

REMOVAL

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

WARNING

To prevent accidental vehicle start-up, which could cause death or serious injury, disconnect negative (-) battery cable before proceeding. (00048a)

2. Disconnect negative battery cable from battery.
3. See [Figure 7-42](#). Both diodes (1, 2) are mounted in the fuse block under the seat.
4. Remove faulty diode by pulling it straight up off the relay block.

INSTALLATION

1. See [Figure 7-42](#). Install the **new** diodes into position on the fuse block by pushing it into the slot.
2. Connect negative battery cable to battery terminal. Tighten fastener to 72-96 **in-lbs** (8-11 Nm).

WARNING

After installing seat, pull upward on front of seat to be sure it is in locked position. While riding, a loose seat can shift causing loss of control, which could result in death or serious injury. (00070a)

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

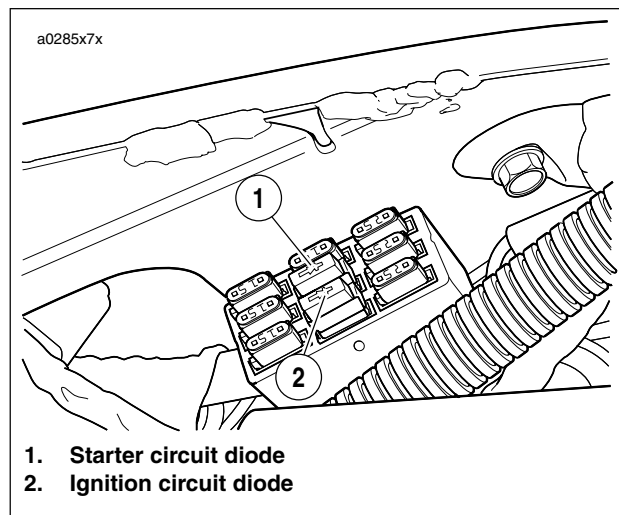


Figure 7-42. Diode Location in Fuse Block

GENERAL

The charging system consists of the alternator and regulator. Charging system circuits are shown in [Figure 7-45](#).

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 7-43](#). 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 [7.16 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 7-45](#).

Voltage Regulator Inspection

See [Figure 7-43](#). The voltage regulator base must have a clean, tight connection for proper grounding. The harness is grounded to the voltage regulator body. 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.

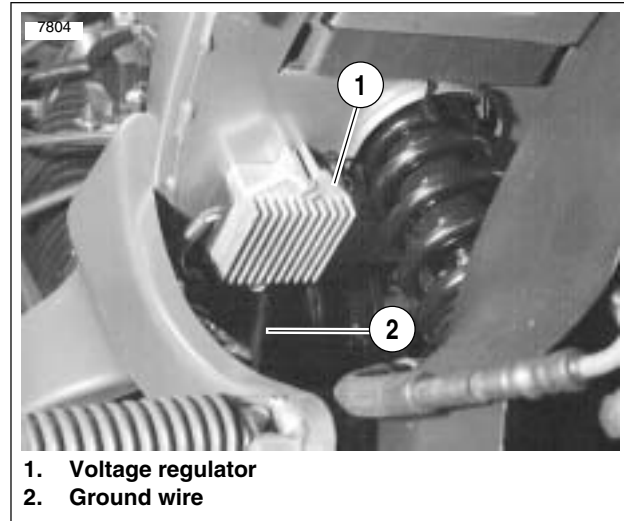


Figure 7-43. Voltage Regulator

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

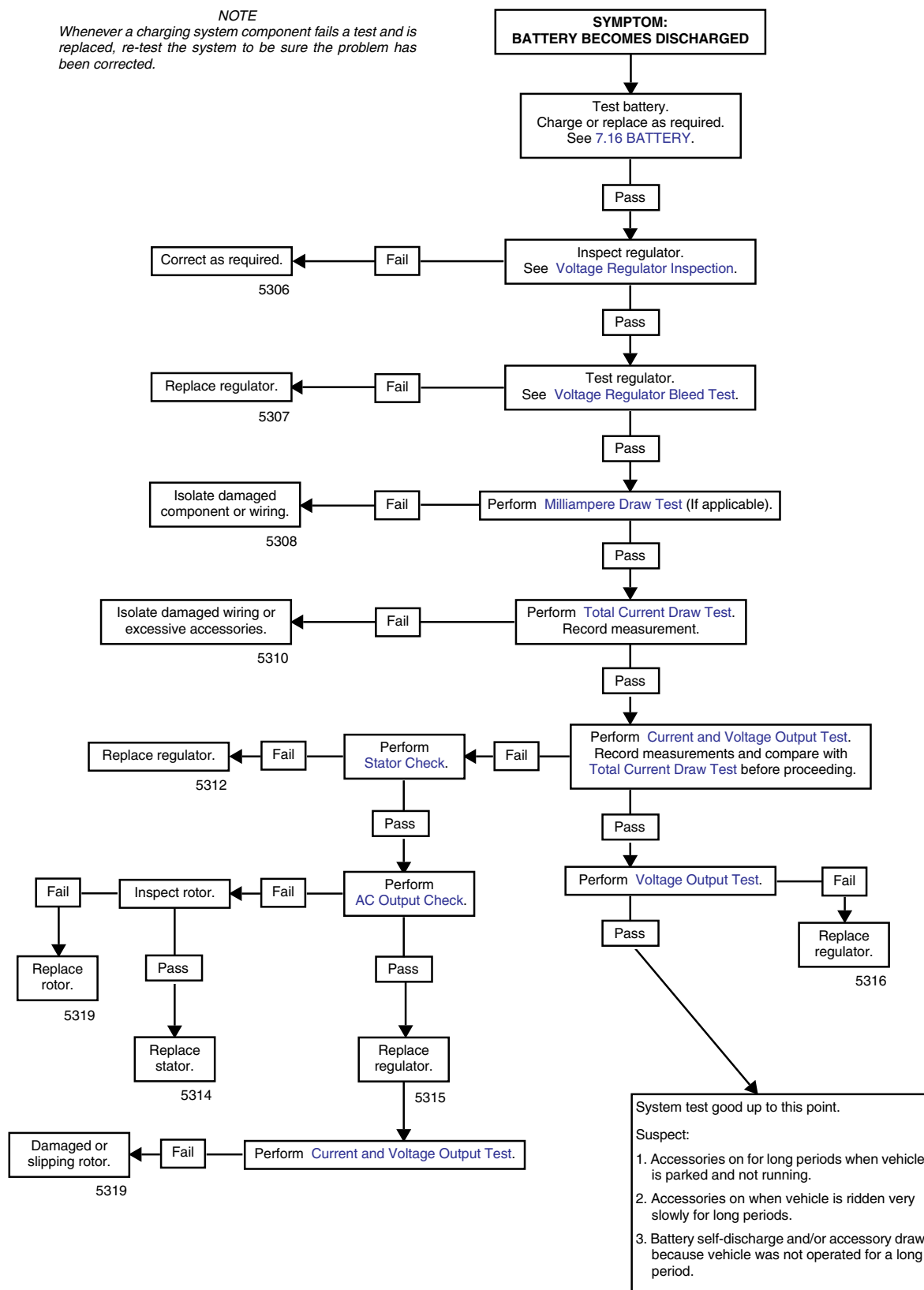


Figure 7-44. Charging System Troubleshooting

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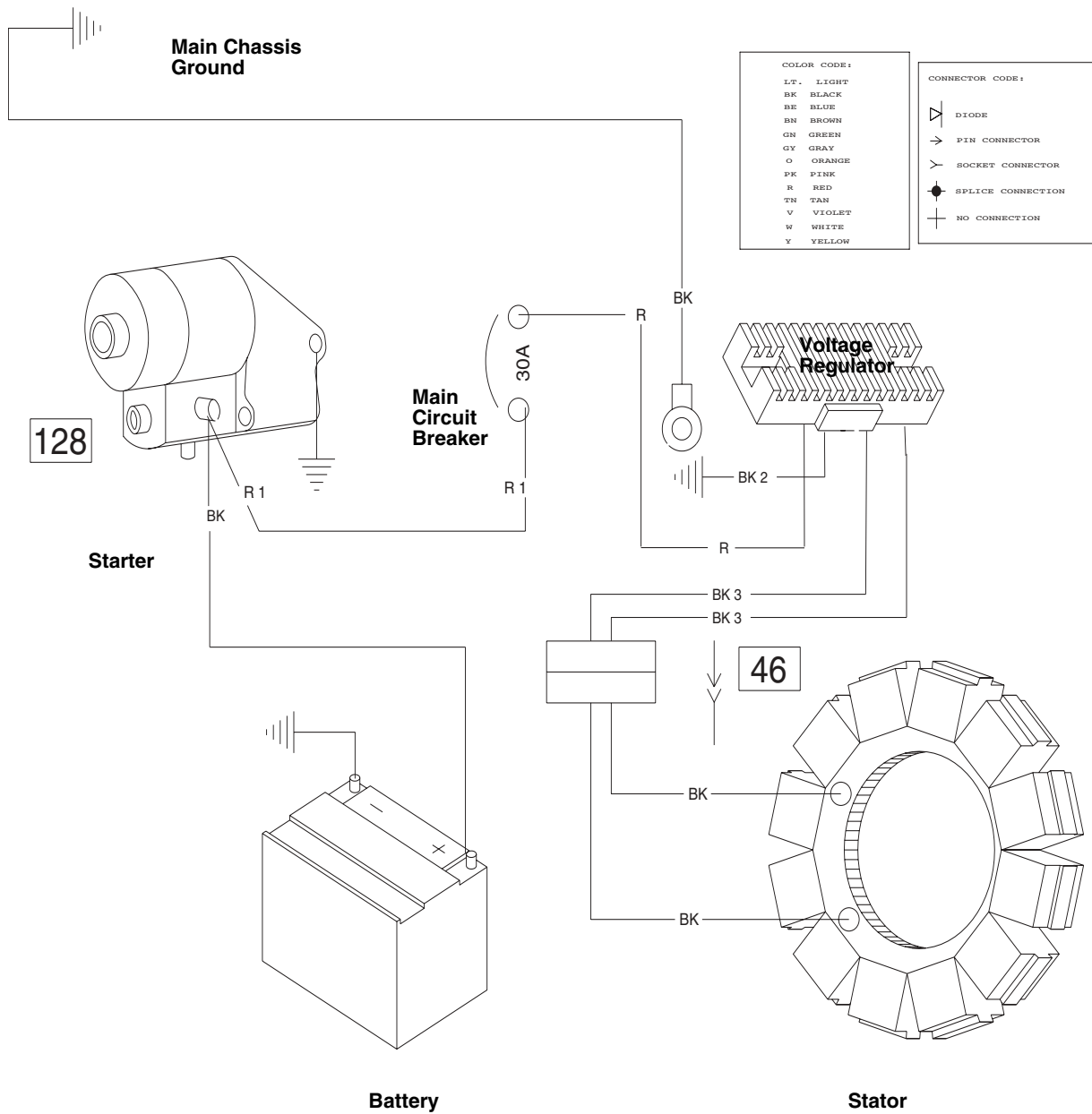


Figure 7-45. Charging System Circuit

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 [46] behind left foot-rest support. Disconnect from alternator stator wiring. Cut cable strap and note its location.
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 7-46. 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 OFF and all lights and accessories off, observe amperage reading.
 - a. Maximum reading should be 1 milliampere.
 - 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 7-47. To check for this condition, place load tester induction pickup over battery negative cable.
2. Disconnect stator wiring from voltage regulator wiring at the connector [46]. 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. Replace cut cable strap.

