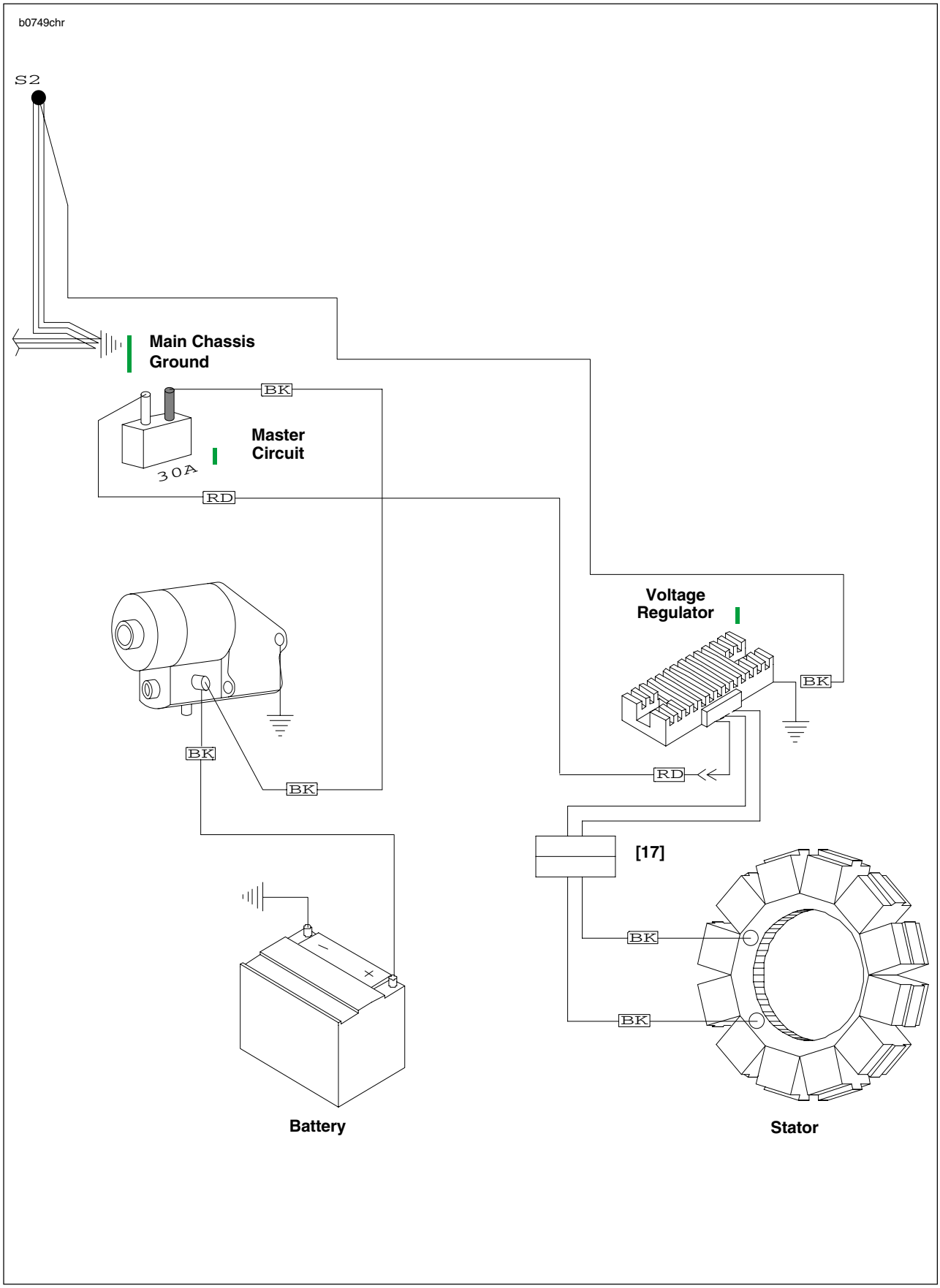


Figure 7-36. Charging System Circuit

NOTE

Whenever a charging system component fails a test and is replaced, re-test the system to be sure the problem has been corrected.

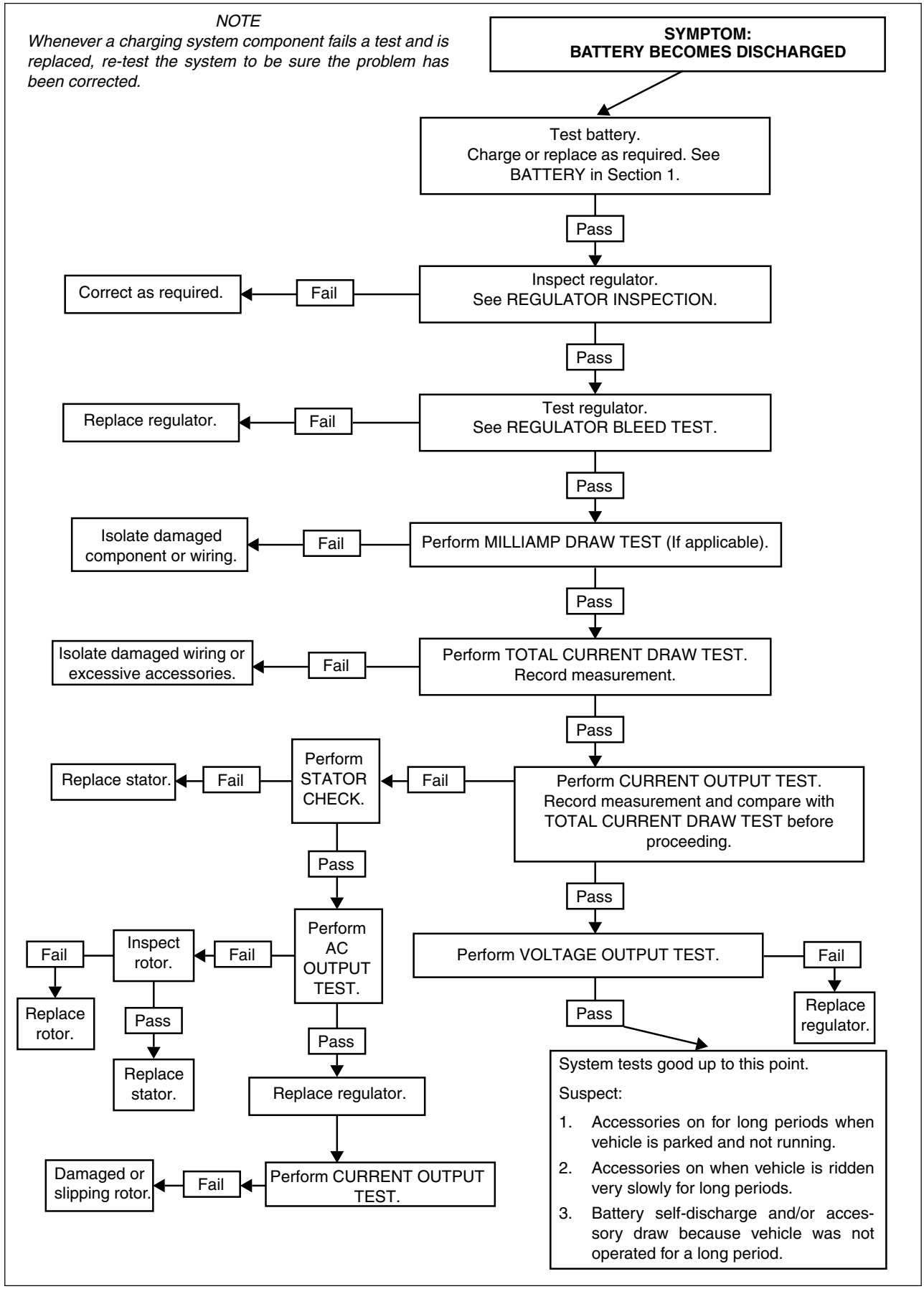


Figure 7-37. Charging System Troubleshooting

TESTING

Voltage Regulator Bleed Test

1. Be sure regulator is connected to battery. Check BK charging wire on gold terminal of master circuit breaker.
2. Locate voltage regulator connector [17] near the oil pump. Disconnect from alternator stator wiring.
3. Check regulator connector using a trouble light.
   a. Touch one probe to a suitable ground.
   b. Touch the other to the regulator pins, one at a time.
   c. If light glows, replace regulator.

Milliampere Draw Test

NOTE

Be sure accessories are not wired so they stay on at all times. This condition could drain battery completely if vehicle is parked for a long time. Check for this by connecting ammeter between negative battery terminal and battery.

1. See Figure 7-38. Connect ammeter between negative battery terminal and battery. With this arrangement, you will also pick up any regulator drain.
2. With ignition key switch turned to LOCK and all lights and accessories off, observe amperage reading.
   a. Maximum reading should be 3 milliamperes.
   b. A higher reading indicates excessive current draw. Any accessories must be considered and checked for excessive drain.

NOTE

A battery with a surface discharge condition could suffer a static drain. Correct by cleaning battery case.

Total Current Draw Test

If battery runs down during use, the current draw of the motorcycle components and accessories may exceed output of the charging system.

1. See Figure 7-39. To check for this condition, place load tester induction pickup or current probe pickup over battery negative cable.
2. Disconnect stator wiring from voltage regulator wiring at the connector [17] near the oil pump. Start the motorcycle and run the engine at 2000 RPM.
3. With ignition and all continuously running lights and accessories turned on (headlamp on high beam), read the total current draw.
4. Compare this reading to the reading obtained after performing the CURRENT AND VOLTAGE OUTPUT TEST.
   a. The current output should exceed current draw by 3.5 amps minimum.
   b. If output does not meet specifications, there may be too many accessories for the charging system to handle.
5. Reconnect regulator after testing.

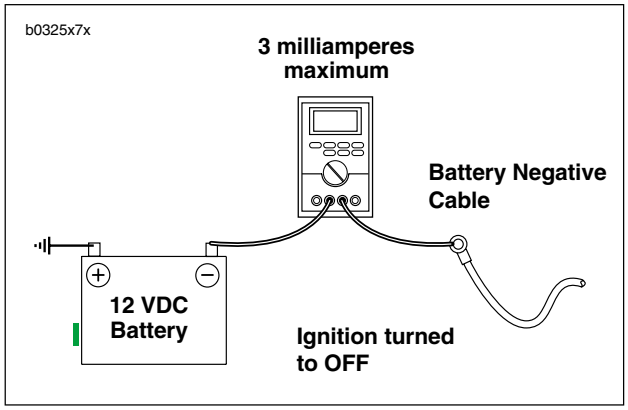


Figure 7-38. Milliampere Draw Test

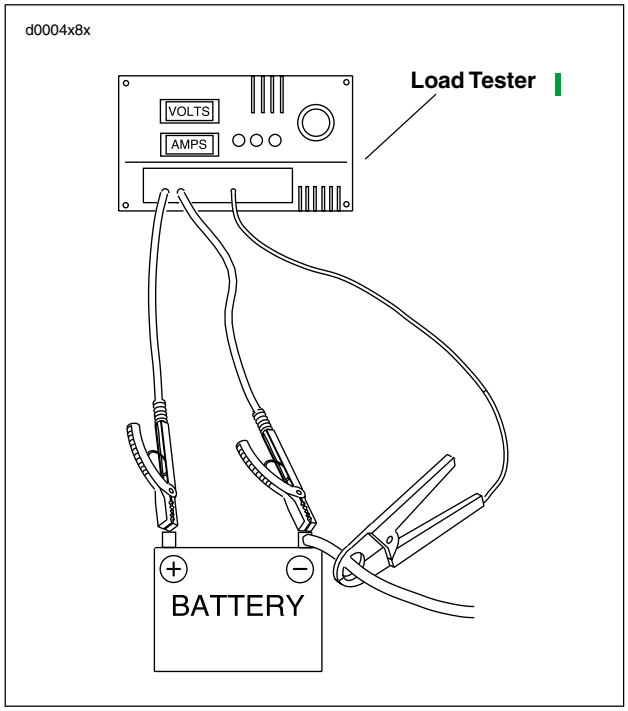


Figure 7-39. Check Current Draw (Ignition Switch ON)

Current and Voltage Output Test

1. See Figure 7-40. Connect load tester.
   a. Connect negative and positive leads to battery terminals.
   b. Place load tester induction pickup over positive regulator cable.

CAUTION

Do not leave any load switch turned on for more than 20 seconds or overheating and tester damage are possible.

2. Run the engine at 2000 RPM. Increase the load as required to obtain a constant 13.0 VDC.
3. The current output should be 19-23 amps. Make note of measurement for use in TOTAL CURRENT DRAW TEST.

NOTE

Rider's habits may require output test at lower RPM.

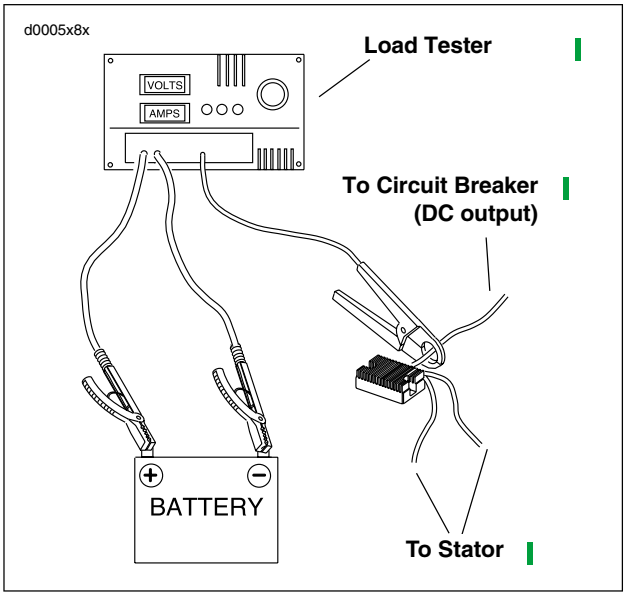


Figure 7-40. Current and Voltage Output Test

Voltage Output Test

1. See Figure 7-40. After removing the load, read the load tester voltage meter.
   a. If voltage to the battery is not more than 15 VDC, voltage output is within specifications. Investigate other possible problems. See Figure 7-37.
   b. If voltage is higher, regulator is not functioning properly or connections are loose or dirty.

Stator Check

1. Turn ignition key switch to LOCK.
2. See Figure 7-41. Connect an ohmmeter.
   a. Locate voltage regulator connector [17] near the oil pump. Disconnect from alternator stator wiring.
   b. Insert one ohmmeter lead into either stator socket.
   c. Attach the other lead to a suitable ground.
3. Test for continuity with ohmmeter set on the RX1 scale.
   a. A good stator will show no continuity (∞ ohms) across either stator socket.
   b. Any other reading indicates a grounded stator which must be replaced.
4. See Figure 7-42. Remove ground lead. Insert lead into the remaining stator socket.
5. Test for resistance with ohmmeter set on the RX1 scale.
   a. Resistance across the stator sockets should be 0.2-0.4 ohms.
   b. If the resistance is lower, the stator is damaged and must be replaced.

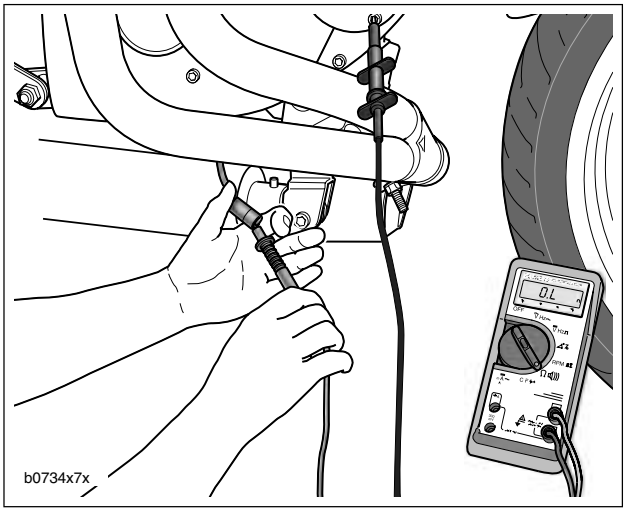


Figure 7-41. Test for Grounded Stator

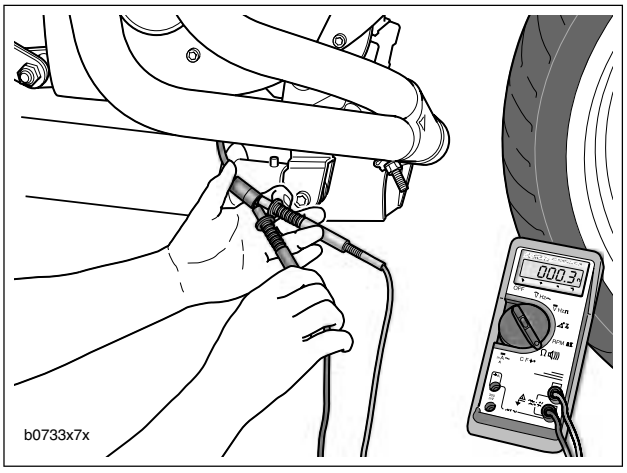


Figure 7-42. Check for Stator Resistance

AC Output Check

1. See Figure 7-43. Test AC output.
   a. Locate voltage regulator connector [17] near the oil pump. Disconnect from alternator stator wiring.
   b. Connect an AC voltmeter across both stator sockets.
   c. Run the engine at 2000 RPM. The AC output should be 38-52 volts AC.
2. Compare test results to specifications.
   a. If the output is below specifications, charging problem could be a faulty rotor or stator.
   b. If output is good, charging problem might be faulty regulator/rectifier. Replace as required.
3. Check the output again as described under CURRENT AND VOLTAGE OUTPUT TEST on page 7-40.

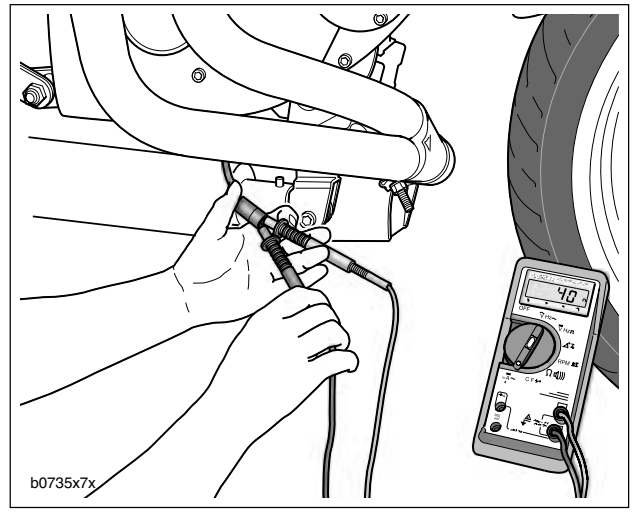


Figure 7-43. Check Stator AC Voltage Output

REMOVAL/DISASSEMBLY

⚠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.

1. Disconnect negative battery cable from the battery.
2. Remove primary cover. See PRIMARY COVER under 6.2 PRIMARY CHAIN.
3. Remove clutch assembly, primary chain and engine sprocket/rotor assembly as a unit. See PRIMARY CHAIN/DRIVE under 6.5 PRIMARY DRIVE/CLUTCH.
4. Remove/disassemble rotor and/or stator, as required. Refer to the following procedures.

Rotor

1. See Figure 7-44. Remove the four bolts which secure alternator rotor to engine sprocket.
2. See Figure 7-45. Position blocking under rotor. Press sprocket free of rotor.

NOTE

Resistance to sprocket/rotor disassembly is due in part to the magnetic force of the permanent rotor magnets.

Stator

1. See Figure 7-46. Disconnect stator wiring (4) from voltage regulator wiring at connector (5) [17] near the oil pump.
2. Remove cable straps holding stator wire to oil filter hose.
3. Withdraw stator wiring (4) from behind the gearcase cover.
4. Remove and discard the four TORX screws (2) which secure stator (1) to left crankcase half.

CAUTION

Stator TORX screws contain a thread locking compound. Do not reuse existing screws. Always use new screws with the proper thread locking compound. Loss of torque on TORX fasteners could result in alternator damage.

5. Remove stator wiring grommet (3) from left crankcase half.
6. Withdraw stator wiring (4) from grommet hole in left crankcase half. Remove stator (1).

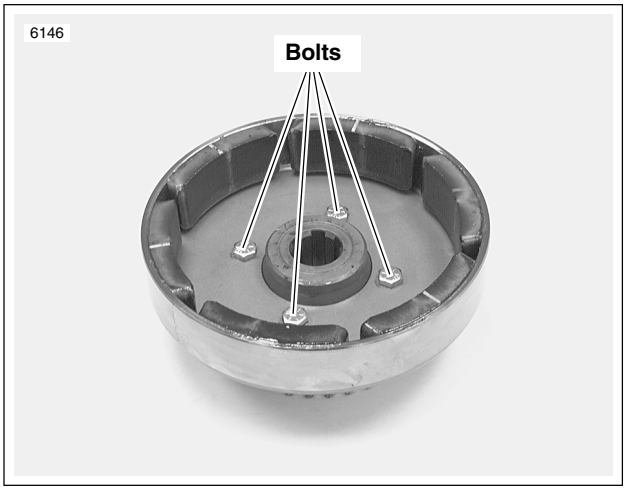


Figure 7-44. Rotor Assembly

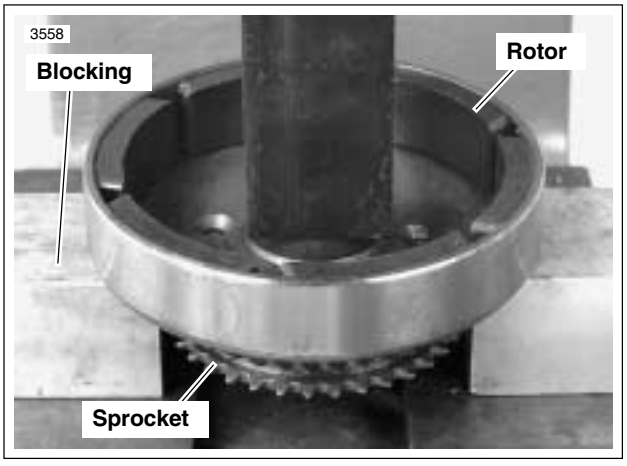
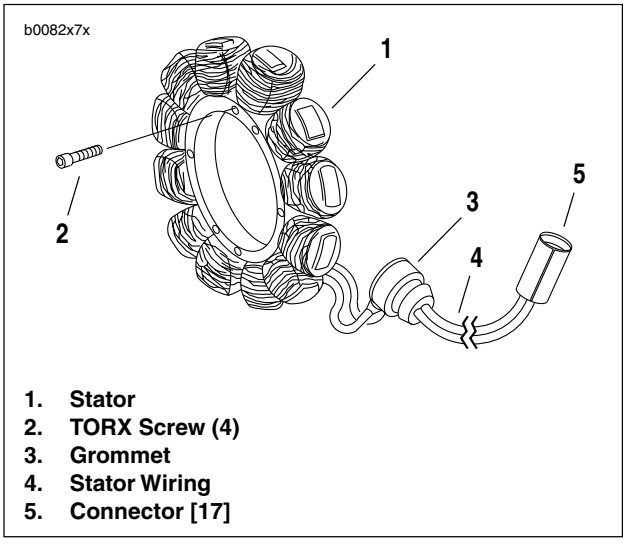


Figure 7-45. Removing Rotor From Sprocket



1. **Stator**
2. **TORX Screw (4)**
3. **Grommet**
4. **Stator Wiring**
5. **Connector [17]**

Figure 7-46. Stator Assembly

CLEANING AND INSPECTION

CAUTION

Do not strike or drop alternator rotor or damage to magnet adhesive could occur. Magnet adhesive damage can result in rotor failure.

1. Clean rotor with a petroleum-base solvent. Remove all foreign material from rotor magnets. Replace rotor if rotor magnets are cracked or loose.
2. Clean stator by wiping with a clean cloth.
3. Examine stator leads for cracked or damaged insulation.

NOTE

The rotor and stator can be replaced individually if either is damaged.

ASSEMBLY/INSTALLATION

Depending on whether the rotor, the stator, or both the rotor and stator were removed/disassembled, perform the applicable procedures which follow:

1. See Figure 7-46. Feed stator wiring (4) with attached grommet (3) into open grommet hole in left crankcase half.
2. Apply a light coating of clean engine oil or chaincase lubricant to grommet. Install grommet into hole in left crankcase half.

CAUTION

Stator TORX screws contain a thread locking compound. Do not reuse existing screws. Always use new screws with the proper thread locking compound. Loss of torque on TORX fasteners could result in alternator damage.

3. Position stator (1) on left crankcase half. Secure stator using four **new** TORX screws (2). Tighten screws to 30-40 **in-lbs** (3.4-3.5 Nm).
4. Route stator wiring (4) in front of starter, behind gearcase cover and outboard of oil pump.

NOTE

Temporarily attach a thin flexible "feed" or mechanic's wire to the connector end of the stator wiring to assist in the routing of the wiring.

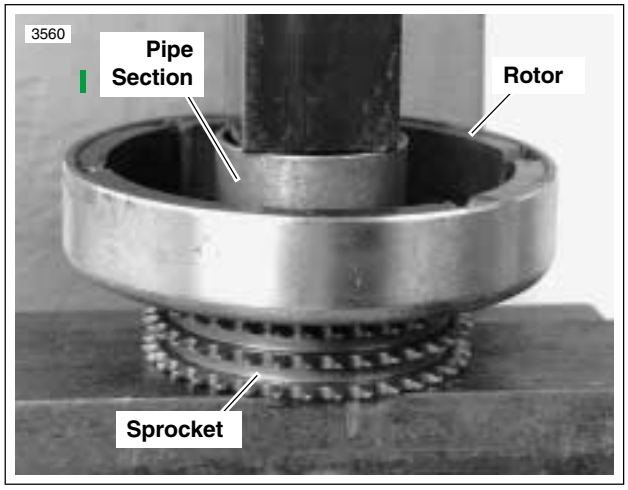


Figure 7-47. Pressing Rotor onto Sprocket

5. Connect alternator stator wiring to voltage regulator connector [17]. Bundle excess wiring in front of oil pump. Secure bundle to oil filter hose using a **new** cable strap.
6. See Figure 7-47. Attach rotor to sprocket.
   a. Position rotor on sprocket. Align holes in sprocket with holes in rotor.
   b. Apply a drop of LOCTITE THREADLOCKER 243 (blue) to threads of each mounting bolt. Insert the four mounting bolts through rotor and start bolts into tapped holes in sprocket.
   c. Position a section of pipe with an inside diameter larger than the sprocket mounting hub over center of rotor. Press rotor onto sprocket. Tighten bolts to 90-110 **in-lbs** (10-12 Nm).
7. Install clutch assembly, primary chain and engine sprocket/rotor assembly as a unit. See 6.5 PRIMARY DRIVE/CLUTCH.
8. Install primary cover. See PRIMARY COVER under 6.2 PRIMARY CHAIN.
9. Connect negative battery cable to battery. Tighten battery terminal hardware to 60-96 **in-lbs** (7-11 Nm).
10. Test charging system. See 7.13 CHARGING SYSTEM.

VOLTAGE REGULATOR 7.15

GENERAL

The voltage regulator attaches to a mounting plate at the front of the crankcase. The voltage regulator is not repairable. Replace the unit if it fails.

REMOVAL

⚠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.

1. Disconnect negative battery cable from battery.

CAUTION

When disconnecting the alternator stator wiring, pull apart the connector by firmly grasping both connector halves. Do not pull on leads or damage to the wires and/or terminals could result.

2. See Figure 7-50. Locate voltage regulator connector [17] near the oil pump. Cut cable straps and disconnect connector [17].
3. Detach charging wire from main circuit breaker.
   a. Remove seat, fuel tank and tail section. See 2.34 TAIL SECTION.
   b. See Figure 7-48. Disconnect BK charging wire from gold post of main circuit breaker.
   c. Route charging wire back to voltage regulator. Cut and mark locations of cable ties while removing.
4. Remove two screws, washers and voltage regulator.

INSTALLATION

1. See Figure 7-49. Attach **new** voltage regulator using screws and washers. Tighten screws to 9-11 ft-lbs (12-15 Nm).
2. See Figure 7-50. Connect voltage regulator connector [17] halves and cable tie halves together. Bundle excess wiring in front of oil pump. Secure bundle to oil pump fitting and hose using **new** cable straps.
3. Route BK charging wire to gold post on main circuit breaker. Secure wire to frame with **new** cable straps.
4. Install tail section, fuel tank and seat. See 2.34 TAIL SECTION.
5. Connect negative battery cable to the battery. Tighten battery terminal hardware to 60-96 **in-lbs** (7-11 Nm).
6. Test charging system. See 7.13 CHARGING SYSTEM.

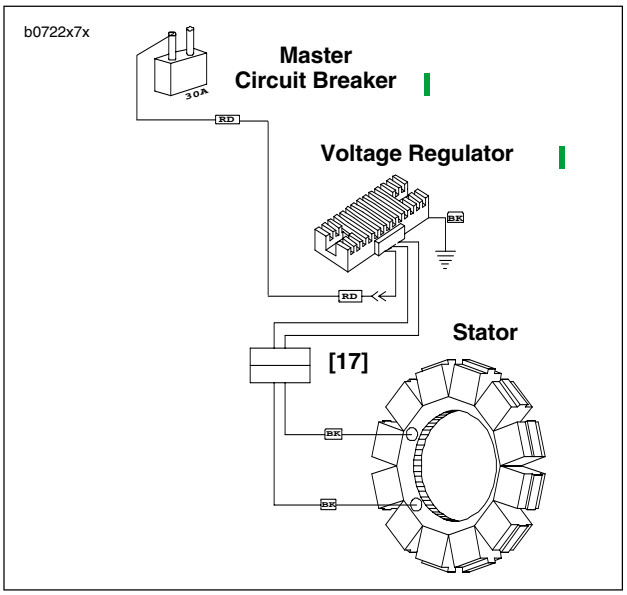


Figure 7-48. Voltage Regulator Connector [17]

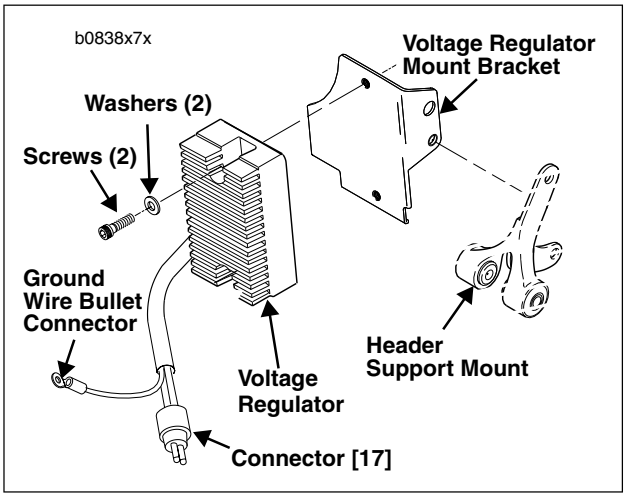


Figure 7-49. Voltage Regulator

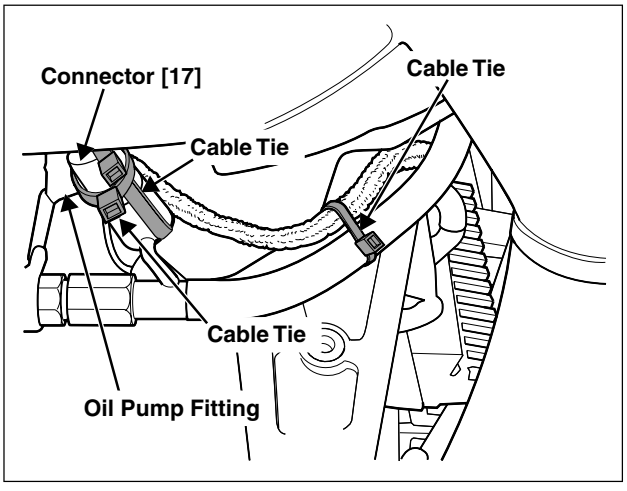


Figure 7-50. Cable Tie Locations

REMOVAL

1. Remove seat and tail section. See 2.34 TAIL SECTION.

⚠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.

⚠WARNING

Always disconnect the negative battery cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion which could result in death or serious injury.

2. Disconnect battery cables from battery, negative cable first.
   a. Remove bolt (metric) holding negative cable to negative battery terminal.
   b. Remove bolt (metric) holding positive cable to positive terminal.
3. See Figure 7-51. Remove bolt to detach negative battery cable from frame.
4. See Figure 7-52. Remove protective boot (1) from starter. Remove nut with washer (3) (metric) to detach positive battery cable (2) from starter.

INSTALLATION

1. Clean cable connectors and battery terminals using a wire brush or sandpaper to remove any oxidation.

⚠WARNING

Always connect positive battery cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks could cause a battery explosion which could result in death or serious injury.

CAUTION

Connect cables to correct terminals of battery or serious damage to motorcycle electrical system will occur.

2. Connect battery cables.
   a. See Figure 7-51. Positive battery cable runs from starter to positive battery terminal. Loosely connect positive cable to positive (+) battery terminal using bolt.
   b. See Figure 7-52. Attach positive battery cable to starter using nut with washer (metric). Tighten to 60-85 **in-lbs** (7-10 Nm). Install protective boot (1).

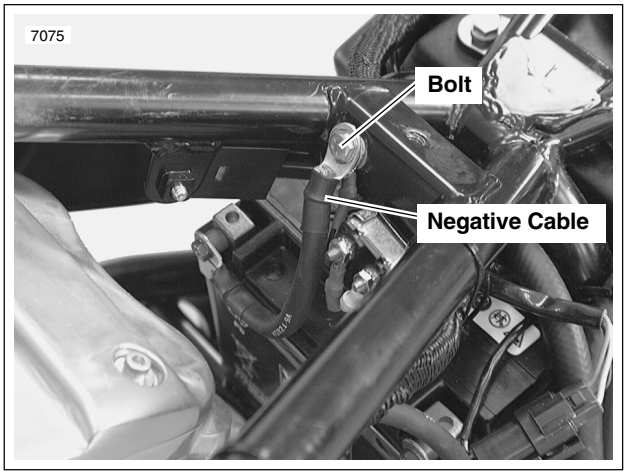
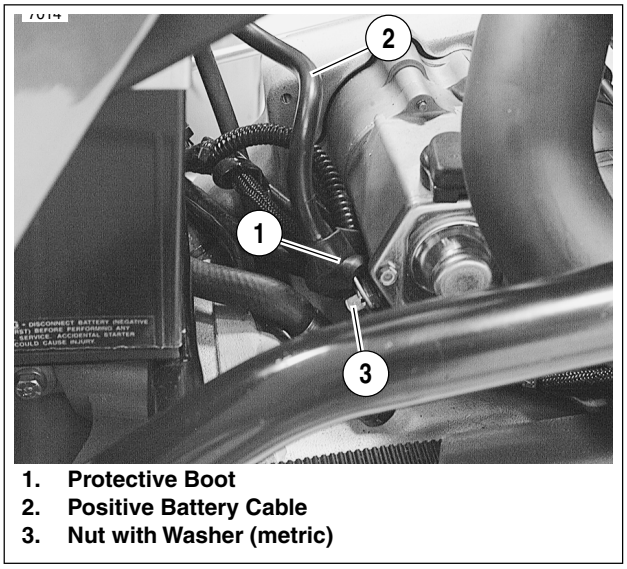


Figure 7-51. Negative Battery Cable (Typical)



1. **Protective Boot**
2. **Positive Battery Cable**
3. **Nut with Washer (metric)**

Figure 7-52. Positive Battery Cable

   c. See Figure 7-51. After positive cable has been connected, loosely connect negative cable to negative (-) battery terminal with screw.
   d. See Figure 7-51. Attach negative cable to frame with bolt.
   e. Tighten both terminal nuts (metric) 60-96 **in-lbs** (7-11 Nm).
3. Apply light coat of petroleum jelly or corrosion-retardant material to both battery terminals.

⚠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 which could result in death or serious injury.

4. Install tail section and seat. See 2.34 TAIL SECTION.

GENERAL

All 2001 Model Year Buell batteries are permanently sealed, maintenance-free, valve-regulated, lead/calcium and sulfuric acid batteries. The batteries are shipped pre-charged and ready to be put into service. Do not attempt to open these batteries for any reason.

⚠WARNING

All batteries contain electrolyte. Electrolyte is a sulfuric acid solution that is highly corrosive and can cause severe chemical burns. Avoid contact with skin, eyes, and clothing. Avoid spillage. Always wear protective face shield, rubberized gloves and protective clothing when working with batteries. A warning label is attached to the top of the battery. See Figures 7-33 and 7-34. Never remove warning label from battery. Failure to read and understand all precautions contained in warning label before performing any service on batteries could result in death or serious injury.