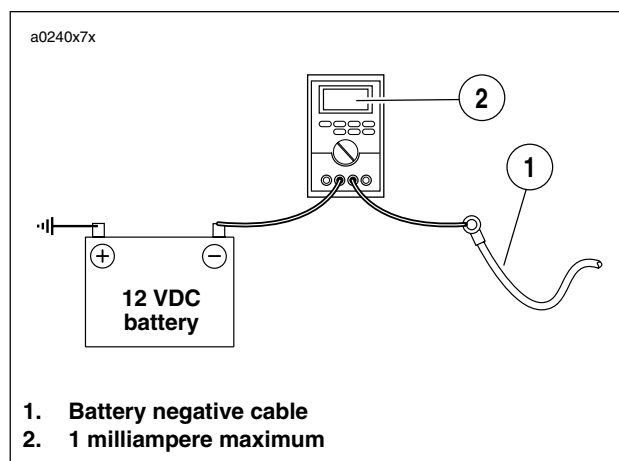


Figure 7-46. Milliampere Draw Test with Ignition Turned to OFF Position

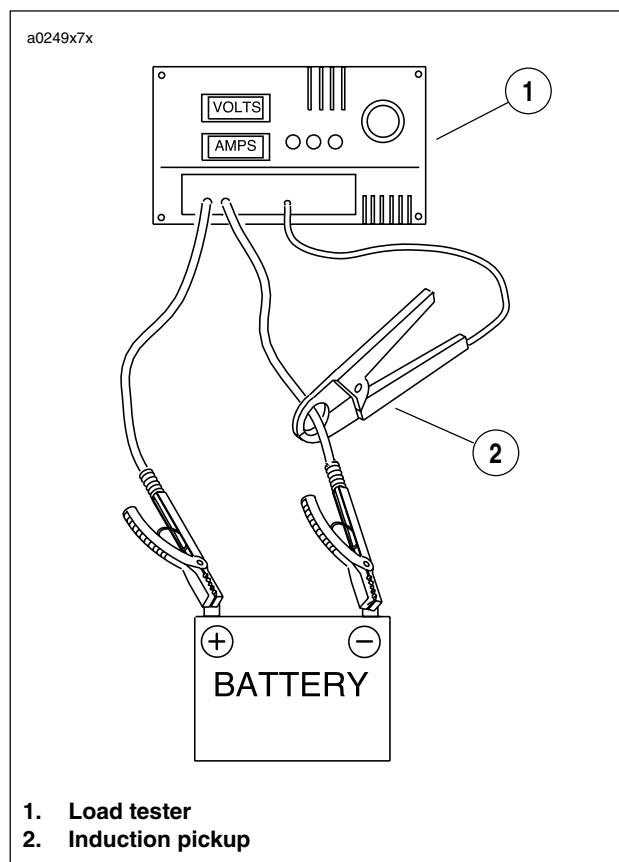


Figure 7-47. Checking Current Draw Using Load Tester with Induction Pickup (Ignition Switch ON)

Current and Voltage Output Test

1. See Figure 7-48. Connect load tester.
 - a. Connect negative and positive leads to battery terminals.
 - b. Place load tester induction pickup over positive regulator cable.

IMPORTANT NOTE

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.

Voltage Output Test

1. See Figure 7-48. After removing the load, read the load tester voltage meter.
2. See Figure 7-44. If voltage to the battery is not more than 15 VDC, voltage output is within specifications. Investigate other possible problems.
3. If voltage is higher, regulator is not functioning properly or connections are loose or dirty.

Stator Check

1. Turn ignition key switch to OFF.
2. See Figure 7-49. Connect an ohmmeter.
 - a. Locate voltage regulator connector [46] behind left footrest support. 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 7-50. 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.

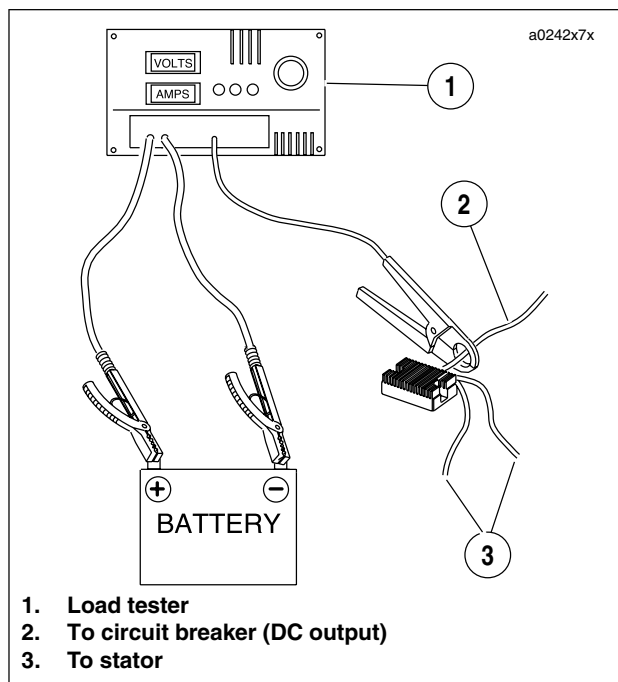


Figure 7-48. Current and Voltage Output Test

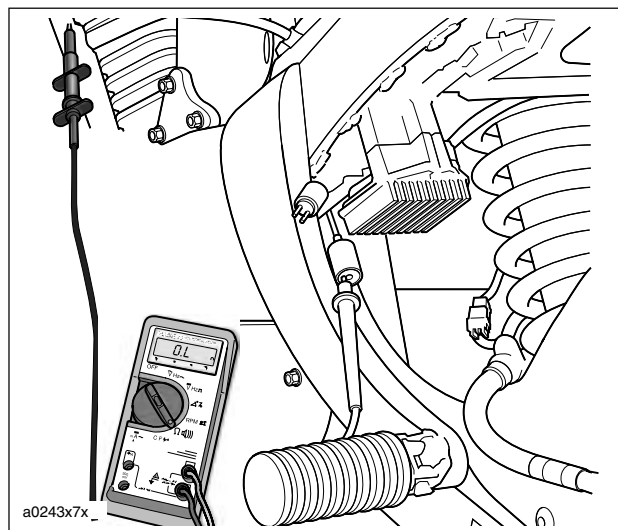


Figure 7-49. Test for Grounded Stator

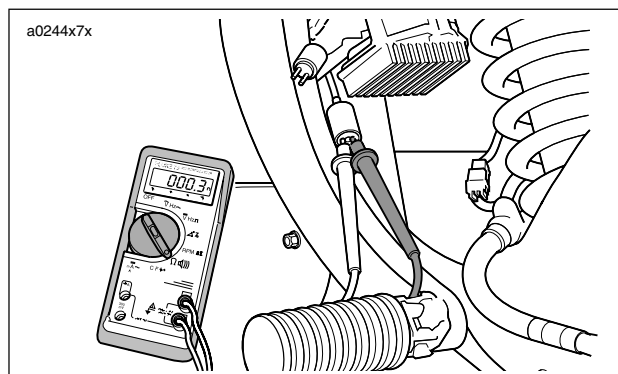


Figure 7-50. Check for Stator Resistance

AC Output Check

1. See [Figure 7-51](#). Test AC output.
 - a. Locate voltage regulator connector [46] behind left footrest support. 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](#).

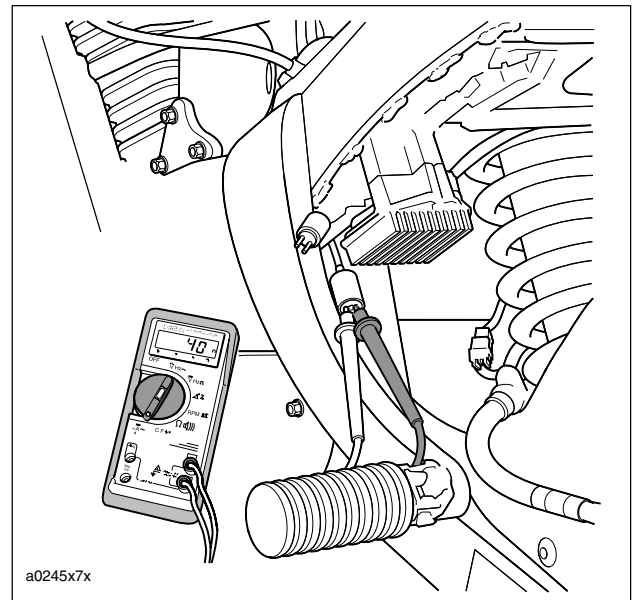


Figure 7-51. Check Stator AC Voltage Output

REMOVAL/DISASSEMBLY

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

WARNING

To prevent accidental vehicle start-up, which could cause death or serious injury, disconnect negative (-) battery cable before proceeding. (00048a)

2. Disconnect negative battery cable from battery.
3. Remove primary cover. See [6.2 PRIMARY CHAIN](#).
4. Remove clutch assembly, primary chain and engine sprocket/rotor assembly as a unit. See [6.4 PRIMARY DRIVE/CLUTCH](#).
5. Remove/disassemble rotor and/or stator, as required. Refer to the following procedures.

Rotor

1. See [Figure 7-52](#). Remove the eight bolts which secure alternator rotor to engine sprocket.



Figure 7-52. Rotor Assembly

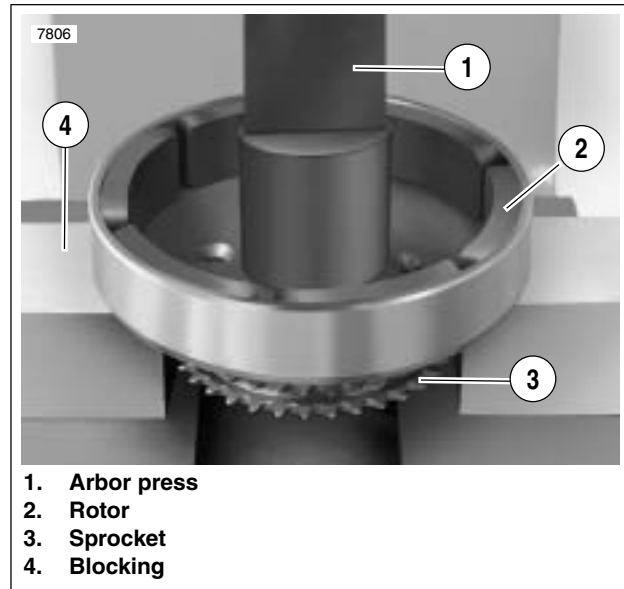


Figure 7-53. Removing Rotor From Sprocket

2. See [Figure 7-53](#). 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 7-54. Disconnect stator wiring from voltage regulator wiring at connector [46] located behind left foot-rest support.