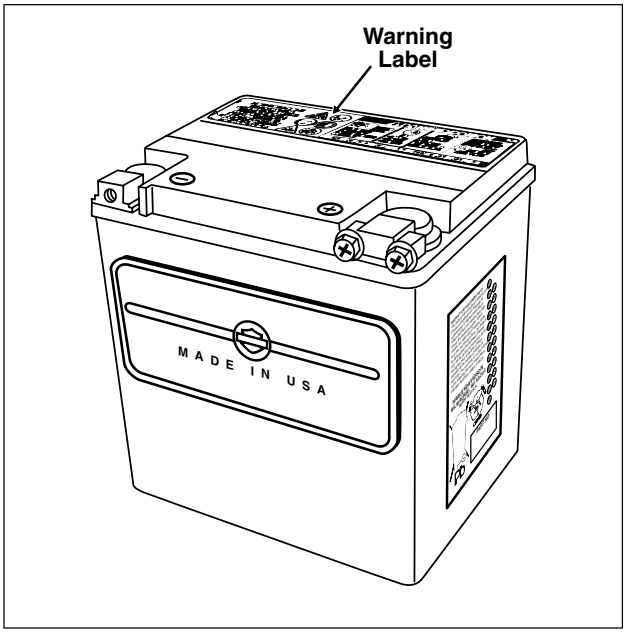


Figure 7-53. Maintenance-Free AGM Battery

BATTERY TESTING

Voltmeter Test

See Table 7-1. The voltmeter test provides a general indicator of battery condition. Check the voltage of the battery to verify that it is in a 100% fully charged condition. If the open circuit (disconnected) voltage reading is below 12.6V, charge the battery and then recheck the voltage after the battery has set for one to two hours. If the voltage reading is 12.8V or above, perform the load test.

ANTIDOTE

External– Flush with water.

Internal– Drink large quantities of milk or water, followed by milk of magnesia, vegetable oil or beaten eggs. Call doctor immediately.

Eyes– Flush with water, get immediate medical attention.

Figure 7-54.

Table 7-1. Voltmeter Test

BATTERY CHARGE CONDITIONS	
Voltage (OCV)	**State of Charge**
12.8	**100%**
12.6	**75%**
12.3	**50%**
12.0	**25%**
11.8	**0%**

CLEANING AND INSPECTION

1. Battery top must be clean and dry. Dirt and electrolyte on top of the battery can cause battery to self-discharge. Clean battery top with a solution of baking soda (sodium bicarbonate) and water (5 teaspoons baking soda per quart or liter of water). When the solution stops bubbling, rinse off the battery with clean water.
2. Clean cable connectors and battery terminals using a wire brush or sandpaper. Remove any oxidation.
3. Inspect the battery screws, clamps and cables for breakage, loose connections and corrosion. Clean clamps.
4. Check the battery posts for melting or damage caused by overtightening.
5. Inspect the battery for discoloration, raised top or a warped or distorted case, which might indicate that the battery has been frozen, overheated or overcharged.
6. Inspect the battery case for cracks or leaks.

BATTERY CHARGING

Safety Precautions

Never charge a battery without first reviewing the in-structions for the charger being used. In addition to the manufacturer's instructions, follow these general safety precautions:

- **Always wear proper eye, face and hand protection.**
- **Always charge batteries in a well-ventilated area.**
- **Turn the charger "OFF" before connecting the leads to the battery to avoid dangerous sparks.**
- **Never try to charge a visibly damaged or frozen battery.**
- **Connect the charger leads to the battery; red positive (+) lead to the positive (+) terminal and black negative (–) lead to the negative (–) terminal. If the battery is still in the vehicle, connect the negative lead to the chassis ground. Be sure that the ignition and all electrical accessories are turned off.**
- **Make sure that the charger leads to the battery are not broken, frayed or loose.**
- **If the battery becomes hot, or if violent gassing or spewing of electrolyte occurs, reduce the charging rate or turn off the charger temporarily.**
- **Always turn the charger "OFF" before removing charger leads from the battery to avoid dangerous sparks.**

Charging Battery

Charge the battery if any of the following conditions exist:

- Vehicle lights appear dim.
- Electric starter sounds weak.
- Battery has not been used for an extended period of time.

⚠WARNING

Charge the battery in a well ventilated area. Explosive hydrogen gas escapes from the battery during charging. Keep open flames, electrical sparks and smoking materials away from the battery at all times. Inadequate safety precautions could result in death or serious injury.

CAUTION

If the battery releases an excessive amount of gas during charging, decrease the charging rate. If the battery gets hotter than 110˚F. (43˚C) during charging, discontinue charging and allow the battery to cool. Overheating may result in plate distortion, internal shorting, dryout or other damage.

1. Perform a voltmeter test to determine the state of charge. See BATTERY TESTING, VOLTMETER TEST, on the previous page. If battery needs to be charged, proceed to step 2.

CAUTION

Always remove the battery from the motorcycle before charging. Accidental electrolyte leakage will damage motorcycle parts.

The figures listed assume that the battery is charging at room temperature. If warmer than room temperature, use a slightly shorter charging time. If colder, use a slightly longer charging time.

The use of constant current chargers to charge sealed maintenance-free batteries is not recommended. Any overcharge will cause dry-out and premature battery failure. If a constant current charger is the only type available, do **not** exceed the charge times listed above and do **not** continue charging the battery if it gets hot. When charging, never exceed 15 volts for more than 30 minutes.

2. Remove the battery from the motorcycle. See BATTERY, DISCONNECTION AND REMOVAL. Place the battery on a level surface.

⚠WARNING

Always unplug or turn OFF the battery charger before connecting the charger clamps to the battery. Connecting clamps with the charger ON could cause a spark resulting in a battery explosion which could result in death or serious injury.

CAUTION

Do not reverse the charger connections described in the following steps or the charging system of the motorcycle could be damaged.

3. Connect the red battery charger lead to the positive (+) terminal of the battery.

4. Connect the black battery charger lead to the negative (–) terminal of the battery.

NOTE

If the battery is still in the vehicle, connect the negative lead to the chassis ground. Be sure that the ignition and all electrical accessories are turned off.

5. Step away from the battery and turn on the charger. See the charging instructions in Table 7-2.

⚠WARNING

Always unplug or turn OFF the battery charger before disconnecting the charger clamps from the battery. Disconnecting clamps with the charger ON could cause a spark resulting in a battery explosion which could result in death or serious injury.

6. After the battery is fully charged, disconnect the black battery charger lead to the negative (–) terminal of the battery.

7. Disconnect the red battery charger lead to the positive (+) terminal of the battery.

8. Mark the charging date on the battery.

9. Perform a load test to determine the condition of the battery. See BATTERY TESTING, LOAD TEST.

Table 7-2. Battery Charging Rates/Times

Battery Amp-Hour	State of Charge		3 Amp Charger	6 Amp Charger	10 Amp Charger	20 Amp Charger
	Voltage Reading	% of Charge				
SPORT 19	12.8 V	100%	-	-	-	-
	12.6 V	75%	1.75 hours	50 minutes	30 minutes	15 minutes
	12.3 V	50%	3.5 hours	1.75 hours	1 hour	30 minutes
	12.0 V	25%	5 hours	2.5 hours	1.5 hours	45 minutes
	11.8 V	0%	6 hours, 40 minutes	3 hours, 20 minutes	2 hours	1 hour

BATTERY LOAD TESTING

The load test measures battery performance under full current load and is the best indicator of battery condition. To load test the battery, proceed as follows:

CAUTION

Load testing a discharged battery can result in permanent battery damage.

1. Always fully charge the battery before testing or test readings will be incorrect. See CHARGING BATTERY. Load testing a discharged battery can also result in permanent battery damage.
10. After charging, allow battery to stand for at least one hour before testing.

⚠WARNING

Always turn the battery load tester OFF before connecting the tester cables to the battery terminals. Connecting tester cables with the load tester ON could cause a spark resulting in a battery explosion which could result in death or serious injury.

11. Connect tester leads to battery posts and place induction pickup over negative (black) cable. See Figure 7-42.

CAUTION

To avoid load tester and/or battery damage, do not leave the load tester switch turned ON for more than 20 seconds.

12. Referencing Table 7-7, load battery at 50% of CCA rating using the load tester. Voltage reading after 15 seconds should be 9.6V or more at 70°F. (21°C).

STORAGE

⚠WARNING

Always store batteries where they cannot be reached by children. Contact with the battery's sulfuric acid could result in death or serious injury.

CAUTION

The electrolyte in a discharged battery will freeze if exposed to freezing temperatures. Freezing may crack the battery case and buckle battery plates.

If the motorcycle will not be operated for several months, such as during the winter season, remove the battery from the motorcycle and fully charge. See CHARGING BATTERY.

Self-discharge is a normal condition and occurs continuously at a rate that depends on the ambient temperature and the battery's state of charge. Batteries discharge at a faster rate at higher ambient temperatures. To reduce the self-discharge rate, store battery in a cool (not freezing), dry place. See Figure 7-37.

Charge the battery every month if stored at temperatures below 60˚ F. (16˚ C). Charge the battery more frequently if stored in a warm area above 60˚ F. (16˚ C).

NOTE

The H-D Battery Tender Automatic Battery Charger (P/N 99863-93TA) may be used to maintain battery charge for extended periods of time without risk of overcharging or boiling.

When returning a battery to service after storage, refer to the instructions under CHARGING BATTERY.

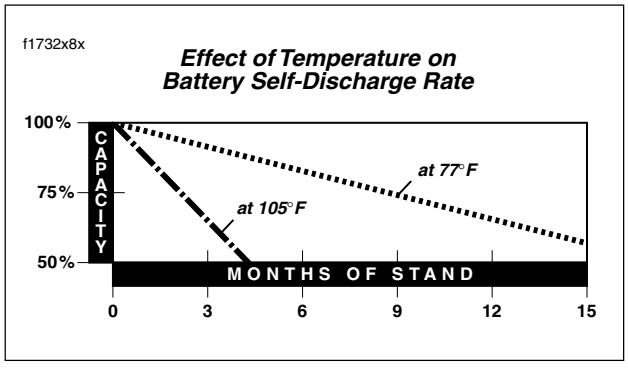


Figure 7-55. Battery Self-Discharge Rate

MODEL YEAR CHANGE

All 2001 model Buell M2/M2L motorcycles have a headlamp bucket common with the P3 Blast model.

REMOVAL/DISASSEMBLY

Headlamp and Bulbs

1. Remove windscreen. See 2.35 WINDSCREEN
2. See Figure 7-59. Remove three screws and bezel from nest.
3. Remove three screws and retaining ring.
4. Slide headlamp from headlamp housing and detach headlamp connector from rear of headlamp.
5. Remove rubber boot from headlamp bulb.

⚠CAUTION

The bulb contains Halogen gas under pressure. Handle bulb carefully and wear eye protection. If the bulb is mishandled or dropped, it could explode which could result in mild or moderate injury.

CAUTION

Never touch the bulb with your fingers. Fingerprints will etch the glass and cause the bulb to fail. Always wrap the bulb in paper or a clean, dry cloth during handling.

6. See Figure 7-60. Remove headlamp bulb.
   a. Open wire retaining latch (1).
   b. Pull bulb housing from headlamp housing.

Headlamp Housing and Bracket

1. Remove seat and fuel tank. See 4.5 FUEL TANK.
2. See Figure 7-61. Cut as many cable straps as necessary to access headlamp connector [4] along right side frame tube. Detach connector [4] from wiring harness.
3. See Figure 7-59. Remove two screws and washers and remove headlamp housing from vehicle. Remove both windscreen brackets.
4. Remove headlamp brackets.
   a. Remove front turn signals. See 7.20 TURN SIGNALS.
   b. Remove bolt, washer and locknut.
   c. Remove bolt and locknut.
   d. Repeat for other bracket.
   e. Remove front forks and headlamp brackets. See 2.16 FRONT FORK.

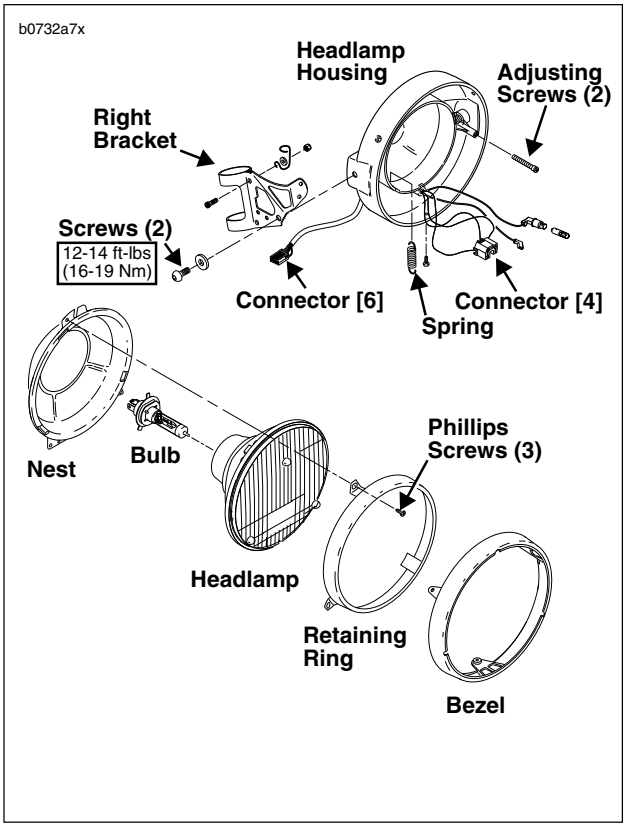
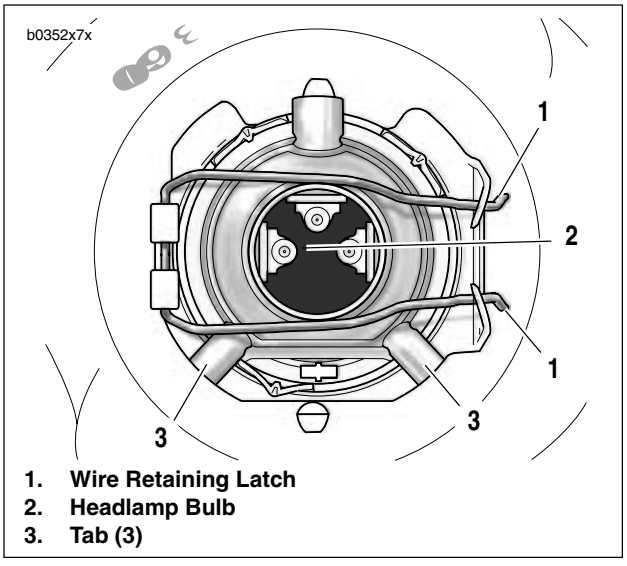


Figure 7-59. Headlamp Assembly



1. **Wire Retaining Latch**
2. **Headlamp Bulb**
3. **Tab (3)**

Figure 7-60. Headlamp Bulbs

ASSEMBLY/INSTALLATION

Headlamp Brackets and Housing

1. Install headlamp brackets.
   a. Install front forks through triple clamps and brackets. See 2.16 FRONT FORK.
   b. See Figure 7-59. Install bracket with two screws.
   c. Repeat for other bracket
   d. Attach both front turn signals. See 7.20 TURN SIGNALS.
2. See Figure 7-61. Route headlamp wire harness between front forks and along right side frame tube. Attach connector [4] to wiring harness. Fasten wiring harness to frame with **new** cable straps.
3. See Figure 7-59. Place windscreen brackets in position and install headlamp housing using two screws (metric) and washers (2). Tighten to 12-14 ft-lbs (16-19 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 which could result in death or serious injury.

4. Install fuel tank and seat. See 4.5 FUEL TANK.
5. Check headlamp for proper operation. See HEADLAMP AND BULBS below.

Headlamp and Bulbs

⚠CAUTION

The bulb contains Halogen gas under pressure. Handle bulb careful and wear eye protection. If the bulb is mishandled or dropped, it could explode which could result in mild or moderate injury.

CAUTION

Never touch the bulb with your fingers. Fingerprints will etch the glass and cause the bulb to fail. Always wrap the bulb in paper or a clean, dry cloth during handling.

NOTE

When bulb replacement is required, see your Buell dealer. Not using the specified bulb may cause charging system problems.

1. See Figure 7-60. Install headlamp bulb (2).
   a. Align tabs (3) on bulb housing with tabs on headlamp. Insert bulb.
   b. Close the wire retaining latch (1).
2. See Figure 7-59. Place rubber boot into position and connect headlamp connector [4] to headlamp.
3. Install headlamp and retaining ring to nest with three fillips screws. Tighten screws to 12-14 **in-lbs** (1.4-1.6 Nm).
4. Install bezel to retaining ring with three phillips screws. Tighten screws to 12-14 **in-lbs** (1.4-1.6 Nm).
5. Install windscreen. See 2.35 WINDSCREEN.

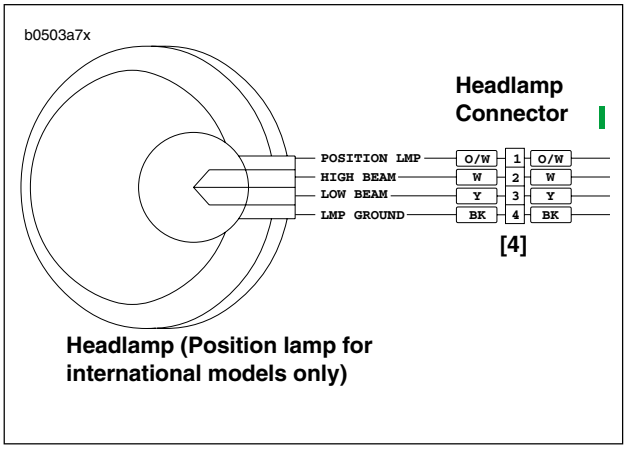


Figure 7-61. Headlamp Connector [4]

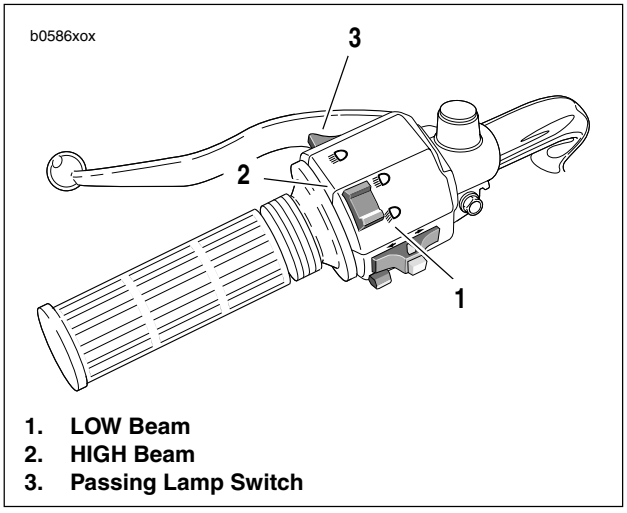


Figure 7-62. Passing Lamp Switch

⚠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.

6. Check headlamp for proper operation. If operation fails, reread procedure and verify that all steps were performed.
   a. Turn ignition key switch to IGN.
   b. See Figure 7-62. Check headlamp LOW (1) and HIGH beam (2) settings.
   c. Set headlamp to LOW beam (2). Press passing lamp switch (3). Headlamp should flash HIGH beam for as long as the switch is pressed.
   d. Turn ignition key switch to LOCK.
7. Align headlamp. See 1.21 HEADLAMP.

REMOVAL/DISASSEMBLY

1. See Figure 7-63. If necessary, remove tail lamp bulb (5).
   a. Remove two screws (3) to detach tail lamp lens.
   b. Turn bulb counterclockwise and remove.
2. Remove seat. See 2.36 SEAT.
3. Disconnect the three tail lamp wires.
4. Remove two locknuts (1) (metric) and washers (2).

ASSEMBLY/INSTALLATION

1. See Figure 7-63. Attach tail lamp to tail section with two washers (2) and locknuts (1) (metric).
2. Attach the three tail lamp wires.
3. If removed, install tail lamp bulb (5).
   a. Turn bulb clockwise to install.
   b. Install tail lamp lens with two screws (3).

⚠WARNING

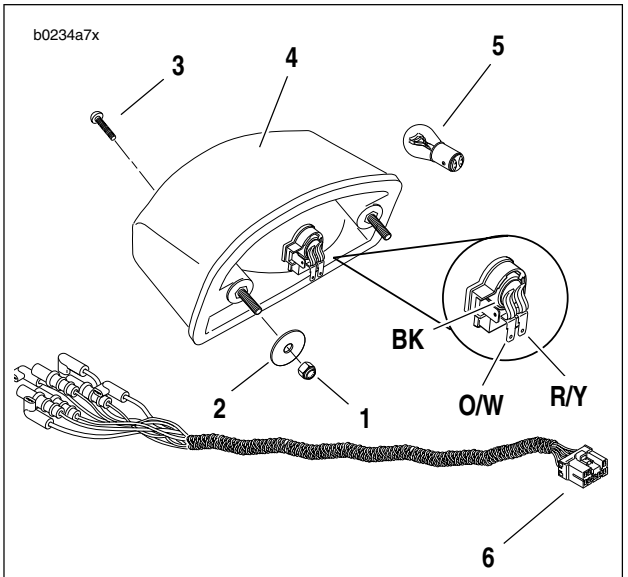
After installing seat, pull upward on front of seat to be sure it is locked in position. If seat is loose, it could shift during vehicle operation and startle the rider, causing loss of control which could result in death or serious injury.

4. Install seat. See 2.36 SEAT.

⚠WARNING

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

5. Check tail lamp for proper operation. If operation fails, reread procedure and verify that all steps were performed.
   a. Turn ignition key switch to IGN.
   b. Check for tail lamp illumination.
   c. Squeeze front brake hand lever. Check for brake lamp illumination. Release front brake hand lever.
   d. Press rear brake pedal. Check for brake lamp illumination. Release rear brake pedal.
   e. Turn ignition key switch to LOCK.



1. **Locknut (2) (metric)**
2. **Washer (2)**
3. **Screw (2)**
4. **Tail Lamp**
5. **Tail Lamp Bulb**
6. **Tail Lamp Connector**

Figure 7-63. Tail Lamp

TURN SIGNALS 7.20

REMOVAL

NOTE

*Remove screw on back of turn signal to detach lens and install **new** turn signal bulbs.*

Front

1. Remove windscreen 2.35 WINDSCREEN.
2. See Figure 7-64. Disconnect bullet connectors on turn signal wires.
3. See Figure 7-65. Remove screws (1) and nuts (6).
4. Remove turn signals (3) and standoffs (4).

Rear

1. Remove seat. See 2.36 SEAT.
2. Cut cable straps to access bullet connectors under tail section.
3. See Figure 7-66. Disconnect bullet connectors on turn signal wires.
4. See Figure 7-67. Remove screws (1) and nuts (4).
5. Remove turn signals (2) from tail lamp bracket.

INSTALLATION

Front

1. See Figure 7-65. Install turn signals (3) and standoffs (4) using screws (1) and nuts (6). Tighten to 20-23 **in-lbs** (2.3-2.6 Nm).

NOTE

Install turn signal with lens drain hole facing downward.

2. Attach bullet connectors on turn signal wires as shown in Figure 7-64.
3. Install windscreen. See 2.35 WINDSCREEN.

⚠WARNING

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

4. Check turn signals for proper operation. If operation fails, reread procedure and verify that all steps were performed.
   a. Turn ignition key switch to IGN.
   b. Activate left turn signals using switch on left handlebar. Front and rear left turn signals must flash.
   c. Activate right turn signals using switch on left handlebar. Front and rear right turn signals must flash.
   d. Turn ignition key switch to LOCK.

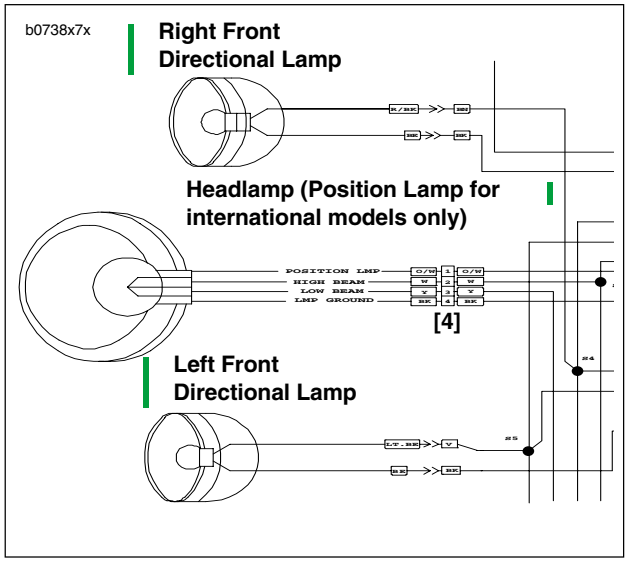
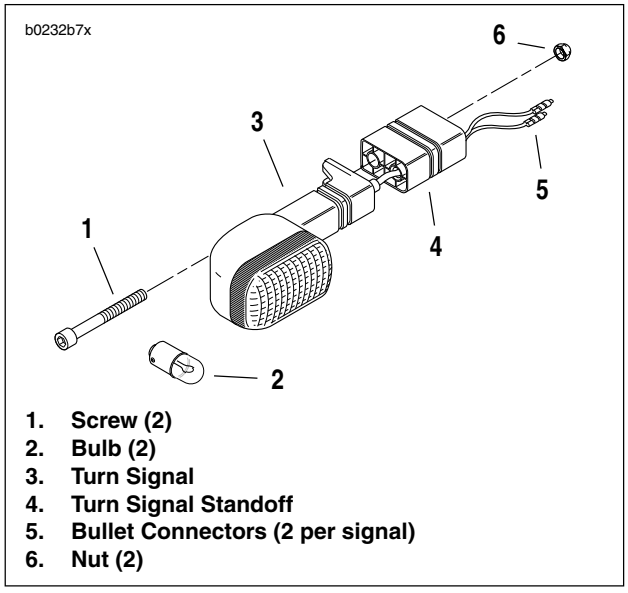


Figure 7-64. Front Turn Signal Connections



1. **Screw (2)**
2. **Bulb (2)**
3. **Turn Signal**
4. **Turn Signal Standoff**
5. **Bullet Connectors (2 per signal)**
6. **Nut (2)**

Figure 7-65. Front Turn Signals

Rear

1. See Figure 7-67. Insert bullet connectors (3) through rear hole in tail lamp bracket. Attach turn signals (2) using screws (1) and nuts (4). Tighten to 25-28 **in-lbs** (2.8-3.2 Nm).

NOTE

Install turn signal with lens drain hole facing downward.

2. Attach bullet connectors on turn signal wires as shown in Figure 7-66.
3. Use **new** cable straps to bundle turn signal wires beneath tail section.

⚠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 which could result in death or serious injury.

4. Install seat. See 2.36 SEAT.

⚠WARNING

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

5. Check turn signals for proper operation. If operation fails, reread procedure and verify that all steps were performed.
   a. Turn ignition key switch to IGN.
   b. Activate left turn signals using switch on left handlebar. Front and rear left turn signals must flash.
   c. Activate right turn signals using switch on left handlebar. Front and rear right turn signals must flash.
   d. Turn ignition key switch to LOCK.

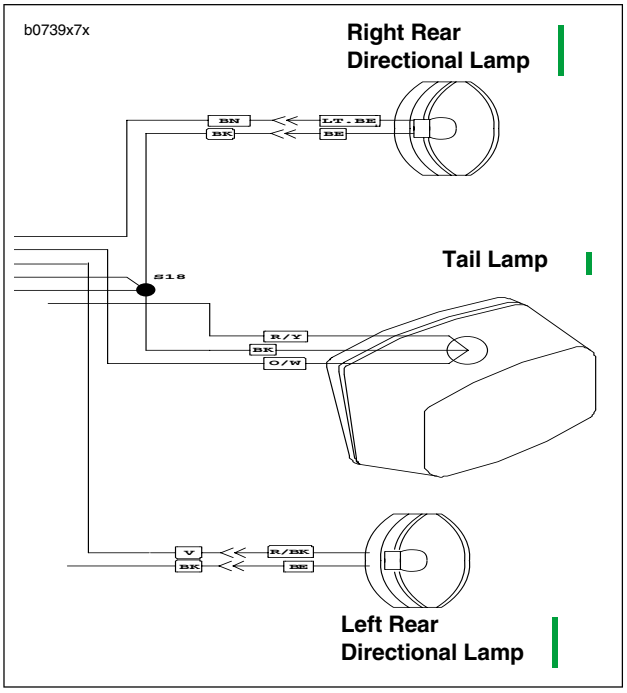
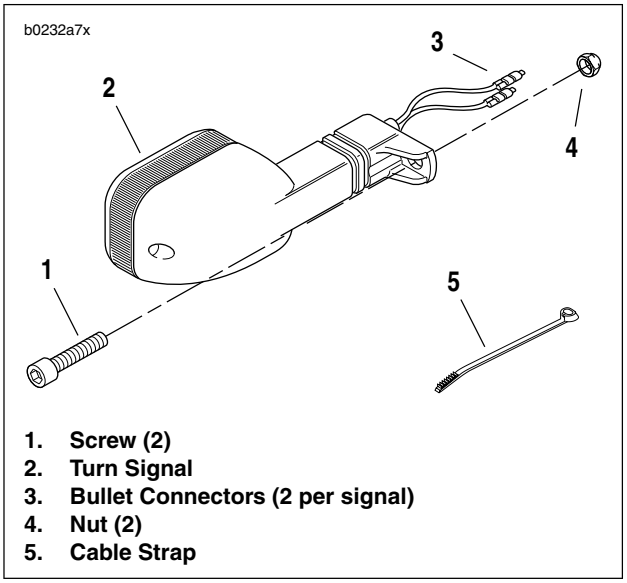


Figure 7-66. Rear Turn Signal Connections



1. **Screw (2)**
2. **Turn Signal**
3. **Bullet Connectors (2 per signal)**
4. **Nut (2)**
5. **Cable Strap**

Figure 7-67. Rear Turn Signals

TURN SIGNAL FLASHER 7.21

REMOVAL

NOTE

The turn signal flasher is not repairable. Replace the unit if it fails.

1. Remove seat and tail section. See 2.34 TAIL SECTION.
2. See Figure 7-68. Remove screw (2) to free flasher (3) and wires (1) from frame.
3. Detach wires (1) from flasher base.

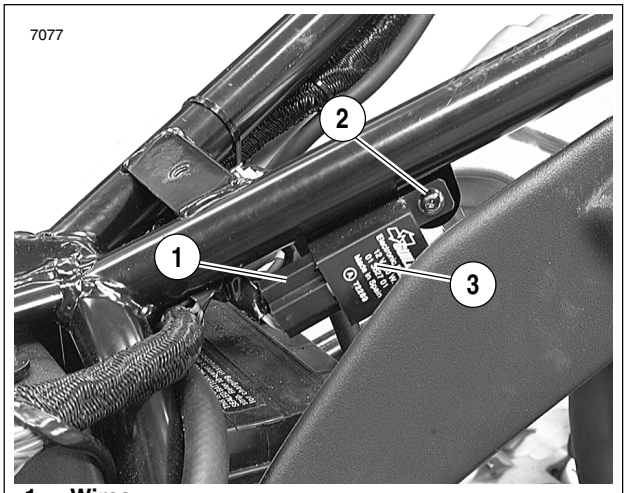
INSTALLATION

1. See Figure 7-68. Connect wires (1) to **new** turn signal flasher (3).
2. Attach assembly to **inside** of frame tube with screw (2).

⚠WARNING

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

3. Check turn signals for proper operation. If operation fails, reread procedure and verify that all steps were performed.
   a. Turn ignition key switch to IGN.
   b. Activate left turn signals using switch on left handlebar. Front and rear left turn signals must flash.
   c. Activate right turn signals using switch on left handlebar. Front and rear right turn signals must flash.
   d. Turn ignition key switch to LOCK.



1. **Wires**
2. **Screw**
3. **Flasher**

Figure 7-68. Turn Signal Flasher

⚠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 which could result in death or serious injury.

4. Install tail section and seat. See 2.34 TAIL SECTION.

REMOVAL

NOTE

The individual handlebar switches are not repairable. Replace switch assembly upon switch failure.

Right Side

1. Detach throttle cables.
2. Remove seat. See 2.36 SEAT
3. Remove fuel tank. See 4.5 FUEL TANK.
4. See Figure 7-69. Cut as many cable straps as necessary to access right handlebar switch connector [1] along right side frame tube. Detach connector [1] from wiring harness.
5. Cut as many cable straps as necessary to access brake switch connector [2] along right side frame tube. Detach connector [2] from wiring harness.

Left Side

1. Remove three screws from handlebar switch.
2. Separate switch housings and remove from handlebar.
3. Remove seat. See 2.36 SEAT
4. Remove fuel tank. See 4.5 FUEL TANK.
5. See Figure 7-71. Cut as many cable straps as necessary to access left handlebar switch connector [6] along right side frame tube. Detach connector [6] from wiring harness.
6. Cut as many cable straps as necessary to access clutch switch connector [5] along right side frame tube. Detach connector [5] from wiring harness.

INSTALLATION

Right Side

1. Attach throttle cables to hand control.
2. Position housings on right handlebar by engaging stud on front housing with hole in handlebar. Fasten housings with two screws. Tighten to 12-17 **in-lbs** (1.4-1.9 Nm).
3. See Figure 7-69. Route switch housing wiring harness between front forks and along right side frame tube. Attach connector [1] and, if necessary, connector [2] to wiring harness. Fasten wiring harness to frame with **new** cable straps.
4. Install fuel tank. See 4.5 FUEL TANK.

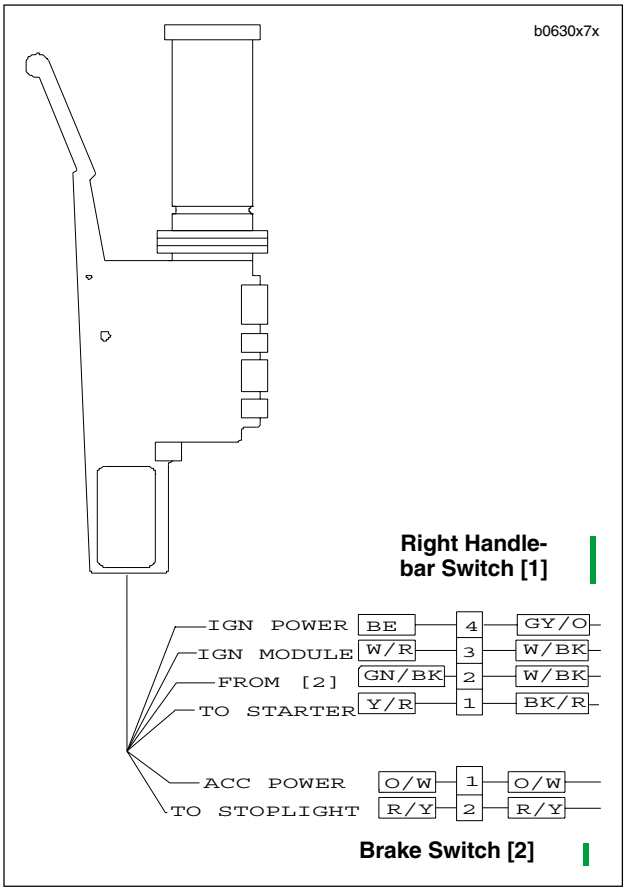
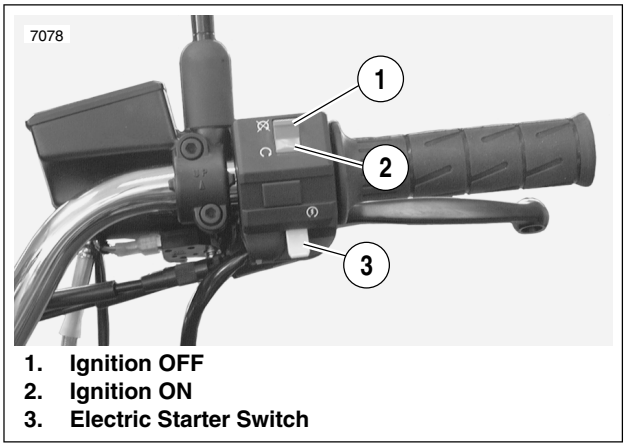


Figure 7-69. Right Handlebar Switch Connection



1. **Ignition OFF**
2. **Ignition ON**
3. **Electric Starter Switch**

Figure 7-70. Right Handlebar Switches

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 which could result in death or serious injury.

5. Install seat. See 2.36 SEAT.
6. Adjust throttle cables. See 1.17 CARBURETOR.

⚠WARNING

Check all handlebar switch operations before riding motorcycle. Handlebar switches not operating properly could result in death or serious injury.

7. Check handlebar switch for proper operation. If operation fails, reread procedure and verify that all steps were performed.
   a. Turn ignition key switch to IGN.
   b. Start motorcycle.
   c. Turn ignition key switch to LOCK.

Left Side

1. Attach switch housing to handlebar with three screws. Tighten screws to 25-33 **in-lbs** (3-4 Nm).
2. See Figure 7-71. Route switch housing wiring harness between front forks and along right side frame tube. Attach connector [6] and, if necessary, connector [5] to wiring harness. Fasten wiring harness to frame with **new** cable straps.
3. Install fuel tank. See 4.5 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 which could result in death or serious injury.

4. Install seat. See 2.36 SEAT.

⚠WARNING

Check all handlebar switch operations before riding motorcycle. Handlebar switches not operating properly could result in death or serious injury.