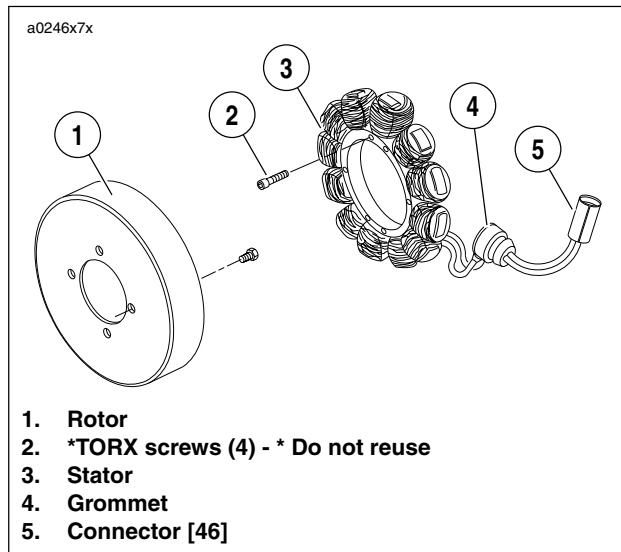


Figure 7-54. Stator Assembly

2. Remove cable straps holding stator wire to oil filter hose.
3. Withdraw stator wiring from behind the gearcase cover.
4. Remove and discard the four TORX screws which secure stator to left crankcase half.

IMPORTANT NOTE

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 from left crankcase half.
6. Withdraw stator wiring from grommet hole in left crankcase half. Remove stator.

CLEANING AND INSPECTION

IMPORTANT NOTE

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 7-54](#). Feed stator wiring with attached grommet 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.

IMPORTANT NOTE

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 on left crankcase half. Secure stator using four **new** TORX screws. Tighten screws to 30-40 **in-lbs** (3-5 Nm).
4. Route stator wiring under starter, behind footpeg support bracket and under seat. Cable strap connector [46] halves together.

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.

5. Connect alternator stator wiring to voltage regulator connector [46] located behind left footrest support.

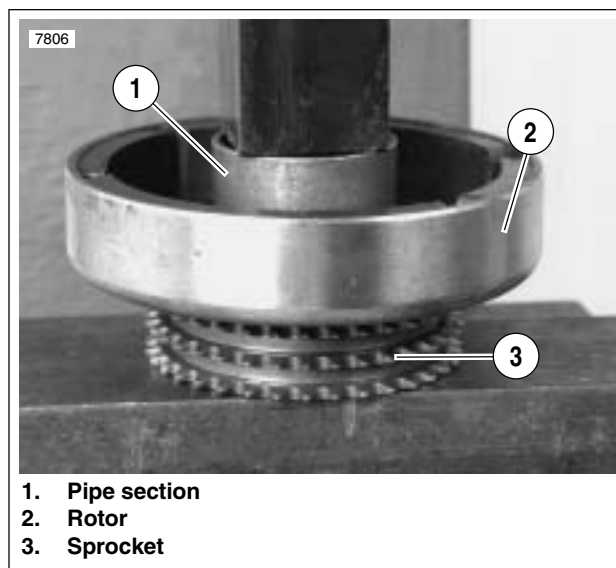


Figure 7-55. Pressing Rotor onto Sprocket

6. See [Figure 7-55](#). Attach rotor to sprocket.
 - a. Position rotor on sprocket. Align holes in sprocket with holes in rotor.
 - b. Apply a drop of Loctite 243 (blue) to threads of each mounting bolt. Insert the eight 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 [6.4 PRIMARY DRIVE/CLUTCH](#).
8. Install primary cover. See [6.2 PRIMARY CHAIN](#).
9. Connect negative battery cable to battery terminal. Tighten fastener to 72-96 **in-lbs** (8-11 Nm).
10. Test charging system. See [7.13 CHARGING SYSTEM](#).

WARNING

After installing seat, pull upward on front of seat to be sure it is in locked position. While riding, a loose seat can shift causing loss of control, which could result in death or serious injury. (00070a)

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

GENERAL

The voltage regulator is located under the frame (above swingarm on left side). The voltage regulator is not repairable. Replace the unit if it fails.

REMOVAL

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

⚠ WARNING

To prevent accidental vehicle start-up, which could cause death or serious injury, disconnect negative (-) battery cable before proceeding. (00048a)

2. Disconnect negative battery cable from battery terminal.

IMPORTANT NOTE

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.

3. See [Figure 7-56](#). Locate voltage regulator connector [46] behind left footrest support. Disconnect from alternator stator wiring. Cut cable straps if necessary.
4. Detach charging wire from main circuit breaker.
 - a. See [Figure 7-57](#). Disconnect red charging wire from gold post of main circuit breaker.
 - b. Route charging wire back to voltage regulator.
5. Remove two mounting screws.
6. Remove and discard voltage regulator.

INSTALLATION

1. Apply Loctite 243 (blue) to threads of two mounting screws.
2. See [Figure 7-57](#). Attach **new** voltage regulator using two screws. Tighten screws to 48-72 **in-lbs** (5-8 Nm).
3. Connect voltage regulator connector [46] to alternator stator wiring. Cable strap connector halves together.
4. Route Red charging wire to gold post on main circuit breaker. Secure wire to frame with **new** cable straps.
5. Connect negative battery cable to battery terminal. Tighten fastener to 72-96 **in-lbs** (8-11 Nm).
6. Test charging system. See [7.13 CHARGING SYSTEM](#).

⚠ WARNING

After installing seat, pull upward on front of seat to be sure it is in locked position. While riding, a loose seat can shift causing loss of control, which could result in death or serious injury. (00070a)

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

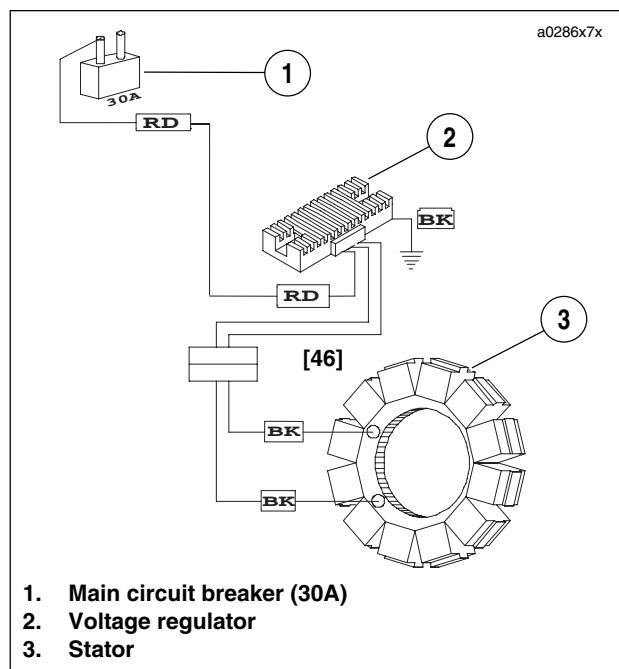


Figure 7-56. Voltage Regulator Connector [46]

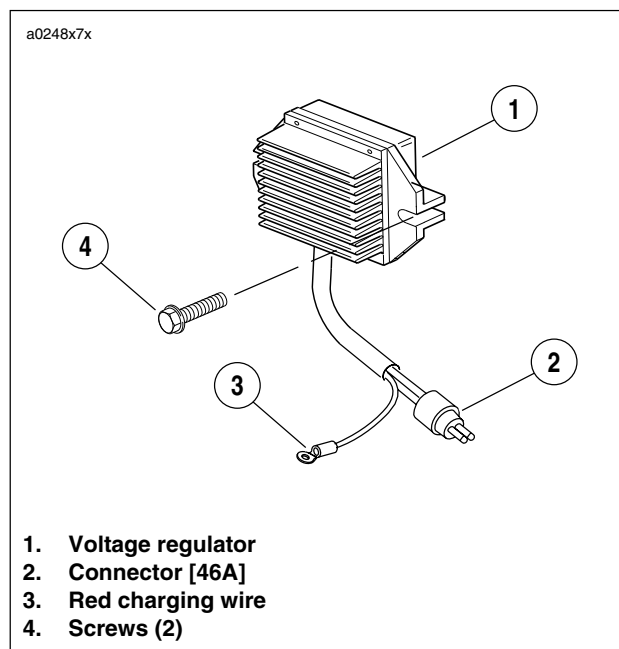


Figure 7-57. Voltage Regulator

GENERAL

All 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

Batteries contain sulfuric acid, which could cause severe burns to eyes and skin. Wear a protective face shield, rubberized gloves and protective clothing when working with batteries. **KEEP BATTERIES AWAY FROM CHILDREN.** (00063a)

WARNING

Figure 7-58. Never remove warning label attached to top of battery. Failure to read and understand all precautions contained in warning, could result in death or serious injury. (00064a)

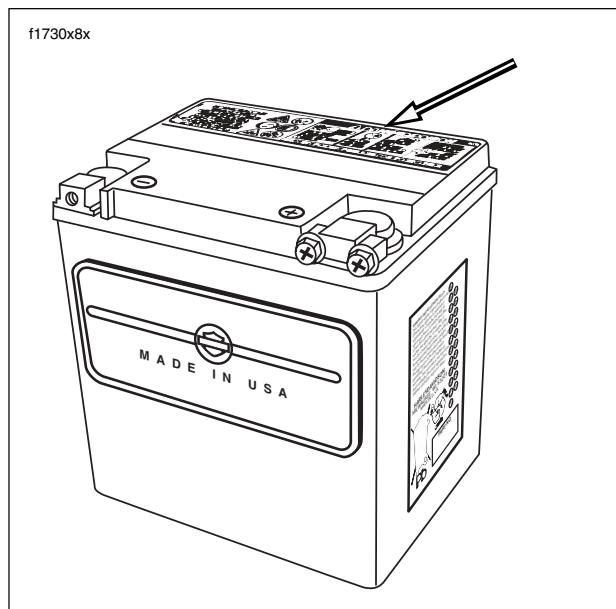


Figure 7-58. Battery Warning Label Location

Table 7-20. Battery Electrolyte Antidotes

CONTACT	SOLUTION
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.

b1184x7x

1. Contents are corrosive.

2. Wear safety glasses.

3. Contents are explosive.

4. Keep flames away.

5. Read instructions.

6. Keep away from children.

Figure 7-59. Battery Warning Label

BATTERY TESTING

Voltmeter Test

See [Table 7-21](#). 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 12.7V or above, perform the load test.

Table 7-21. Battery Charge Conditions

Voltage (OCV)	State of Charge
12.7	100%
12.6	75%
12.3	50%
12.0	25%
11.8	0%

Load Test

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:

IMPORTANT NOTE

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 [BATTERY INSTALLATION AND CONNECTION](#). Load testing a discharged battery can also result in permanent battery damage.
2. After charging, allow battery to stand for at least one hour before testing.