5. Check handlebar switch for proper operation. If operation fails, reread procedure and verify that all steps were performed.
   a. Turn ignition key switch to IGN.
   b. Check headlamp LOW and HIGH beam settings.
   c. Set headlamp to LOW beam. Press passing lamp switch. Headlamp should flash HIGH beam for as long as the switch is pressed.
   d. Check left and right turn signals.
   e. Activate horn by pressing horn switch.
   f. Turn ignition key switch to LOCK.

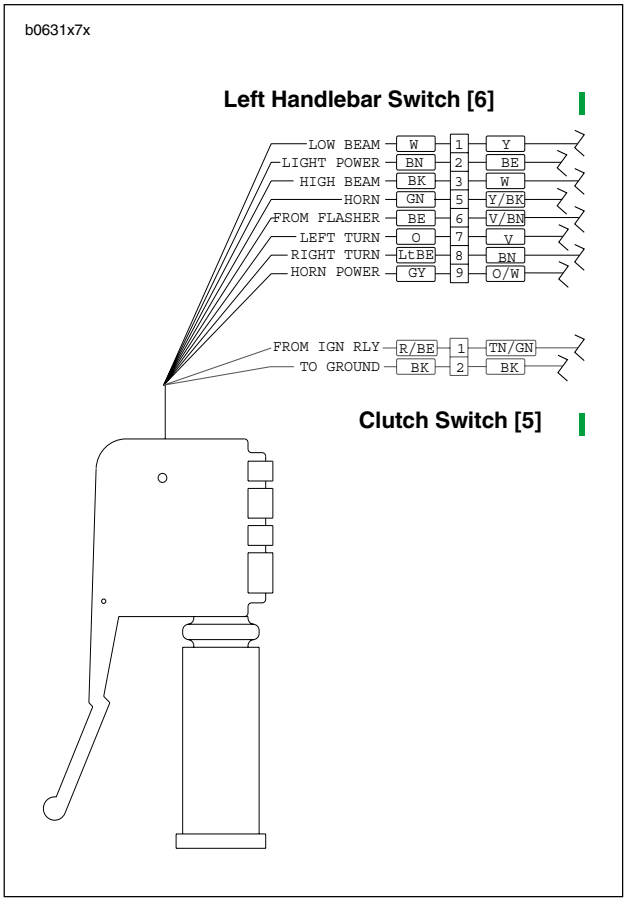
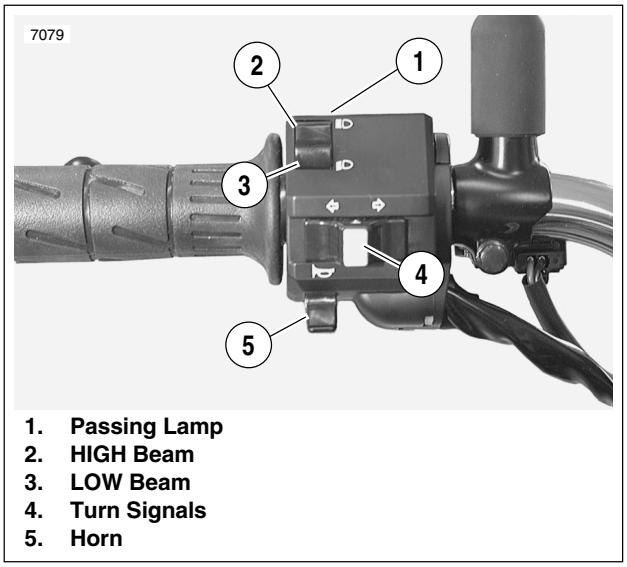


Figure 7-71. Left Handlebar Switch Connection



1. **Passing Lamp**
2. **HIGH Beam**
3. **LOW Beam**
4. **Turn Signals**
5. **Horn**

Figure 7-72. Left Handlebar Switches

REMOVAL

1. Remove seat and fuel tank bolt. Move fuel tank aside. See 4.5 FUEL TANK.
2. See Figure 7-73. Remove bolt and washer (1).
3. Remove horn (2) from frame. Detach Y/BK power wire (3) and BK ground wire (4) from terminal clips.

INSTALLATION

1. See Figure 7-73. Connect Y/BK power wire (3) and BK ground wire (4) to terminal clips.
2. Attach horn (2) to frame using bolt and washer (1).

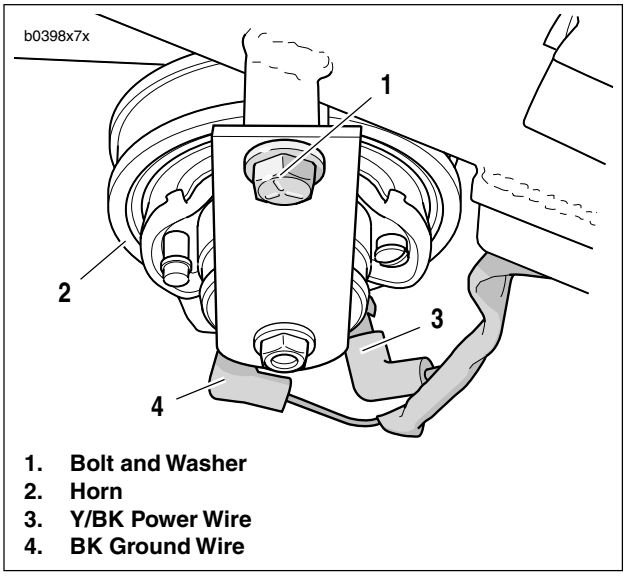
⚠WARNING

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 which could result in death or serious injury.

3. Install fuel tank and seat. See 4.5 FUEL TANK.
4. Check horn operation. If horn does not sound or fails to function satisfactorily, see TROUBLESHOOTING.
   a. Turn ignition key switch to IGN.
   b. Press horn switch to activate horn.
   c. Turn ignition key switch to LOCK.

TROUBLESHOOTING

1. If the horn does not sound or fails to function satisfactorily, check for the following conditions:
   a. Discharged battery.
   b. Loose, frayed or damaged wiring leading to horn terminal.
2. If battery has a satisfactory charge and wiring appears to be in good condition, test horn grounds and switch using voltmeter.
   a. See Figure 7-73. Remove Y/BK power (3) and BK ground (4) wires from terminal clips.
   b. Connect voltmeter positive (+) lead to Y/BK (3) wire.
   c. Connect voltmeter negative (–) lead to ground.
   d. Turn ignition key switch to IGN.
3. See Figure 7-74. Depress horn switch and observe voltmeter reading.
   a. If battery voltage is present, horn or horn grounding is faulty. If horn is faulty, replace unit as an assembly. The horn is not repairable.
   b. If battery voltage is not present, either horn switch or wiring to horn is faulty. If horn switch is faulty, replace left handlebar switch. See 7.22 HANDLEBAR SWITCHES.



1. **Bolt and Washer**
2. **Horn**
3. **Y/BK Power Wire**
4. **BK Ground Wire**

Figure 7-73. Horn Assembly

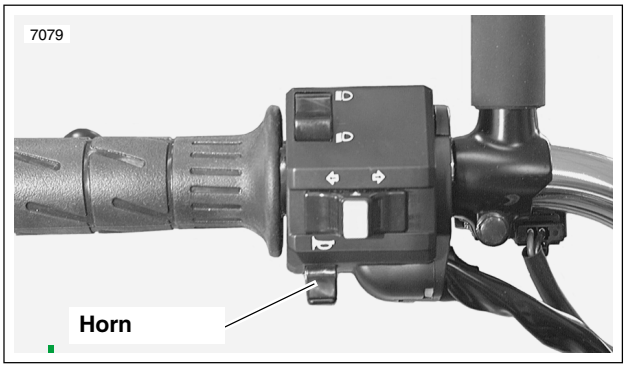


Figure 7-74. Horn Switch Location

NEUTRAL INDICATOR SWITCH 7.24

GENERAL

See Figure 7-75. The neutral indicator switch (1) is threaded into the transmission portion of the right crankcase half (2); it is immediately forward of the main drive gear shaft (3). The sprocket cover must be removed to test the switch. If switch requires replacement, secondary drive belt and transmission sprocket must also be removed; there is not enough clearance to allow the removal of the switch without first removing the transmission sprocket.

A pin on the shifter drum contacts the neutral indicator switch plunger, completing the neutral indicator circuit. The switch is not repairable. Replace the switch if it malfunctions.

TESTING

1. Remove sprocket cover. See 2.30 SPROCKET COVER.
2. See Figure 7-75. Disconnect wire lead from neutral indicator switch (1).
3. Turn ignition key switch to IGN. Touch the neutral indicator wire lead to a suitable ground.
   a. If indicator lamp lights, then problem is at indicator switch. Replace switch.
   b. If indicator lamp does not light, then problem is elsewhere in circuit. Check for loose connections, burned out indicator lamps or faulty wiring.
   c. After testing and repair, connect wire lead to indicator switch.
4. Install sprocket cover. See 2.30 SPROCKET COVER.

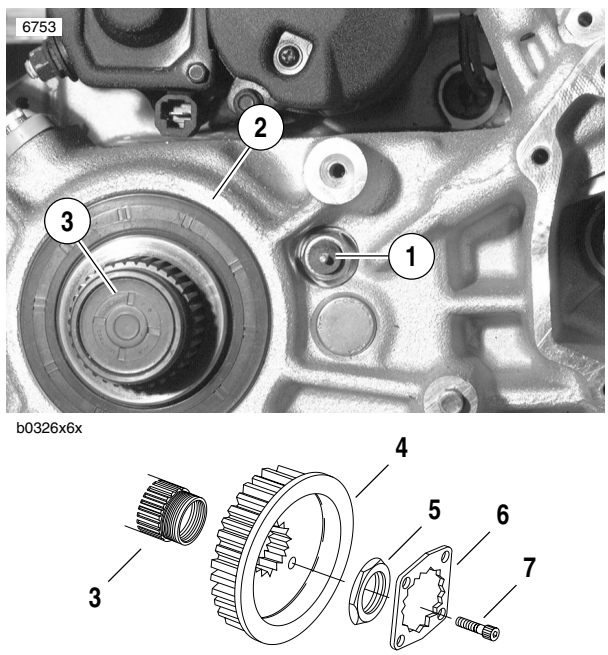
REMOVAL/INSTALLATION

1. Verify that the ignition key switch is turned to LOCK.
2. Remove sprocket cover. See 2.30 SPROCKET COVER.
3. See Figure 7-75. Place transmission in first gear. Remove two socket head screws (7) and lockplate (6).

CAUTION

Transmission sprocket nut has left-hand threads. Turn nut clockwise to loosen and remove from main drive gear shaft. Transmission sprocket nut will be damaged if turned counterclockwise to remove.

4. Remove transmission sprocket nut (5) from main drive gear shaft (3).



1. **Neutral Indicator Switch**
2. **Right Crankcase Half**
3. **Main Drive Gear Shaft**
4. **Transmission Sprocket**
5. **Transmission Sprocket Nut (LH threads)**
6. **Lockplate**
7. **Socket Head Screw (2)**

Figure 7-75. Neutral Indicator Switch

5. Decrease secondary drive belt tension by loosening axle adjusting nuts. See 1.8 DRIVE BELT DEFLECTION.
6. Remove transmission sprocket (4) (with secondary drive belt) from main drive gear shaft (3).
7. Remove wire lead from neutral indicator switch (1). Remove switch from right crankcase half (2).
8. Install **new** neutral indicator switch.
   a. Apply a light coating of LOCTITE THREADLOCKER 243 (blue) to **new** neutral indicator switch (1) threads.
   b. Install switch in crankcase. Tighten to 3-5 ft-lbs (4-7 Nm).
   c. Connect wire lead to switch.
9. Install transmission sprocket (4) (with secondary drive belt) onto main drive gear shaft (3). See 6.13 TRANSMISSION INSTALLATION AND SHIFTER PAWL ADJUSTMENT.
10. Install sprocket cover. See 2.30 SPROCKET COVER.
11. Adjust drive belt tension. See 1.8 DRIVE BELT DEFLECTION.

GENERAL

Buell motorcycles feature two components which protect the electrical system.

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.

Fuses

See Figure 7-76. The fuse block is on the right side of the frame under the tail section. The block contains five replaceable fuses. A spare fuse (1) is attached to the fuse block. Additional spares may be added at the rider's discretion.

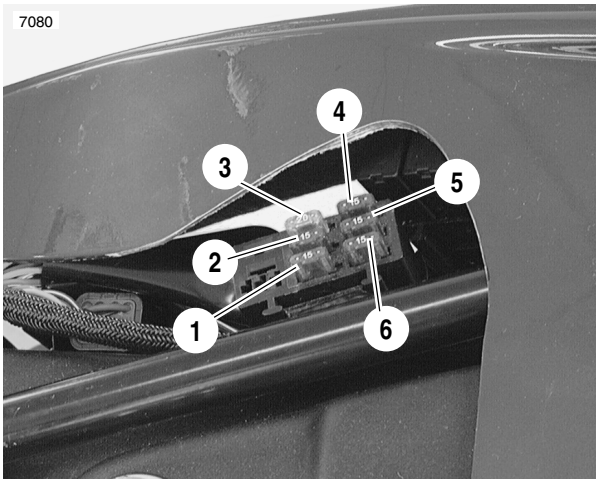
The memory (2), lights (4), instruments (5), and accessory (6) fuses are each rated at 15 amperes. The ignition (3) is rated at 20 amperes.

Always investigate the cause of blown fuses before replacing them. See your Buell dealer for more information.

Circuit Breakers

See Figure 7-77. The 30 ampere main circuit breaker is on the frame beneath the tail section.

Since the circuit breaker is the automatic-reset type, the bimetallic breaker contacts automatically close (completing the circuit) once they have cooled down from the initial overload. If the overload condition still exists, the breaker contacts will again open to interrupt current flow. This opening and closing of the breaker contacts continues as long as the current circuit overload condition exists.



1. **Spare 15A**
2. **Memory 15A**
3. **Ignition 20A**
4. **Lights 15A**
5. **Instruments 15A**
6. **Accessory 15A**

Figure 7-76. Fuse Block

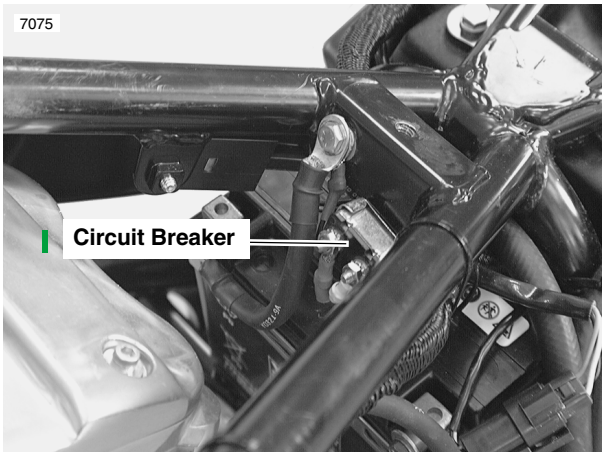


Figure 7-77. Circuit Breaker

SPEEDOMETER SENSOR 7.26

REMOVAL

1. See Figure 7-78. Remove bolt to detach speedometer sensor from crankcase.
2. Remove seat and tail section. See 2.34 TAIL SECTION.
3. See Figure 7-79. Disconnect 3-place Deutsch connector [11] for speedometer sensor (located under seat near battery negative terminal).

CLEANING AND INSPECTION

1. Clean any metal particles that may have collected on sensor.
2. For testing information see speedometer sensor test in 7.28 SPEEDOMETER PERFORMANCE CHECK.

INSTALLATION

1. See Figure 7-78. Install speedometer sensor to crankcase with bolt. Tighten bolt to 80-100 **in-lbs** (9-11 Nm).
2. Connect speedometer sensor connector [11] to 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 which could result in death or serious injury.

3. Install tail section and seat. See 2.34 TAIL SECTION.

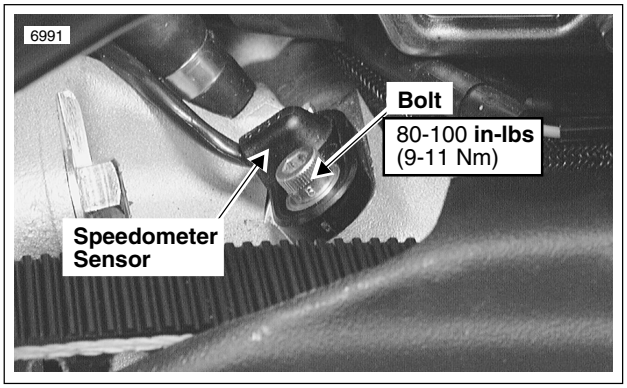


Figure 7-78. Speedometer Sensor

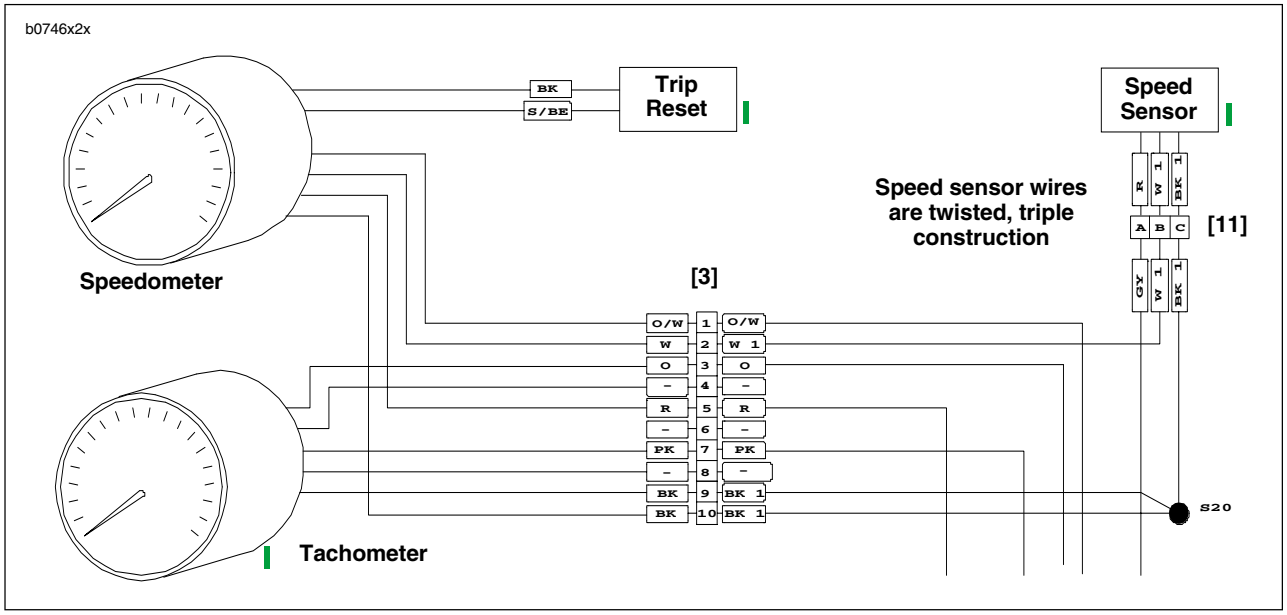


Figure 7-79. Speedometer Sensor Wiring

SPEEDOMETER 7.27

GENERAL

Replace the speedometer if the unit is not working properly. The instrument is not repairable. However, before replacing a component, check that the problem is not caused by a faulty cable or loose wire connection.