⚠ WARNING

Turn battery load tester OFF before connecting tester cables to battery terminals. Connecting tester cables with load tester ON can cause a spark and battery explosion, which could result in death or serious injury. (00252a)

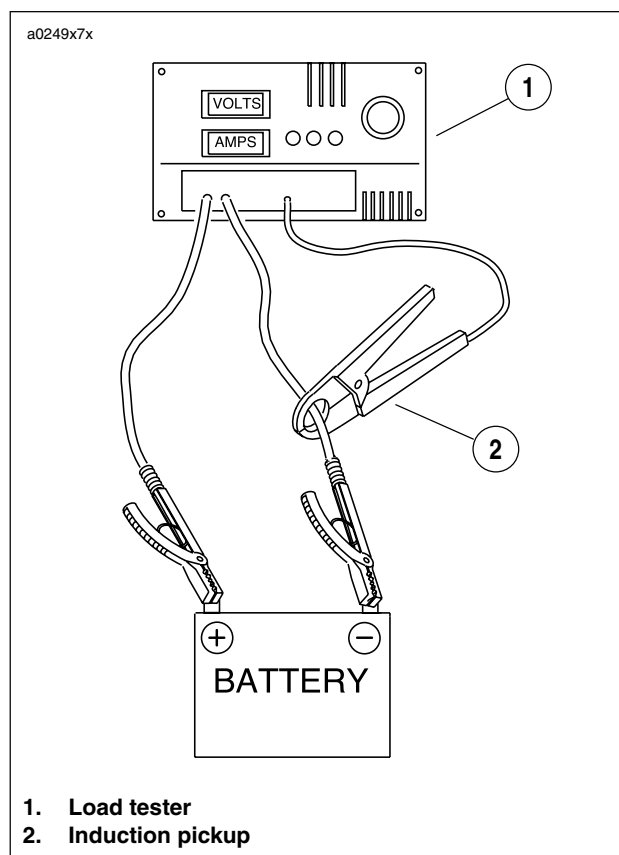


Figure 7-60. Load Test Battery

3. See [Figure 7-60](#). Connect tester leads to battery posts and place induction pickup over negative (black) cable.

IMPORTANT NOTE

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

4. See [Figure 7-60](#). 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).

Table 7-22. Battery Load Test

COLD CRANKING AMPERAGE (CCA)	100%	50%
BLAST	200	100

⚠ WARNING

Turn battery load tester OFF before disconnecting tester cables to battery terminals. Disconnecting tester cables with load tester ON can cause a spark and battery explosion, which could result in death or serious injury. (00253a)

5. Install the battery on the motorcycle. See [BATTERY INSTALLATION AND CONNECTION](#).

DISCONNECTION AND REMOVAL

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

WARNING

To prevent accidental vehicle start-up, which could cause death or serious injury, disconnect battery cables (negative (-) cable first) before proceeding. (00307a)

WARNING

Disconnect negative (-) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00049a)

2. Unthread bolt and remove battery negative cable (black) from battery negative (-) terminal.
3. Unthread bolt and remove battery positive cable (red) from battery positive (+) terminal.
4. Remove battery from motorcycle.

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 instructions 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

Explosive hydrogen gas, which escapes during charging, could cause death or serious injury. Charge battery in a well-ventilated area. Keep open flames, electrical sparks and smoking materials away from battery at all times. KEEP BATTERIES AWAY FROM CHILDREN. (00065a)

IMPORTANT NOTE

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, dry out or other damage.

1. Perform a voltmeter test to determine the state of charge. See BATTERY TESTING, VOLTMETER TEST.

WARNING

Connect positive (+) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00068a)

CAUTION

Remove battery from motorcycle before charging. Electrolyte leakage will damage motorcycle parts. (00213a)

2. Install the battery on the motorcycle. See [BATTERY INSTALLATION AND CONNECTION](#).

BATTERY CABLE ROUTING

Positive battery cable runs from the starter post to the positive battery terminal. Negative battery cable runs from frame to negative battery terminal.

NOTE

Route negative battery cable between battery and frame rail.

BATTERY INSTALLATION AND CONNECTION

1. Place the fully charged battery on the battery pad, terminal side facing up.

CAUTION

Connect the cables to the correct battery terminals. Failure to do so could result in damage to the motorcycle electrical system. (00215a)

WARNING

Connect positive (+) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00068a)

CAUTION

Do not over-tighten bolts on battery terminals. Use recommended torque values. Over-tightening battery terminal bolts could result in damage to battery terminals. (00216a)

2. See [Figure 7-61](#). Insert bolt through battery positive cable (red) into threaded hole of battery positive (+) terminal. Tighten bolt to 72-96 **in-lbs** (8-11 Nm).
3. Insert bolt through battery negative cable (black) into threaded hole of battery negative (-) terminal. Tighten bolt to 72-96 **in-lbs** (8-11 Nm).
4. Apply a 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 in locked position. While riding, a loose seat can shift causing loss of control, which could result in death or serious injury. (00070a)

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

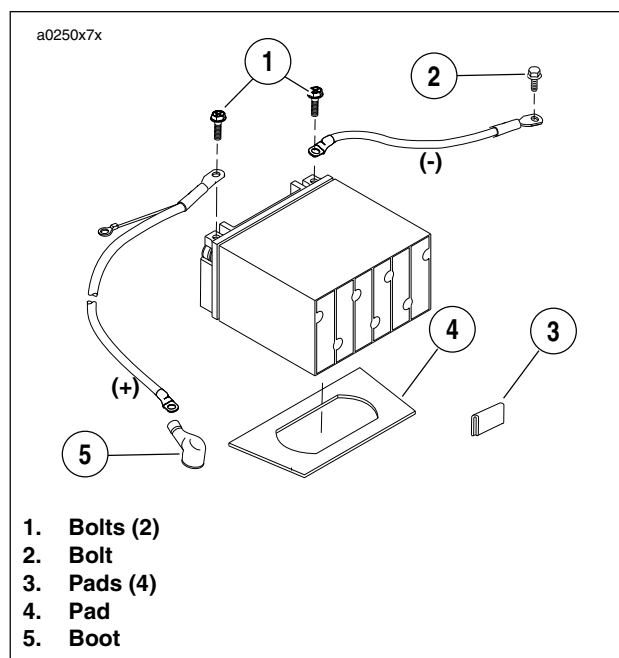


Figure 7-61. Battery Installation

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

Do not allow battery to completely discharge. The electrolyte in a discharged battery will freeze. The more discharged a battery is, the more easily it can freeze and crack the battery case. (00218a)

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.

See [Figure 7-62](#). 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.

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.

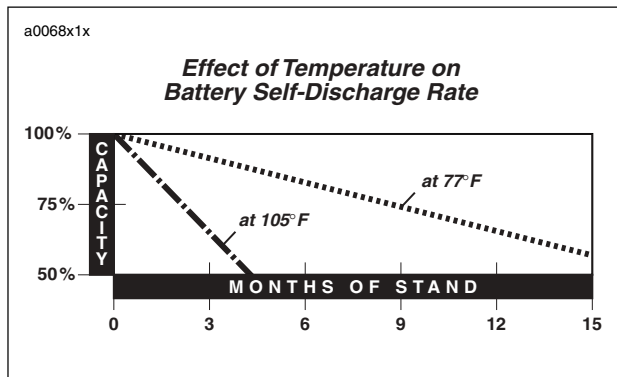


Figure 7-62. Battery Self-Discharge Rate

REMOVAL/DISASSEMBLY

Headlamp

NOTE

The headlamp is a sealed assembly. If bulb fails, replace headlamp.

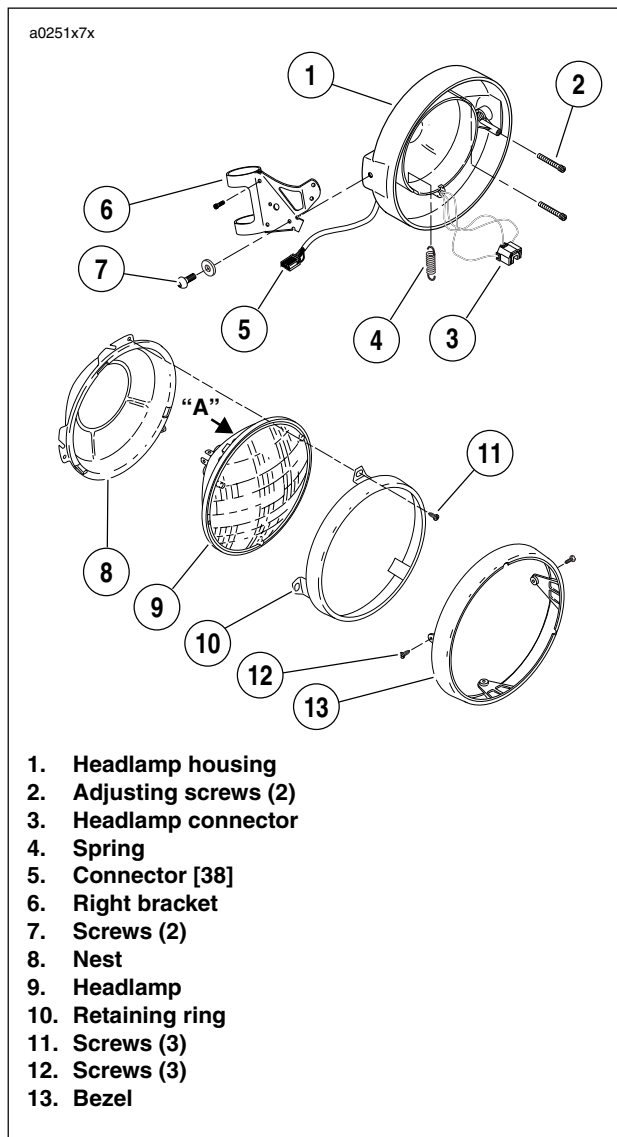
1. Remove four screws, washers and windscreen. See 2.26 WINDSCREEN.
2. See Figure 7-63. Remove three phillips head screws (12) and bezel (13) from nest.
3. Remove three screws (11) and retaining ring (10).
4. Slide headlamp (9) from headlamp housing (1) and detach headlamp connector (3) from rear of headlamp.

CAUTION

Handle bulb carefully and wear eye protection. Bulb contains Halogen gas under pressure, which, if not handled carefully, could cause serious eye injury. (00062a)

Headlamp Housing and Brackets

1. See Figure 7-63. Remove two screws (7) and washers and partially remove headlamp housing (1) from vehicle.
2. Detach connector [38] (5) from wiring harness. Remove headlamp housing from vehicle.
3. To remove nest (8), remove two adjusting screws (2) and detach spring from nest.
4. Remove headlamp brackets (6).
 - a. Remove front turn signals. See 7.19 TURN SIGNALS.
 - b. Remove two screws from bracket.
 - c. Repeat for other bracket.
 - d. Remove front forks and headlamp brackets. See 2.17 FRONT FORK.
 - e. Remove windscreen from brackets. See 2.26 WINDSCREEN.



1. Headlamp housing
2. Adjusting screws (2)
3. Headlamp connector
4. Spring
5. Connector [38]
6. Right bracket
7. Screws (2)
8. Nest
9. Headlamp
10. Retaining ring
11. Screws (3)
12. Screws (3)
13. Bezel

ASSEMBLY/INSTALLATION

Headlamp Housing and Brackets

1. Install headlamp brackets.
 - a. Install front forks through triple clamps and brackets. See 2.17 FRONT FORK.
 - b. See Figure 7-63. Install bracket (6) with two allen screws and tighten to 12-14 ft lbs (16.3-19.0).
 - c. Repeat for other bracket
 - d. Attach front turn signals. See 7.19 TURN SIGNALS.
 - e. Install windscreen if removed with four screws and washers. See 2.26 WINDSCREEN.
2. See Figure 7-63. Mate connector [38] (5) to wiring harness.
3. Install headlamp housing (1) using two screws (7) and washers. Tighten to 12-14 ft-lbs (16.3-19 Nm).

Figure 7-63. Headlamp Assembly

Headlamp

CAUTION

Handle bulb carefully and wear eye protection. Bulb contains Halogen gas under pressure, which, if not handled carefully, could cause serious eye injury. (00062a)

1. See [Figure 7-63](#). Connect headlamp connector (3) to rear of headlamp (9).

NOTE

Align protrusion "A" on headlamp with slot in upper portion of nest for proper fit. Retaining ring only fits one way. Rotate retaining ring until all three holes align.

2. Install headlamp and retaining ring (10) to nest with three phillips screws (11). Tighten screws to 12-14 **in-lbs** (1-2 Nm).

NOTE

Make sure slots on bezel are positioned so they allow access to adjusting screws.

3. Install bezel (13) to retaining ring with three phillips screws (12). Tighten screws to 12-14 **in-lbs** (1-2 Nm).
4. Install windscreen with four screws and washers. See [2.26 WINDSCREEN](#).

WARNING

Be sure that all lights and switches operate properly before operating motorcycle. Low visibility of rider can result in death or serious injury. (00316a)

5. See [Figure 7-64](#). Check headlamp for proper operation.
 - a. Turn ignition key switch to IGN.
 - b. Check headlamp LOW (3) and HIGH (2) beam settings.
 - c. Set headlamp to LOW beam. Press highbeam flash switch (4). Headlamp should flash HIGH beam for as long as the switch is pressed.
 - d. Turn ignition key switch to OFF.
 - e. If operation fails, reread procedure and verify that all steps were performed.
6. Align headlamp. See [1.22 HEADLAMP](#).

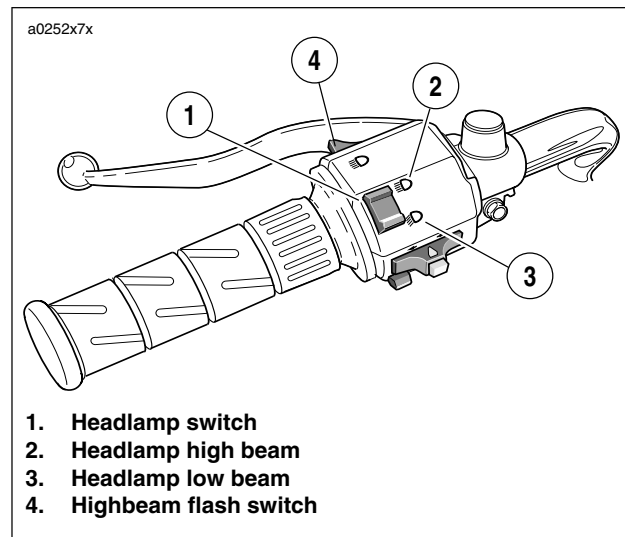


Figure 7-64. Headlamp Switch

BULB REPLACEMENT

1. See [Figure 7-65](#). Remove two screws (1) and lens (2).
2. Rotate bulb (3) counterclockwise and pull to remove.
3. Install **new** tail lamp bulb by pushing into socket and rotating bulb clockwise.
4. Install tail lamp lens with two screws.

REMOVAL

1. See [Figure 7-65](#). Disconnect the tail lamp connector (7) from rear of tail lamp under tail section.
2. Remove two locknuts (metric) (5), washers (4) and tail lamp.

INSTALLATION

NOTE

Push up on metal bracket under tail section to align tail lamp mounting holes.

1. See [Figure 7-65](#). Attach tail lamp to tail section with two washers (4) and locknuts (metric) (5). Tighten locknuts to **23-28 in-lbs (2.6-3.2 Nm)**.
2. Attach the tail lamp connector (7) to the back of the tail lamp.

WARNING

Be sure that all lights and switches operate properly before operating motorcycle. Low visibility of rider can result in death or serious injury. (00316a)

3. 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 OFF.

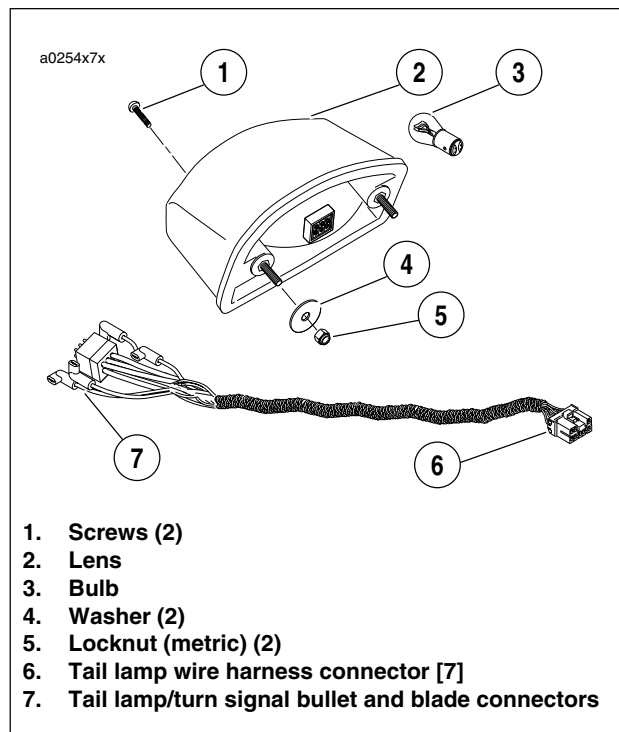


Figure 7-65. Tail Lamp

REMOVAL

NOTES

- Remove screw on back of turn signal to detach lens and install **new** turn signal bulbs.
- Front bulbs are identical to rear bulbs.

Front

1. Remove four screws, washers and windscreen. See [2.26 WINDSCREEN](#).
2. See [Figure 7-66](#). Disconnect two bullet connectors on turn signal wires.
3. See [Figure 7-67](#). Remove nut and lock washer.
4. Remove turn signal from headlamp bracket.
5. Repeat steps 2-4 for other turn signal.

Rear

1. Cut cable strap that secures bullet connectors under tail section.
2. See [Figure 7-68](#). Disconnect two bullet connectors on turn signal wires.
3. Remove nut and lockwasher.
4. Remove turn signal from tail lamp bracket.
5. Repeat steps 2-4 for other turn signal.

INSTALLATION

Front

1. See [Figure 7-67](#). Install turn signal with lock washer and nut. Tighten nut to 25-28 **in-lbs** (2.8-3.2 Nm).

NOTE

Install turn signal with lens drain hole facing downward.

2. Attach two bullet connectors on turn signal wires as shown in [Figure 7-66](#).
3. Install four screws, washers and windscreen. See [2.26 WINDSCREEN](#).

WARNING

Be sure that all lights and switches operate properly before operating motorcycle. Low visibility of rider can result in death or serious injury. (00316a)

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 OFF.

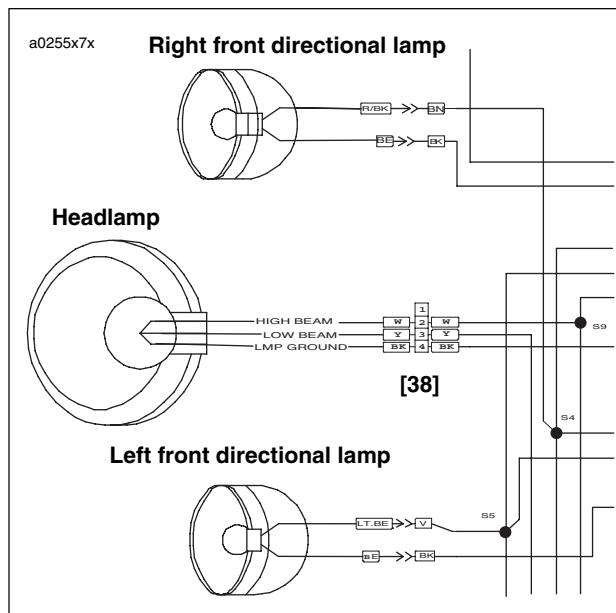


Figure 7-66. Front Turn Signal Connections

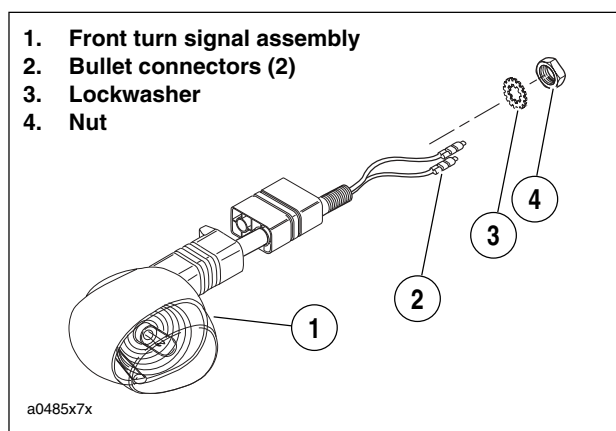


Figure 7-67. Front Turn Signals

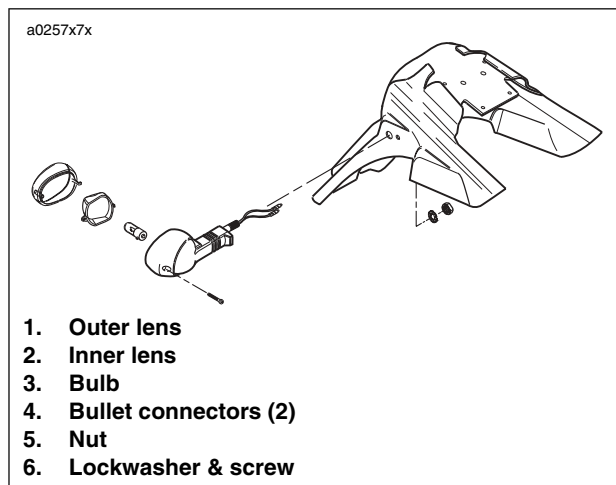


Figure 7-68. Rear Turn Signals

Rear

- See Figure 7-68. Insert bullet connectors through rear hole in tail lamp bracket. Attach turn signal using lock washer and nut. Tighten nut to 25-28 **in-lbs** (2.8-3.2 Nm).

NOTE

Install turn signal with lens drain hole facing downward.

- Attach two bullet connectors on turn signal wires as shown in Figure 7-69.
- Use **new** cable strap to bundle turn signal wires beneath tail section.

WARNING

Be sure that all lights and switches operate properly before operating motorcycle. Low visibility of rider can result in death or serious injury. (00316a)

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

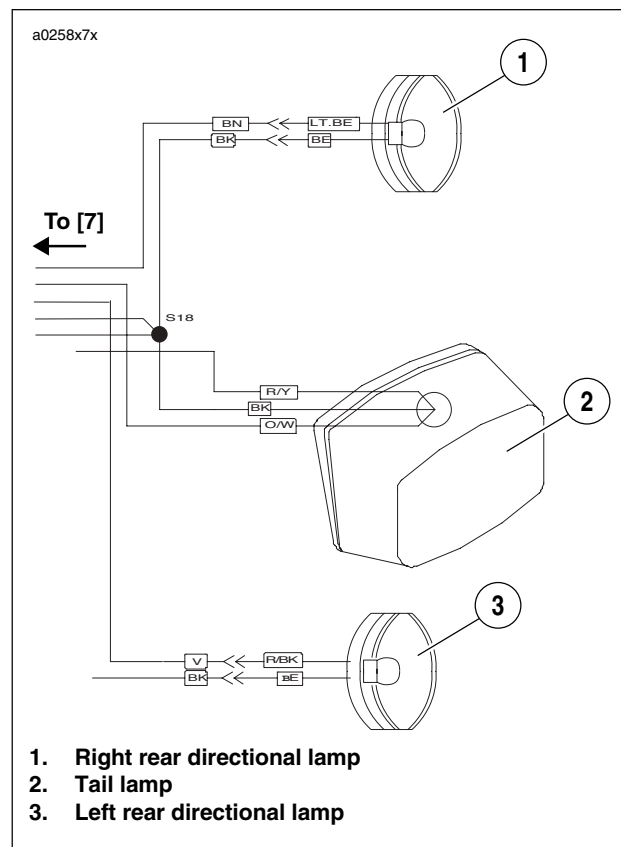


Figure 7-69. Rear Turn Signal Connections

REMOVAL

NOTE

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

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

⚠ WARNING

Disconnect negative (-) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00049a)

2. Disconnect negative battery cable.
3. Pry tab on circuit breaker clip left side and remove circuit breaker from clip with wires still attached.
4. See [Figure 7-70](#). Remove screw and flasher relay from frame tray.
5. Unplug relay connector [30] from flasher relay and remove flasher relay.