REMOVAL

1. Gain access to the back side of the dash panel by detaching the windscreen from mounting brackets. See 2.35 WINDSCREEN
2. See Figure 7-80. Remove odometer reset button from dash panel.
   a. Pry plastic grommet from dash panel.
   b. See Figure 7-81. Remove odometer reset button from back side of dash panel.
   c. Remove two nuts (metric) and lockwashers from speedometer cover.
3. See Figure 7-80. Detach instrument panel by removing two screws. Pull dash panel upward, but do not damage wiring.

CAUTION

Do not remove all the speedometer wires at the same time. Only remove one wire at a time and reinstall screw immediately. Failure to comply will cause extreme difficulty during reassembly.

4. See Figure 7-81. Slide speedometer cover away from speedometer.
5. See Figure 7-83. Remove wires from speedometer one at a time. After removing each wire, reinstall screw immediately.
6. Pull lamp (5) from bore.
7. Pull speedometer and attached odometer reset button from front of dash panel.
8. Remove mounting gasket.
9. If necessary, replace speedometer wiring.
   a. Remove fuel tank.
   b. Cut cable straps on wiring harness. Detach wires at plug connector. See Figure 7-84.

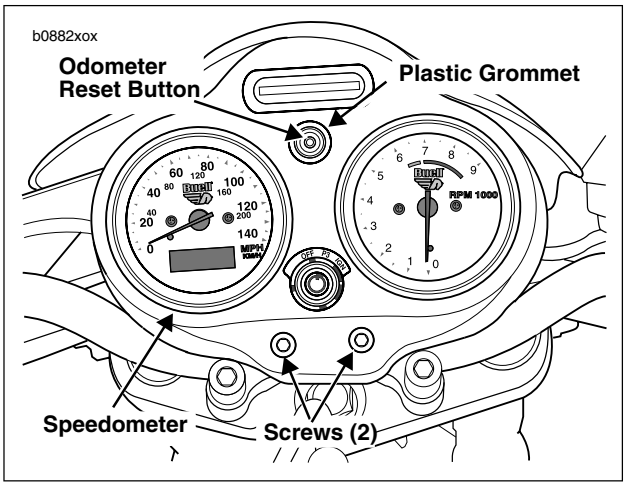


Figure 7-80. Dash Panel (Front)

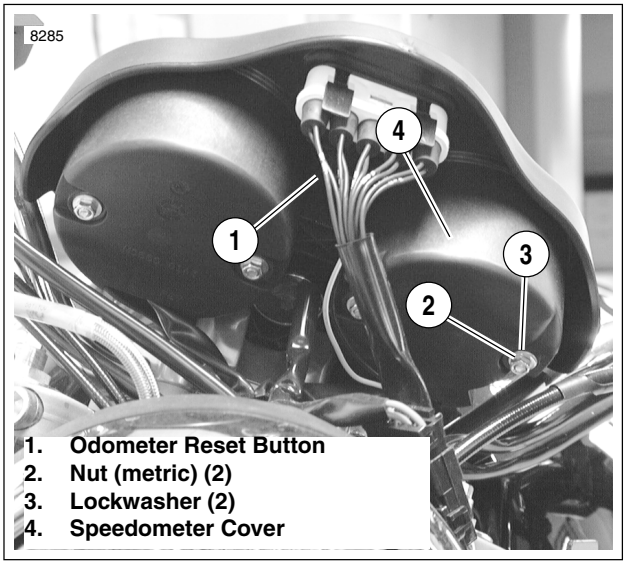
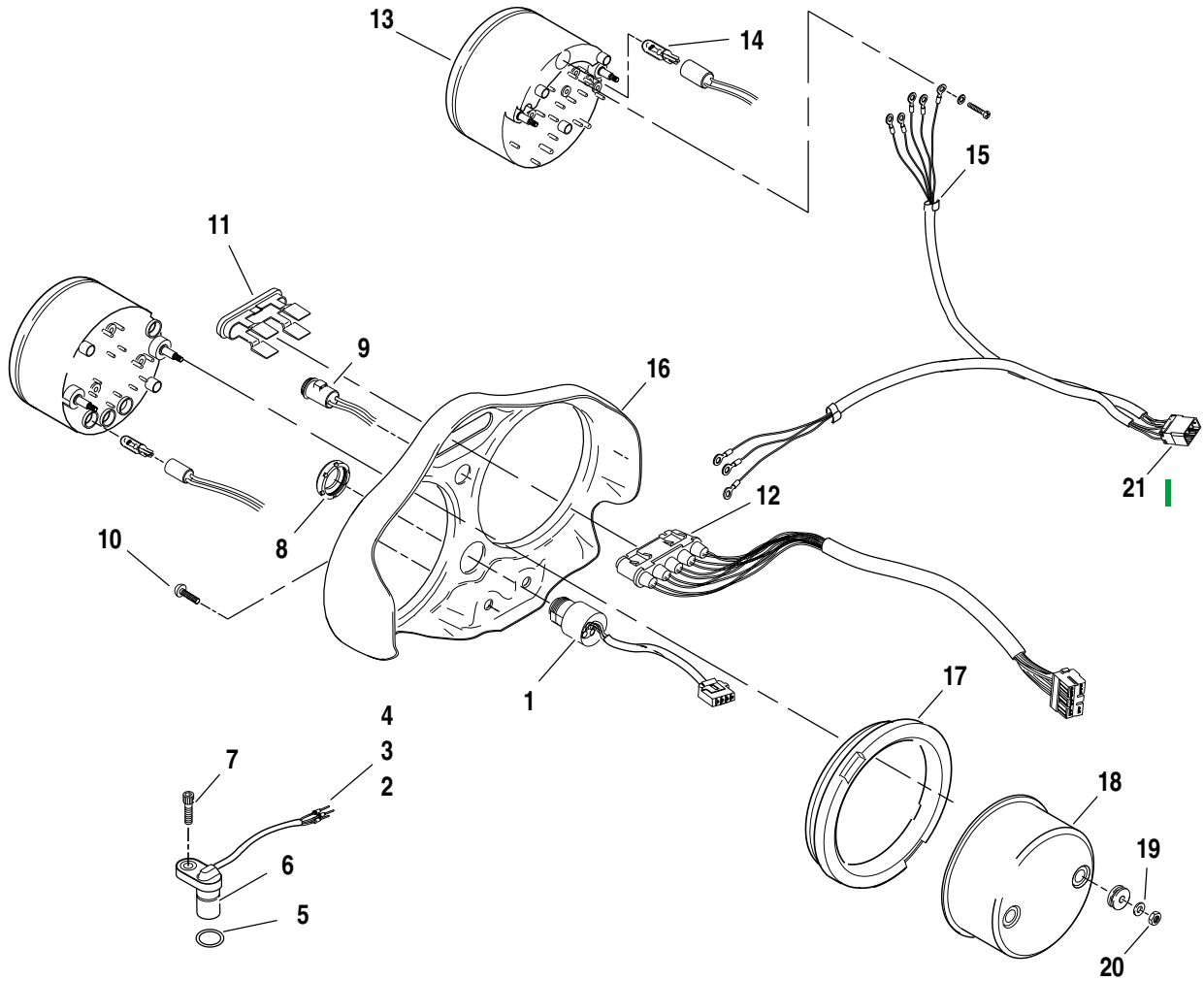


Figure 7-81. Dash Panel (Back)

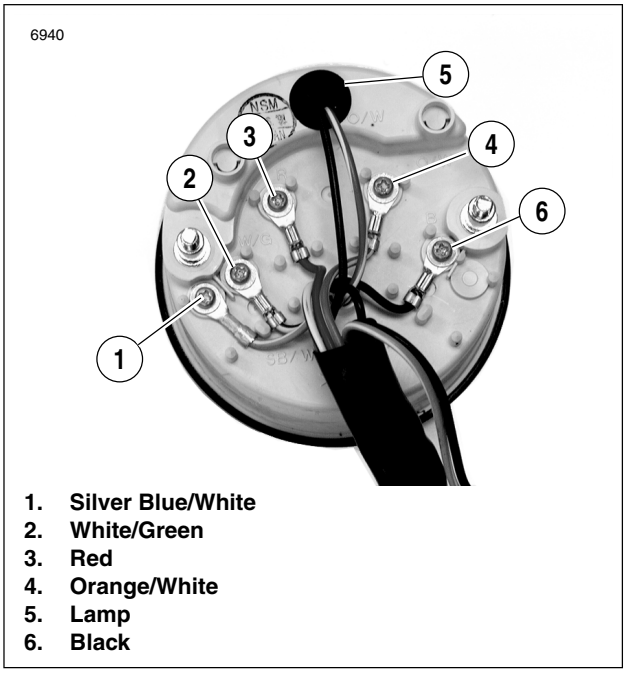


1. Ignition Set & Lock Set
2. Terminal Pin (3)
3. Receptacle
4. Secondary Lock
5. O-ring
6. Sensor, Speed
7. Screw
8. Face Nut
9. Odometer Reset Button
10. Screw (2)
11. Bezel, Indicator Lamp
12. Indicator Light Assembly
13. Speedometer
14. Bulb (2)
15. Wiring Harness
16. Dash Panel
17. Cushion
18. Cover
19. Lockwasher (3)
20. Nut (metric) (2)
21. Connector [3]

Figure 7-82. Speedometer Assembly

INSTALLATION

1. If replacing speedometer wiring:
   a. See Figure 7-83. Attach wires at plug connector.
   b. Feed wiring on left side of steering neck through to dash panel. Secure with cable straps.
   c. Install fuel tank. See 4.5 FUEL TANK.
2. Install odometer reset.
   a. See Figure 7-82. Install odometer reset button (1) from back side of dash panel.
   b. See Figure 7-80. Secure odometer reset button (3) on front of dash panel with plastic grommet (2).
3. Install rubber mounting gasket.
   a. Apply 2 drops of Permabond 105 at each end of notches in gasket.
   b. Apply 1 drop of Permabond 105 at top of gasket and bottom of gasket.
   c. Position mounting gasket in dash panel.
4. Install speedometer in dash panel.
   a. Feed wires through opening in speedometer cover.
   b. Slide speedometer into rubber mounting gasket.
   c. See Figure 7-83. Insert lamp (5).
   d. Attach wires to speedometer as shown.
5. See Figure 7-81. Install speedometer cover (4).
   a. Place speedometer cover over speedometer. Align posts on back of speedometer with holes in cover. Drain hole must be at the bottom of cover.
   b. Apply LOCTITE THREADLOCKER 243 (blue) to both nuts (metric) (2).
   c. Fasten cover (4) to speedometer using two nuts (metric) (2) and lockwashers (3).
6. Secure the dash panel.
   a. See Figure 7-80. Position dash panel on instrument support clamp.
   b. Attach panel using two screws (1). Tighten to 7-9 ft-lbs (10-12 Nm).
   c. Attach windscreen to mounting brackets. See 2.35 WINDSCREEN.



1. **Silver Blue/White**
2. **White/Green**
3. **Red**
4. **Orange/White**
5. **Lamp**
6. **Black**

Figure 7-83. Speedometer Wiring

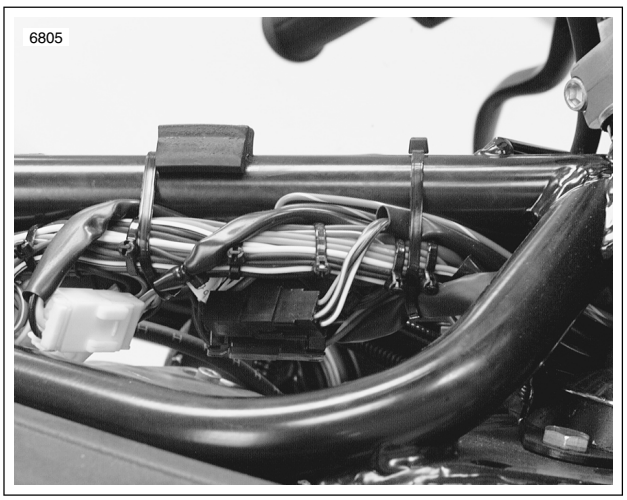


Figure 7-84. Speedometer Wiring Connector Locations (Approximate)

SPEEDOMETER PERFORMANCE CHECK 7.28

GENERAL

See Figure 7-85. Use the SPEEDOMETER TESTER (Part No. HD-41354) for speedometer diagnostics. These diagnostics may include:

- Checking speedometer operation.
- Testing speedometer needle sweeping action.

The tester generates a simulated speedometer sensor signal. This signal aids in determining whether speedometer replacement is necessary. It can also be used to simulate running engine conditions for ignition system troubleshooting.

NOTES

- *Use the following procedures in conjunction with the manual supplied with the speedometer tester.*
- *Test results may be inaccurate if tester battery is low.*

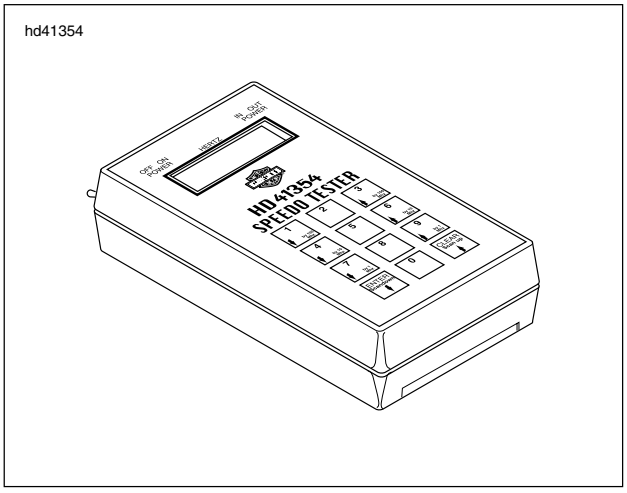


Figure 7-85. Speedometer Tester

TESTING

NOTE

The SPEEDOMETER TESTER (Part No. HD-41354) cannot be used to verify the calibration of a speedometer and it will not verify the speedometer's function to support legal proceedings. It's purpose is to verify speedometer function when performing service diagnosis or repair. It can also assist in determining if speedometer replacement is necessary.

Speedometer Operation Test

1. See Figure 7-86. Locate the 3-place Deutsch connector [11] for the speedometer sensor above battery negative (-) terminal and disconnect.
2. Attach speedometer tester connector to speedometer sensor connector.
3. Place speedometer tester power switch in the ON position. Place signal switch in the OUT position.
4. Turn vehicle ignition switch ON.
5. Begin test.
   a. Press ENTER on the tester keypad.
   b. Enter a frequency from page 7-18 Note that different markets use different frequencies.
   c. Verify that speedometer display reads the corresponding speed. To change the test frequency, press CLEAR to cancel and enter the new frequency. Press ENTER to begin and reverify.

NOTE

The speedometer should be accurate within 0-4 MPH (0-6.5 KPH).

Figure 7-86. Speedometer Sensor Connector

MARKET	20 MPH (30 KPH)	40 MPH (60 KPH)	60 MPH (100 KPH)	80 MPH (130 KPH)
USA	432	864	1296	1728
ENG	362	725	1088	1454
AUS, EUR	340	680	1134	1474
CAN, JPN, NZ	405	810	1350	1755

Speedometer Needle Sweep Test

The tester's sweep function moves the speedometer needle through the full range of movement. This allows for testing the smoothness of operation and checking for hesitancy or a stuck needle.

1. See Figure 7-86. Disconnect speedometer sensor connector. Attach speedometer tester connector to speedometer sensor connector.
2. Place speedometer tester power switch in the ON position. Place signal switch in the OUT position.
3. Turn vehicle ignition switch ON.
4. Begin test by pressing 0 on the tester keypad, then pressing ENTER. The tester will scan for two seconds, then the tester will put out a 1 Hz signal.
5. Select a test range.
   a. Press 2 to select LO range (1-20 Hz).
   b. Press 5 to select CEN range (21-999 Hz).
   c. Press 8 to select HI range (1000-20,000 Hz).
6. After selecting a range, use the corresponding arrow keys to accelerate through the range. As you move through the speed range, check for smooth needle movement.
   a. If testing LO range, press 1 or 3.
   b. If testing CEN range, press 4 or 6.
   c. If testing HI range, press 7 or 9.

Speedometer Sensor Test

If the speedometer is inoperative, but backlighting and odometer work, the speedometer sensor may not be working.

See Figure 7-87. Fabricate a test harness using the following parts. This harness can also be used to test the tachometer.

- Two Deutsch 3-place socket housings (Part No. 72113-94BK).
- Deutsch 3-place pin housing (Part No. 72103-94BK).
- Six lengths of 18 gauge wire, each 6.0 in. (15 cm) long.

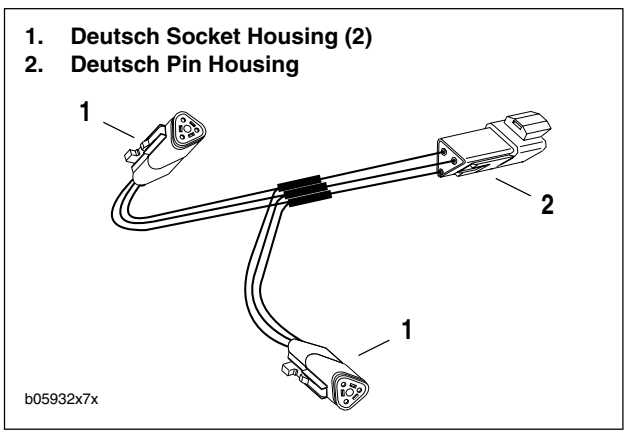


Figure 7-87. Test Harness

Before attempting the actual speedometer sensor check, two system checks must be made. Install the test harness at the cam position sensor connector. See Figure 7-88.

- Test for voltage to sensor by checking for 8-12 VDC on red wire in connector [11].
- Then check for continuity to ground on black wire in connector [11].

1. Raise rear wheel off floor using REAR WHEEL SUPPORT STAND (Part No. B-41174).
2. Install the test harness between the speedometer sensor connectors.
3. Place speedometer tester power switch in the ON position. Place signal switch in the IN position.
4. Plug the speedometer tester into the test harness. Turn vehicle ignition switch ON.
5. Press ENTER on the tester keypad.
6. Rotate the motorcycle's rear wheel.
   a. If reading on speedometer tester changes as wheel is rotated, speedometer sensor is OK.
   b. If reading does not change, speedometer sensor is suspect. Install a known, good speedometer sensor and test again.