INSTALLATION

1. See [Figure 7-70](#). Connect relay connector [30] to **new** turn signal flasher relay.
2. Attach flasher relay to frame tray with screw. Tighten screw to 48-60 **in-lbs** (5.4-8 Nm).
3. Install circuit breaker to clip.
4. Connect negative battery cable to battery terminal. Tighten fastener to 72-96 **in-lbs** (8-11 Nm).

⚠ WARNING

Be sure that all lights and switches operate properly before operating motorcycle. Low visibility of rider can result in death or serious injury. (00316a)

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 OFF.

⚠ WARNING

After installing seat, pull upward on front of seat to be sure it is in locked position. While riding, a loose seat can shift causing loss of control, which could result in death or serious injury. (00070a)

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

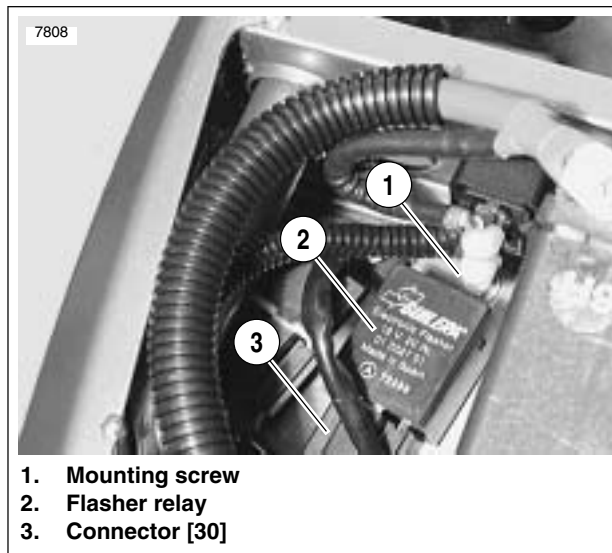


Figure 7-70. Turn Signal Flasher

REMOVAL

NOTE

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

Right Side

1. Detach throttle cables.
2. See [Figure 7-71](#). Cut cable strap to access right handlebar switch connector [22] behind dash. Detach connector [22] from wiring harness.
3. Cut as many cable straps as necessary to access brake switch connector [170]. Detach connector [170] from wiring harness.

Left Side

1. Remove three screws from handlebar switch.
2. Separate switch housings and remove from handlebar.
3. See [Figure 7-73](#). Cut cable strap(s) as necessary to access left handlebar switch connector [24] and clutch switch connector [95] behind dash. Detach connector [24] from wiring harness.
4. Remove connector [95] from clutch switch.

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 25-33 **in-lbs** (2.8-3.7 Nm).
3. See [Figure 7-71](#). Route switch housing wiring harness between front forks. Attach connector [170] and connector [22] to wiring harness. Fasten wiring harness behind dash with **new** cable straps.
4. Adjust throttle cables. See [1.18 THROTTLE CABLES](#).

WARNING

Be sure that all lights and switches operate properly before operating motorcycle. Low visibility of rider can result in death or serious injury. (00316a)

5. See [Figure 7-72](#). 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 OFF.

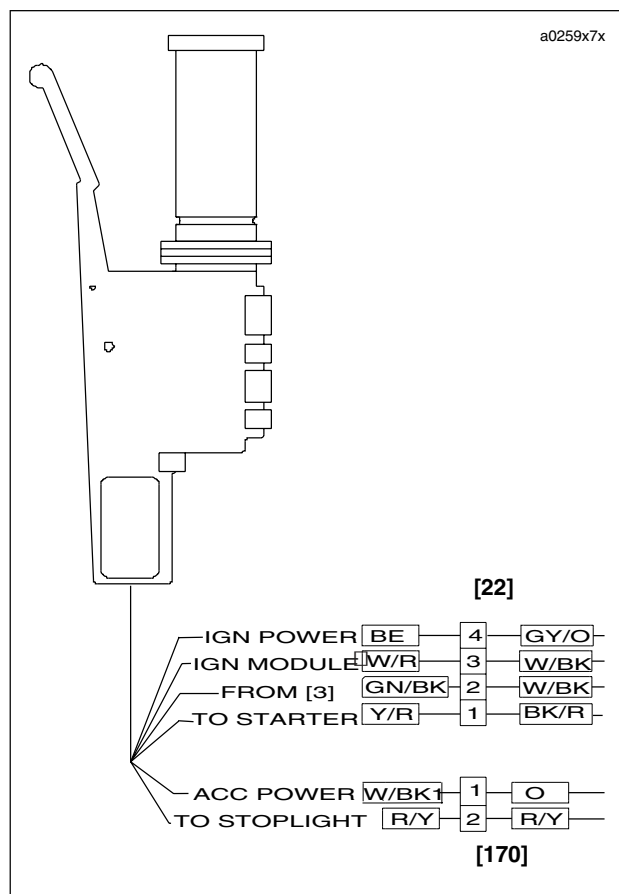


Figure 7-71. Right Handlebar Switch Connection [22] and Brake Switch Connection [170]

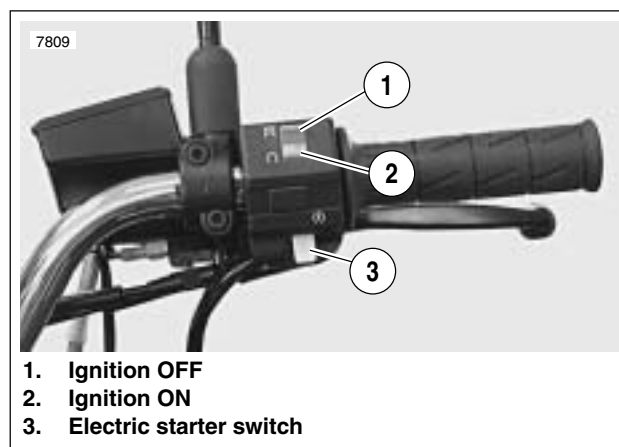


Figure 7-72. Right Handlebar Switches

Left Side

1. Attach switch housing to handlebar with three screws. Tighten screws to 25-33 **in-lbs** (2.8-3.7 Nm).
2. See [Figure 7-73](#). Route switch housing wiring harness between front forks. Attach connector [24] and connector [95] to wiring harness. Fasten wiring harness behind dash with **new** cable straps.

WARNING

Be sure that all lights and switches operate properly before operating motorcycle. Low visibility of rider can result in death or serious injury. (00316a)

3. See [Figure 7-74](#). 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 OFF.

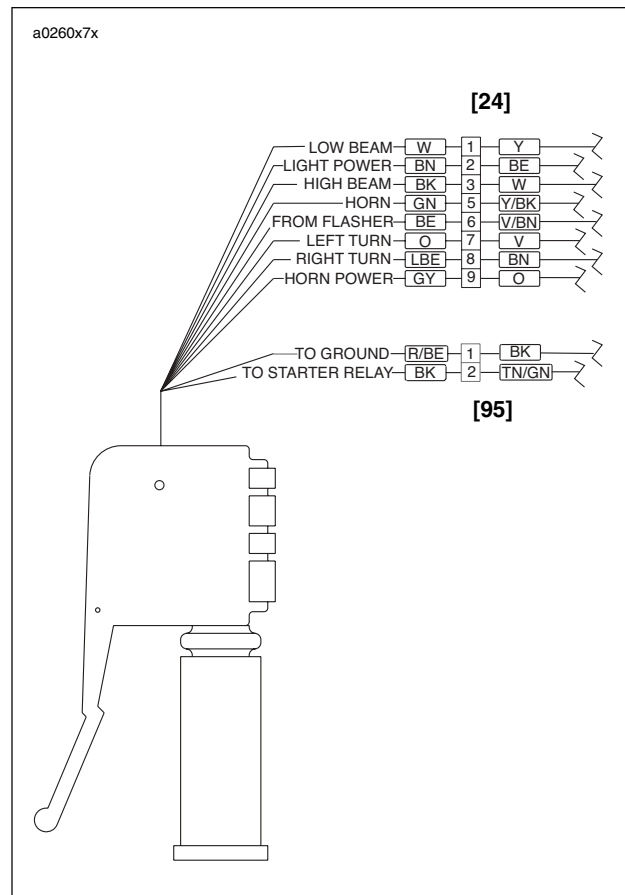


Figure 7-73. Left Handlebar Switch Connection [24] and Clutch Switch Connection [95]

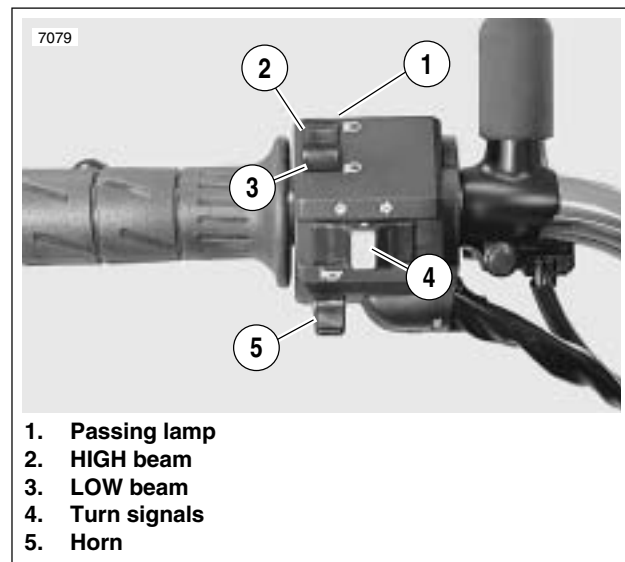


Figure 7-74. Left Handlebar Switches

REMOVAL

1. Pull bottom of horn forward slightly and remove nut (metric) from back of horn.
2. See [Figure 7-75](#). Detach Y/BK power wire and BK ground wire from terminal clips.
3. Remove horn from motorcycle.

INSTALLATION

1. See [Figure 7-75](#). Connect Y/BK power wire and BK ground wire to terminal clips.
2. Attach horn to bracket with nut (metric). Tighten nut to 25-33 **in-lbs** (2.6-3.7 Nm).
3. 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 OFF.

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 7-75](#). Remove Y/BK power and BK ground wires from terminal clips.
 - b. Connect voltmeter positive (+) lead to Y/BK wire.
 - c. Connect voltmeter negative (-) lead to ground.
 - d. Turn ignition key switch to IGN.
3. See [Figure 7-76](#). 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 [7.21 HANDLEBAR SWITCHES](#).