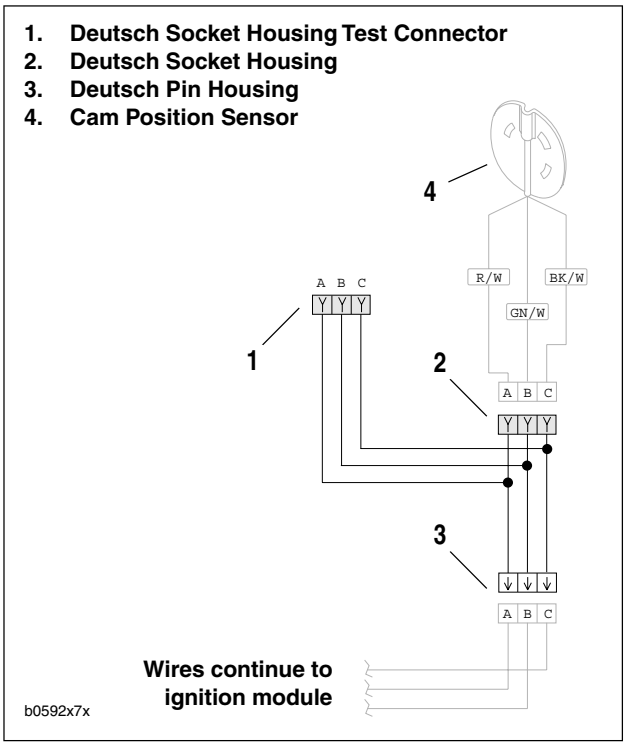
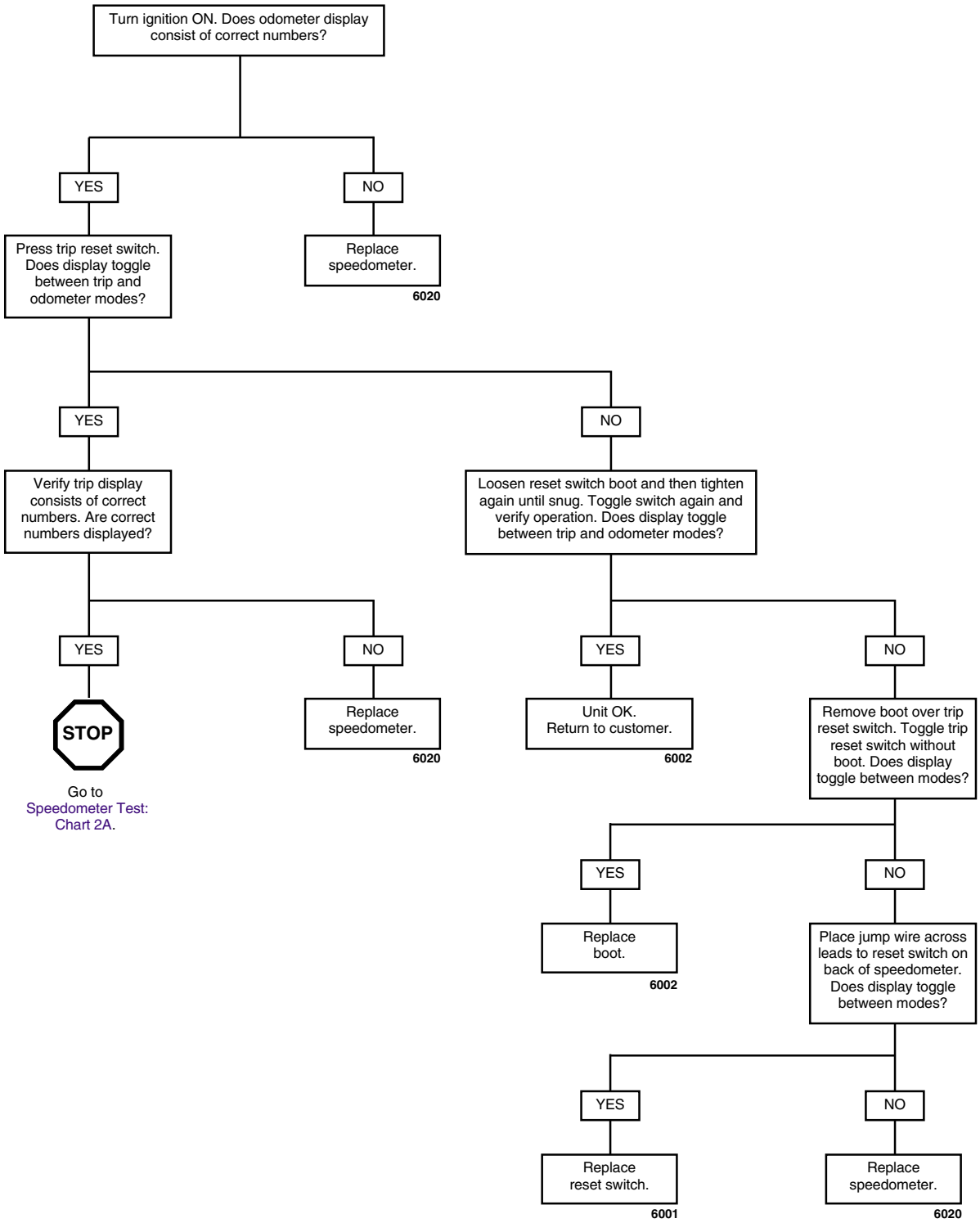


Figure 7-88. Test Harness Installed

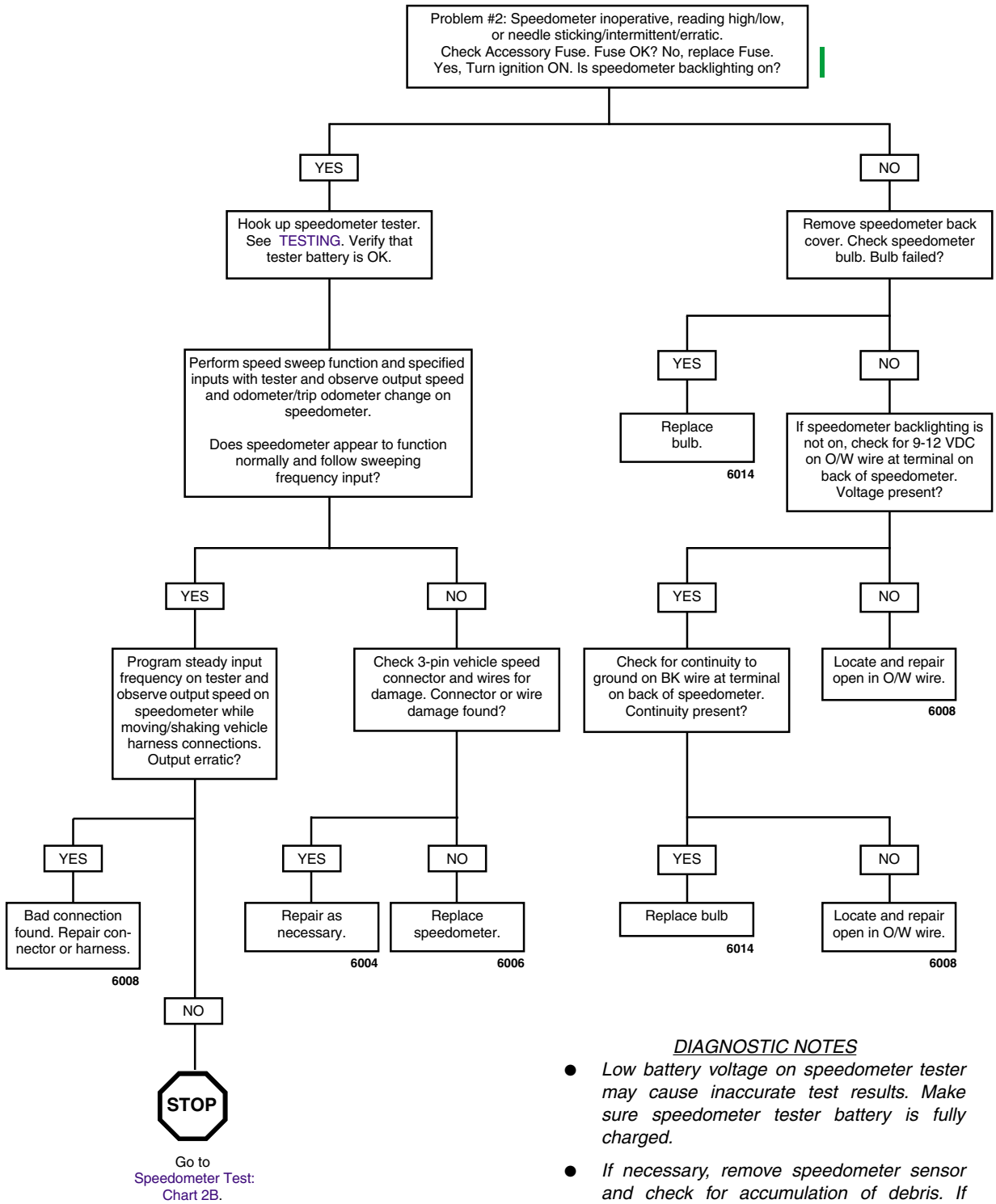
Speedometer Test: Chart 1

ODOMETER, TRIP ODOMETER AND RESET SWITCH TESTING



Speedometer Test: Chart 2A

INOPERATIVE, INACCURATE OR ERRATIC SPEEDOMETER

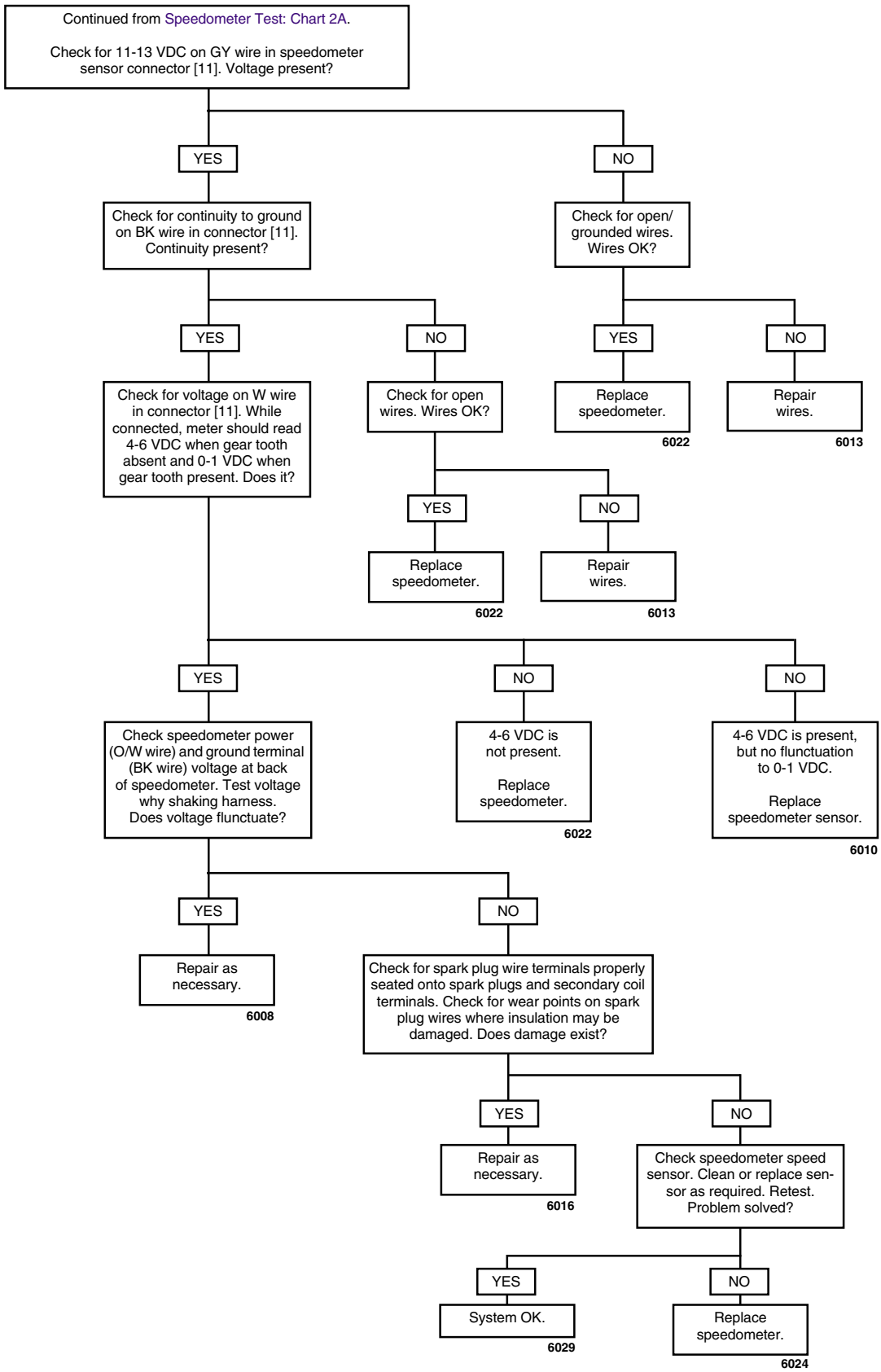


DIAGNOSTIC NOTES

- *Low battery voltage on speedometer tester may cause inaccurate test results. Make sure speedometer tester battery is fully charged.*
- *If necessary, remove speedometer sensor and check for accumulation of debris. If debris is not present, replace sensor. If debris is present, clean sensor and repeat test. Replace if necessary.*

Speedometer Test: Chart 2B

INOPERATIVE, INACCURATE OR ERRATIC SPEEDOMETER



TACHOMETER 7.29

MODEL YEAR CHANGE

All 2001 Buell M2/M2L models come equipped with a standard tachometer and revised instrument panel.

GENERAL

Replace the tachometer if the unit is not working properly. The instrument is not repairable. However, before replacing a component, check that the problem is not caused by a loose wire connection.

REMOVAL

1. Gain access to the back side of the dash panel. Detach windscreen from mounting brackets by removing four screws and washers. See 2.35 WINDSCREEN.
2. See Figure 7-89. Detach instrument panel by removing two screws holding panel to instrument support clamp. Pull dash panel upward, but do not damage wiring.
3. See Figure 7-90. Remove two nuts (metric) and lockwashers from tachometer cover.
4. Slide tachometer cover away from tachometer.

CAUTION

Do not remove all the tachometer wires at the same time. Only remove one wire at a time and reinstall screw immediately. Failure to follow this caution will cause extreme difficulty during reassembly.

5. See Figure 7-92. Remove wires from tachometer.
   a. Remove three lamps (1, 2, and 3) and attached wires.
   b. Loosen screws and remove wires (4, 5 and 6) one at a time. After removing each wire, reinstall screw immediately.
6. Pull tachometer from front of dash panel.
7. Remove rubber mounting gasket if necessary.
8. If necessary, replace tachometer wiring.
   a. Remove fuel tank. See 4.5 FUEL TANK.
   b. Cut cable straps on wiring harness. See Figure 7-93. Detach wires at plug connector.

NOTE

Tachometer and speedometer wiring share a common connector [3] on the wiring harness.

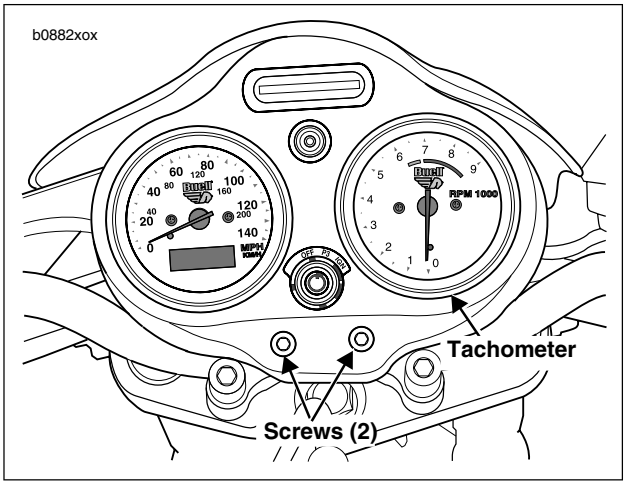
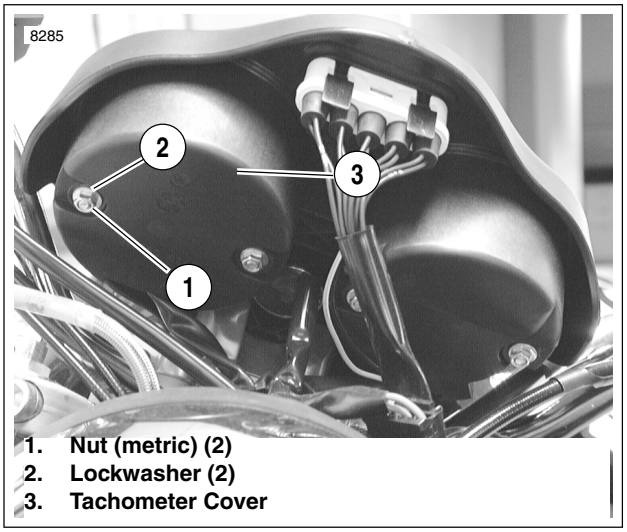
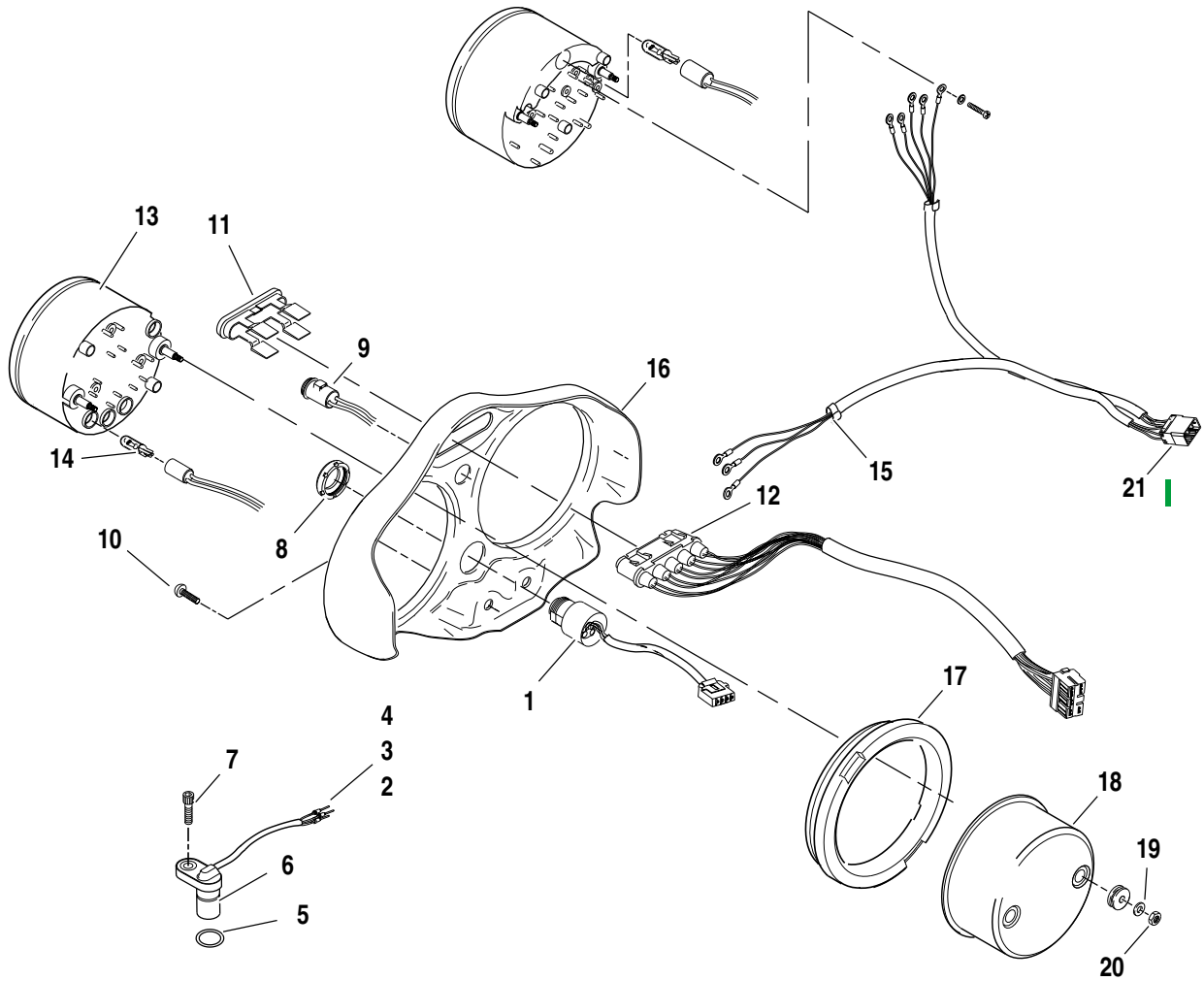