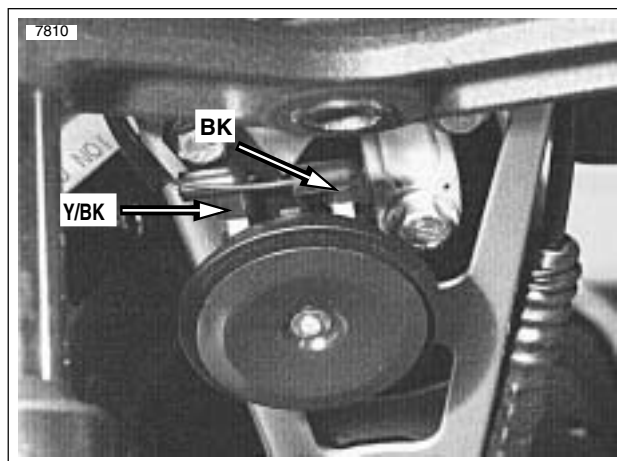


Figure 7-75. Horn Assembly

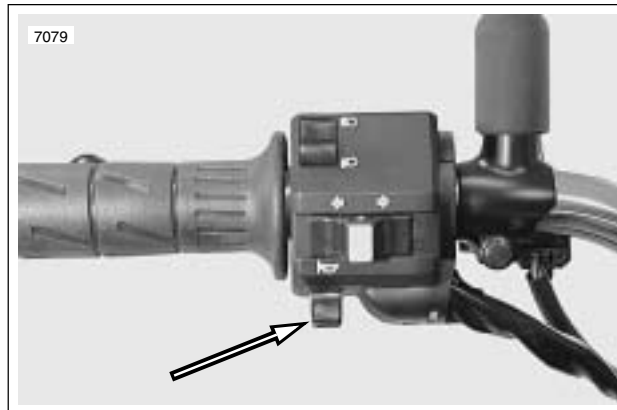


Figure 7-76. Horn Switch Location

GENERAL

See [Figure 7-77](#). 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.

For diagnostic information, see [Section 7.28 INDICATORS](#).

REMOVAL/INSTALLATION

1. Verify that the ignition key switch is turned to OFF.
2. Remove front sprocket cover. See [2.22 SPROCKET COVER](#).
3. See [Figure 7-77](#). Place transmission in first gear. Remove two socket head screws (7) and lockplate (6).

IMPORTANT NOTE

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. See [Figure 7-77](#). Remove transmission sprocket nut (5) from main drive gear shaft (3).
5. Remove transmission sprocket (4) (with secondary drive belt) from main drive gear shaft (3).
6. Remove wire lead from neutral indicator switch (1). Remove switch from right crankcase half (2).
7. Install **new** neutral indicator switch.
 - a. Apply a light coating of Loctite 243 (blue) to **new** neutral indicator switch (1) threads.
 - b. Install switch in crankcase. Tighten to 36-60 **in-lbs** (4.0-6.8 Nm).
 - c. Connect wire lead to switch.
8. Install transmission sprocket (4) (with secondary drive belt) onto main drive gear shaft (3). See [6.14 TRANSMISSION SPROCKET](#).
9. Install sprocket cover. See [2.22 SPROCKET COVER](#).

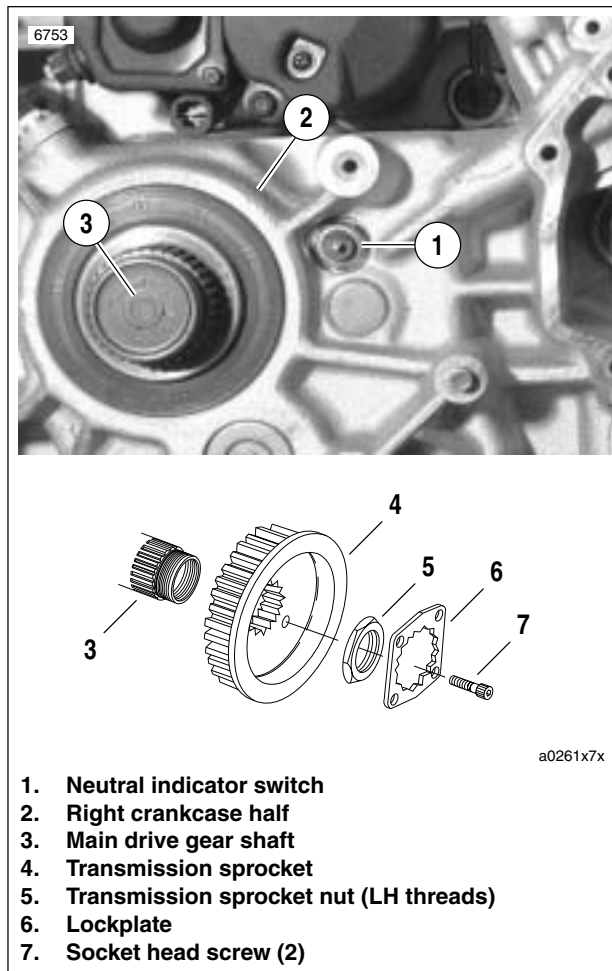


Figure 7-77. Neutral Indicator Switch

GENERAL

Fuses

See [Figure 7-78](#). The fuse block is on the right side of the frame under the seat. The block contains five replaceable fuses. Two spare fuses (4) are attached to the fuse block.

The lights (1), key switch (2) and system (3) fuses are each rated at 15 amperes. The ignition (5) and accessory (6) fuses are rated at 7.5 amperes.

Remove fuses by pulling them straight up and out of the fuse block. Inspect metal strip inside opaque plastic shell. A broken metal strip indicates a blown fuse. Always replace fuses with fuses of the same amp rating.

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

Circuit Breakers

See [Figure 7-79](#). The 30 ampere main circuit breaker is under the seat next to the battery.

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.

To replace the circuit breaker:

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

⚠ WARNING

Disconnect negative (-) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00049a)

2. Disconnect battery negative cable from battery.
3. Remove acorn nuts, nuts with lock washers and wire leads from circuit breaker studs. Tag wire leads for ease of assembly.
4. Remove circuit breaker from circuit breaker bracket by carefully prying clip tab, located on left side, open and sliding circuit breaker out.

NOTE

Bank Angle Sensor will require reinstallation if bracket is removed. See [7.5 BANK ANGLE SENSOR](#).

5. Install in the reverse order. Tighten screw (if bracket was removed) to 25-27 **in-lbs** (2.8-3.1 Nm). Tighten metal nut to 15-18 **in-lbs** (1.7-2 Nm). Tighten plastic acorn nuts to 1-3 **in-lbs** (0.1-0.3 Nm).

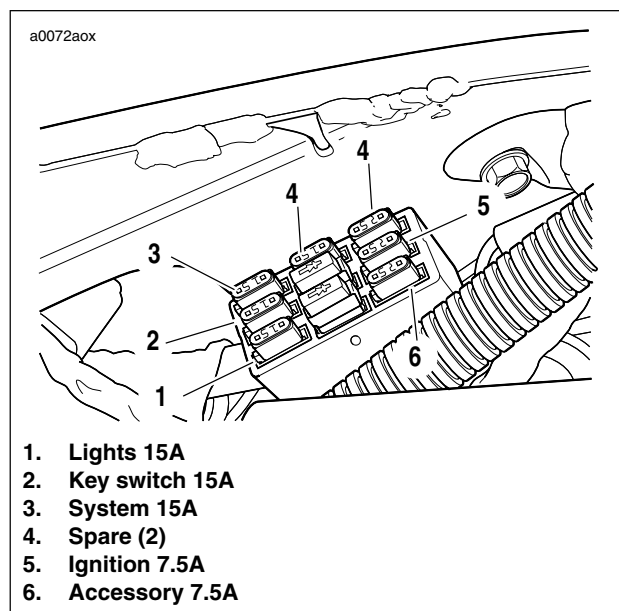


Figure 7-78. Fuse Block

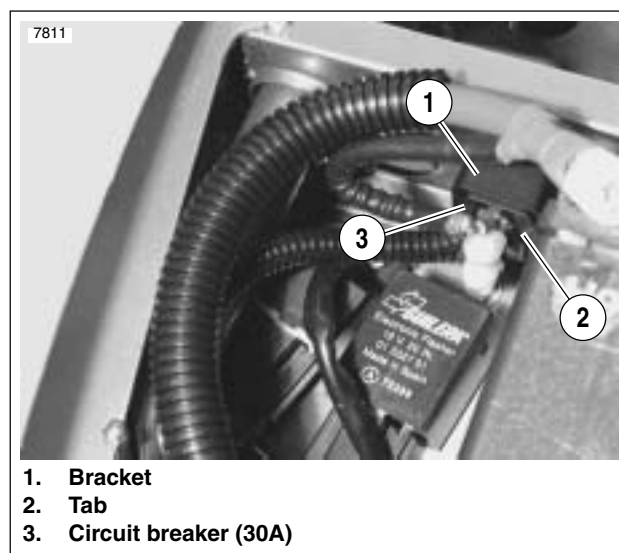


Figure 7-79. Circuit Breaker

⚠ WARNING

After installing seat, pull upward on front of seat to be sure it is in locked position. While riding, a loose seat can shift causing loss of control, which could result in death or serious injury. (00070a) injury.

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

GENERAL

The electronic speedometer consists of a speed sensor, function switch and the speedometer. The speed sensor is mounted on the right side of the transmission case, below the starter. The sensor circuitry is that of a Hall-Effect sensor that is triggered by the gear teeth of 5th gear on the transmission main shaft. The output from the sensor is a series of pulses that are interpreted by speedometer circuitry to control the position of the speedometer needle and the liquid crystal display (LCD) odometer display. The odometer mileage is permanently stored and will not be lost when electrical power is turned off or disconnected. The function switch allows switching, or "toggling" between the odometer and trip odometer displays. To zero the trip odometer, have the odometer display visible, press and keep the function switch depressed. The trip odometer mileage will be displayed for 2 to 3 seconds and then the mileage will return to 0 miles.

The odometer can display seven numbers to indicate a maximum of 999999.9 miles. The trip odometer can display five numbers for a maximum of 9999.9 miles.

Circuitry in the speedometer also conditions the sensor input to provide an input to the turn signal canceller.

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

DIAGNOSTICS

Blast Models have a speedometer with self-diagnostic capabilities.

General

The reset switch is used to change the odometer display between mileage and trip values and to reset the trip odometer. It is also used to identify the speedometer calibration and to enter the diagnostic mode, clear diagnostic codes and exit the diagnostic mode.

Diagnostic Mode

The diagnostic mode is entered by turning the ignition switch from OFF to ON while holding the reset switch in. The normal power-up sequence will occur before entering the diagnostic mode. Diagnostic codes set during this power-up sequence will be stored as well.

NOTE

Make sure no Diagnostic Codes are indicated before reset is held in for more than 5 seconds or diagnostic information will be lost.

When in the diagnostic mode, the odometer will display the first diagnostic code. When the trip switch is pressed again, the next code will be shown. If the trip switch is pressed for more than 5 seconds at any time while in the diagnostic mode, the **diagnostic code displayed will be erased**.

There are seven different diagnostic codes available. They are as follows:

Table 7-23. Trouble Codes

CODE	DESCRIPTION
d01	Speed sensor power output shorted low
d02	Speed sensor power output shorted high or open
d03	Not used
d04	Not used
d05	Speed sensor return shorted high
d06	Speed sensor return shorted low
d07	Not used
d08	Speedometer power over voltage
d09	Speed output shorted high
d10	Speed output shorted low or open

CAL XX Speedometer application calibration number:
14 = domestic

When in the diagnostic mode, all codes are displayed in sequence from d01 to d10.