Figure 7-89. Dash Panel (Front)



1. Nut (metric) (2)
2. Lockwasher (2)
3. Tachometer Cover

Figure 7-90. Dash Panel (Back)

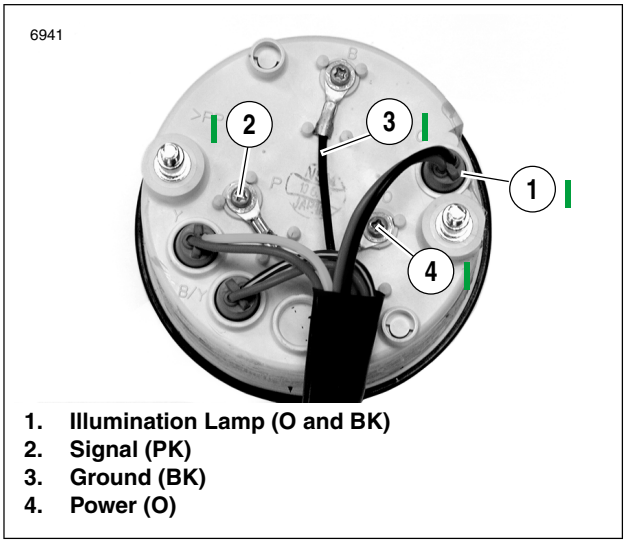


1. Ignition Set & Lock Set
2. Terminal Pin (3)
3. Receptacle
4. Secondary Lock
5. O-ring
6. Sensor, Speed
7. Screw
8. Face Nut
9. Odometer Reset Button
10. Screw (2)
11. Bezel, Indicator Lamp
12. Indicator Light Assembly
13. Tachometer
14. Bulb (2)
15. Wiring Harness
16. Dash Panel
17. Cushion
18. Cover
19. Lockwasher (3)
20. Nut (metric) (2)
21. Connector [3]

Figure 7-91. Tachometer Assembly

INSTALLATION

1. If replacing tachometer wiring:
   a. See Figure 7-93. Attach wires at plug connector.
   b. Feed wiring through wiring harness to dash panel and secure with ties on electrical cabling.
   c. Install fuel tank. See 4.5 FUEL TANK.
2. Install rubber mounting gasket if removed.
   a. Apply 2 drops of adhesive (Permabond 105) at each end of notches in gasket.
   b. Apply 1 drop of adhesive (Permabond 105) at top of gasket and bottom of gasket.
   c. Position mounting gasket in dash panel.
3. Install tachometer in dash panel.
   a. Feed wires through opening in tachometer cover.
   b. Lubricate rubber gasket with alcohol or glass cleaner and slide tachometer into rubber mounting gasket.
   c. See Figure 7-92. Insert illumination lamp (1) into its bore.
   d. Attach wires (2, 3 and 4) to tachometer as shown.
4. See Figure 7-91. Install tachometer cover (18).
   a. Place tachometer cover over tachometer. Align posts on back of tachometer with holes in tachometer cover. Drain hole must be at the bottom of cover.
   b. Apply LOCTITE THREADLOCKER 243 (blue) to both nuts (metric) (20).
   c. Fasten cover (18) to tachometer using two nuts (metric) (20) and lockwashers (19).
5. See Figure 7-89. Position dash panel on instrument support clamp.
   a. Attach dash panel using two screws to hold panel to clamp.
   b. Tighten screws to 4-5 ft-lbs (5-7 Nm).
   c. Attach windscreen to mounting brackets using four screws and washers. See 2.35 WINDSCREEN.



1. **Illumination Lamp (O and BK)**
2. **Signal (PK)**
3. **Ground (BK)**
4. **Power (O)**

Figure 7-92. Tachometer Wiring (Typical)

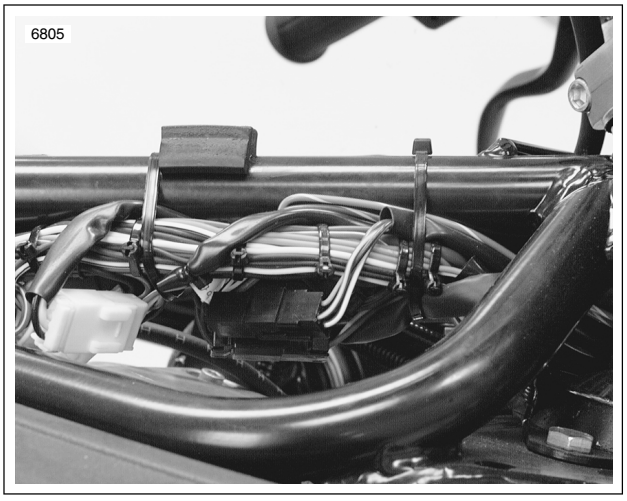


Figure 7-93. Tachometer Wiring Connector Locations (Approximate)

TACHOMETER PERFORMANCE CHECK 7.30

GENERAL

See Figure 7-85. Use the SPEEDOMETER TESTER (Part No. HD-41354) for tachometer diagnostics. These diagnostics may include:

- Checking tachometer operation.
- Testing tachometer needle sweeping action.

The tester can be connected to the vehicle's cam position sensor connector. This connection introduces a signal to the ignition module that simulates the signal from the cam position sensor. The ignition module will use this simulated signal to open and close circuits to fire the spark plugs. This allows you to simulate the engine running and therefore generate tachometer readings.

TESTING

Operation Test

1. See Figure 7-94. Connect the speedometer tester to the cam position sensor Deutsch socket housing.
2. Convert the desired test RPM to a tester frequency in Hertz. Several conversions are listed on page 7-18
   a. Select a desired tachometer reading for testing. This example will use 2000 RPM.
   b. Divide the desired tachometer reading by 60. For example, 2000/60=33.3.
3. Enter the result (33.3 for 2000 RPM) into the speedometer tester.
   a. The tachometer should respond by moving its needle to the desired RPM.
   b. Test the tachometer at several different RPM readings to verify proper operation.

READING	2000 RPM	4000 RPM	6000 RPM	7500 RPM
Tolerance (+/- RPM)	100	120	210	320
Conversion factor	33.3	66.7	100	125

NOTE

All tachometer accuracy tolerances were taken at 68°-77° F (20-25° C).

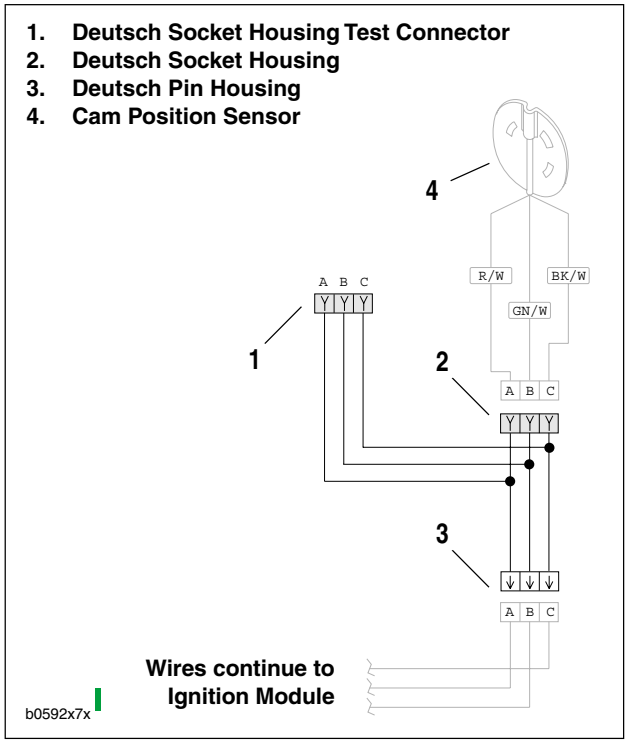


Figure 7-94. Testing Tachometer

Sweep Test

1. See Figure 7-94. Connect the speedometer tester to the cam position sensor Deutsch socket housing.
2. Place speedometer tester power switch in the ON position. Place signal switch in the OUT position.
3. Turn vehicle ignition switch ON.
4. Begin test by pressing 0 on the tester keypad, then pressing ENTER. The tester will scan for two seconds, then the tester will put out a 1 Hz signal.
5. Select a test range.
   a. Press 2 to select LO range.
   b. Press 5 to select CEN range.
   c. Press 8 to select HI range.
6. After selecting a range, use the corresponding arrow keys to accelerate through the range. As you move through the speed range, check for smooth needle movement.
   a. If testing LO range, press 1 or 3.
   b. If testing CEN range, press 4 or 6.
   c. If testing HI range, press 7 or 9.

NOTES

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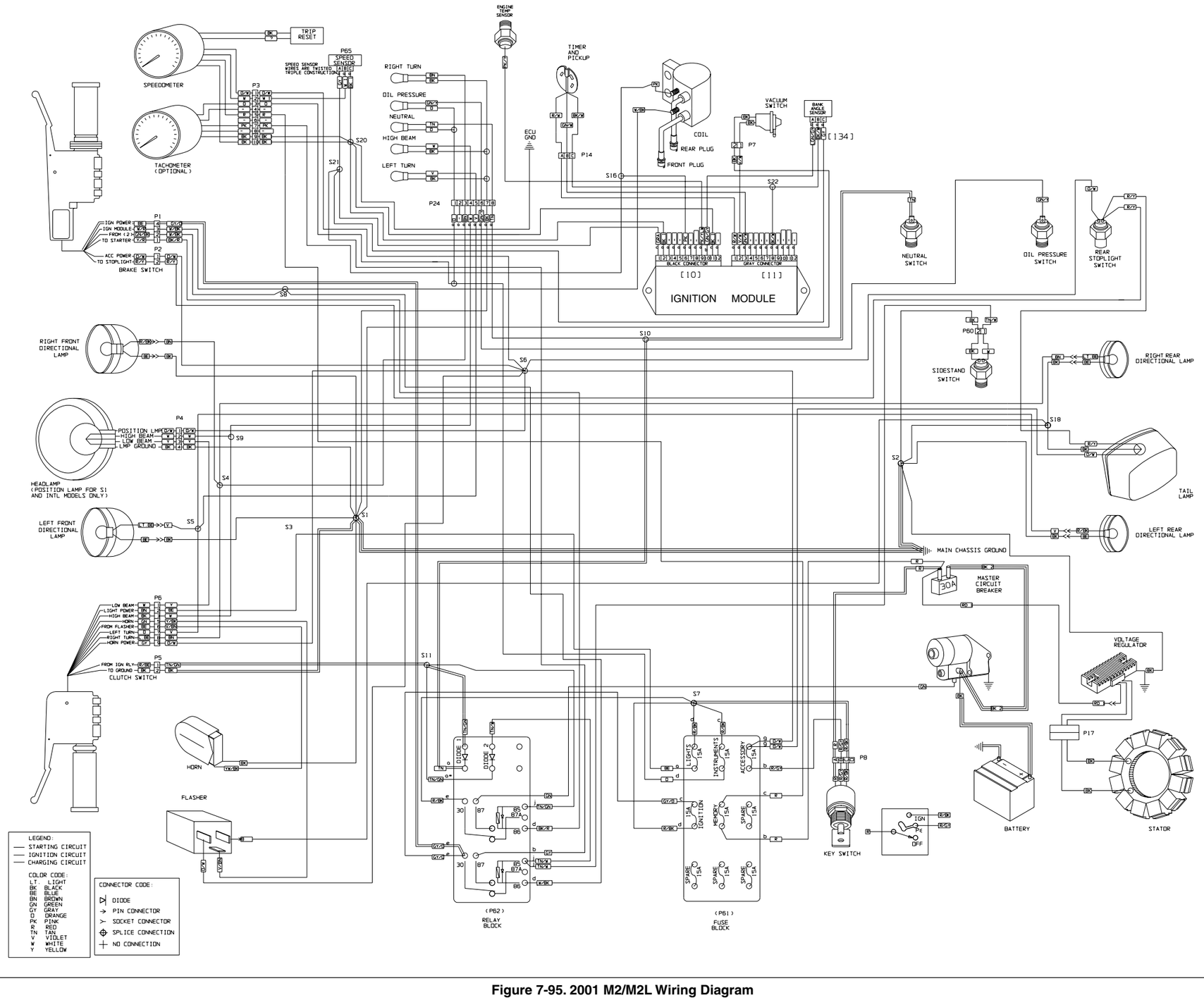

Figure 7-95. 2001 M2/M2L Wiring Diagram

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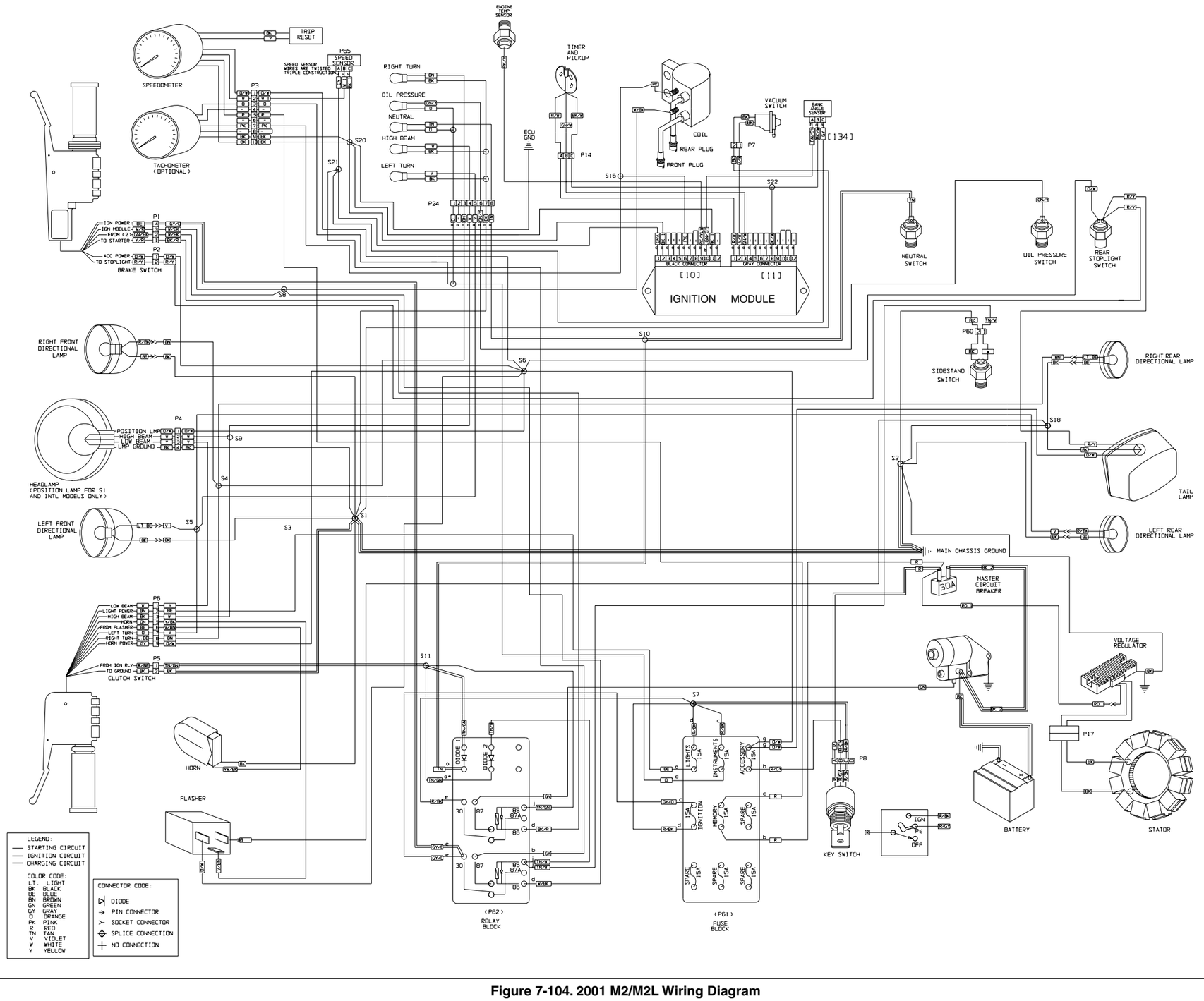

Figure 7-104. 2001 M2/M2L Wiring Diagram

NOTES