As a code appears in the display (for instance d02), it will read "d02SEt" if set or "d02CLr" if clear.

The diagnostic mode is exited either by turning ignition from ON to OFF to ON again without depressing the reset switch or if a speed signal greater than 5 m.p.h. is detected.

Diagnostics cannot be performed if a system voltage is less than 9 VDC or greater than 16 VDC. The only exception is **d08** which is set when the system voltage is greater than 16 VDC.

After all diagnostic codes are displayed, the speedometer calibration number is displayed (**CAL14**).

Reset Switch Replacement

1. Remove odometer reset boot from instrument panel.
2. Unscrew bezel ring from reset switch and pull switch out from behind instrument panel.
3. Cut wires from switch.
4. Install **new** switch wires using SEALED WIRE SPLICES.
5. Position **new** reset switch in squared boss Behind instrument panel.
6. Install bezel inside of rubber boot.
7. Install rubber boot/bezel assembly to odometer reset switch.

REMOVAL

1. See [Figure 7-80](#). Remove two fasteners holding dash panel to upper triple clamp.

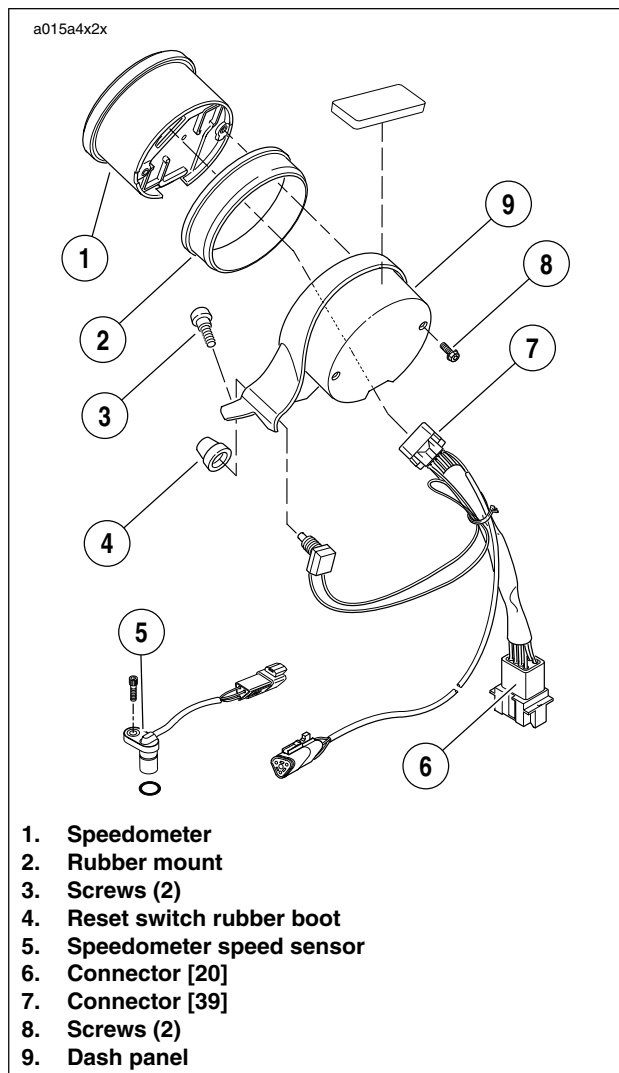


Figure 7-80. Speedometer

2. Unplug connector [20]. Cut and remove cable strap.
3. The rubber mount is a tight fit in the dash panel. To remove the speedometer without damaging the dash panel:
 - a. See [Figure 7-81](#). Loosen screw until head is approximately 0.125 in. (3.2 mm) above the back surface of the dash.
 - b. Liberally apply glass cleaner around circumference of rubber mount.
 - c. See [Figure 7-82](#). Position dash and speedometer on edge of hard surfaced bench and apply even pressure to dash to open a gap between the speedometer and dash.
 - d. Remove two screws that secure speedometer to rear of dash panel.
 - e. Apply more glass cleaner in gap and work speedometer free from dash.
4. Depress tab and remove speedometer connector [39].

INSTALLATION

1. Install connector [39] on back of speedometer.
2. Lubricate rubber mount with glass cleaner and insert speedometer into dash panel.
3. Install speedometer to dash panel with two screws in back of dash panel.
4. Connect connector [20] and replace cable strap to adjacent wire bundle.
5. Apply Loctite 243 (blue) to first few threads of dash panel mounting screws.
6. Position dash panel in mounting position on upper triple clamp and install two screws. Tighten screws to 30-36 in-lbs (3-4 Nm).



Figure 7-81. Speedometer Fasteners

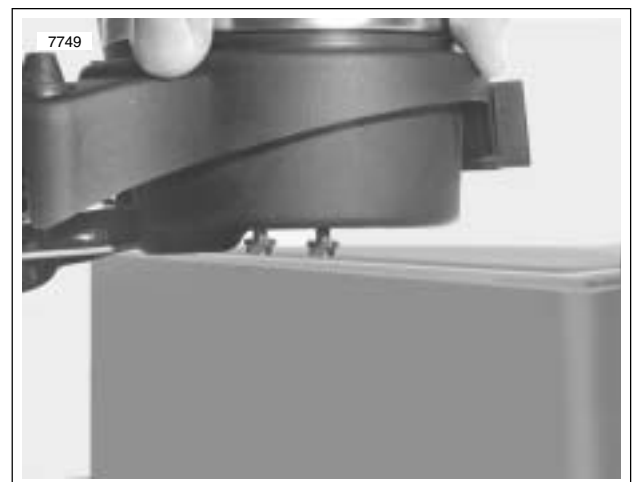


Figure 7-82. Removing Speedometer

REMOVAL

1. Remove seat. See [2.28 SEAT](#).
2. See [Figure 7-83](#). Locate and unplug speedometer sensor 3-place connector [65]. Connector is located in the right side frame cavity.
3. See [Figure 7-84](#). Locate speed sensor on engine case right side, to the rear of the starter solenoid.
4. Remove speed sensor mounting screw.
5. Remove sensor with o-ring from engine case cavity and pull wires down through frame.

INSPECTION

NOTE

Debris on speedometer sensor can result in false speedometer reading, especially during break-in. Always clean and troubleshoot speedometer sensor and verify proper operation before replacing speedometer. See [Speedometer Sensor Test](#).

Clean any debris from speedometer sensor.

INSTALLATION

1. Install speedometer sensor in engine case.
2. Install screw and tighten to 80-100 **in-lbs** (9-11 Nm).
3. Connect connector [65] in right side frame cavity.

⚠ WARNING

After installing seat, pull upward on front of seat to be sure it is in locked position. While riding, a loose seat can shift causing loss of control, which could result in death or serious injury. (00070a)

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

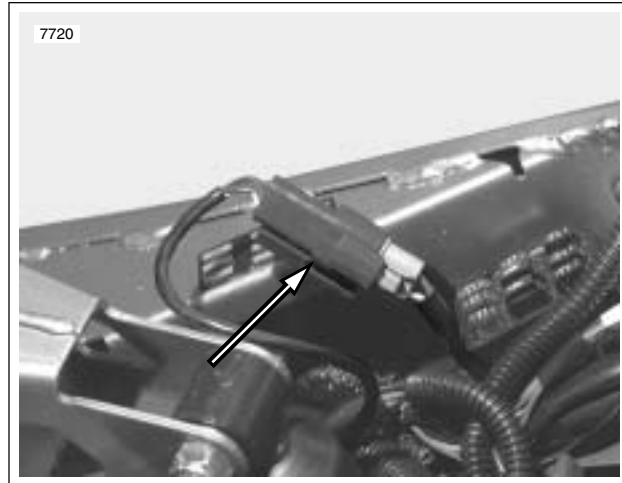
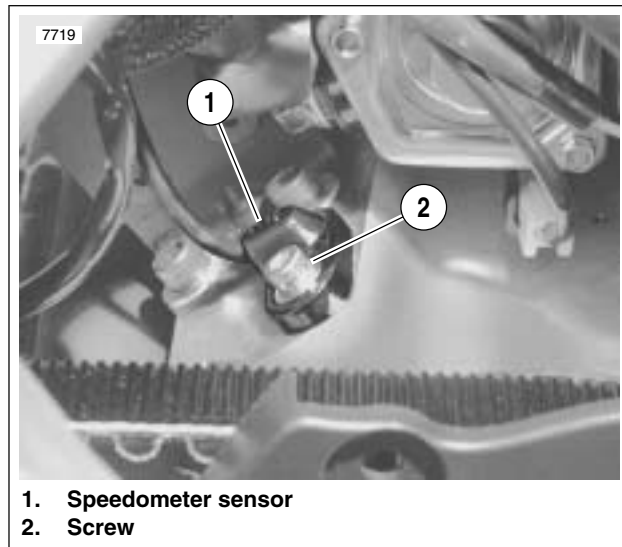


Figure 7-83. Speedometer Sensor Connector [65]



1. Speedometer sensor
2. Screw

Figure 7-84. Speedometer Sensor

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.

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 [65] for the speedometer sensor to right of battery 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 [Table 7-24](#). 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).

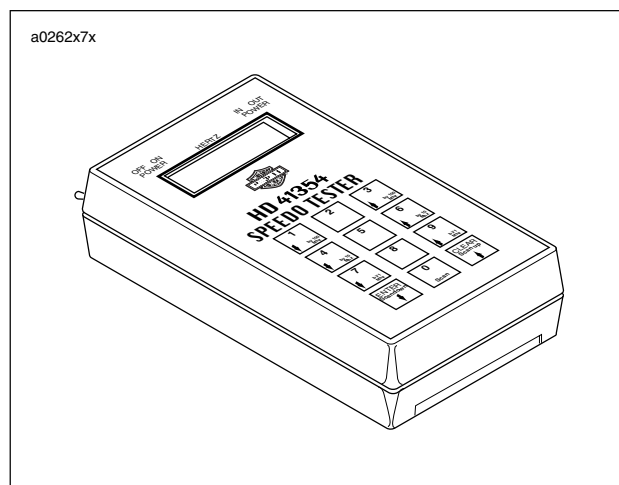


Figure 7-85. Speedometer Tester

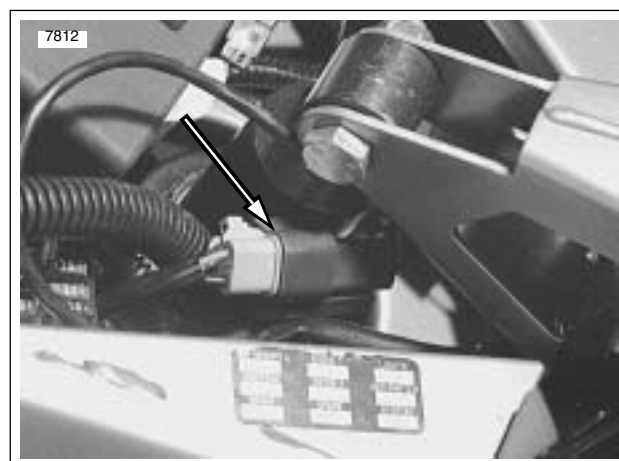


Figure 7-86. Speedometer Sensor Connector [65]

Table 7-24. Speedometer Test Frequency in Hertz (Hz)

MARKET	20 MPH (30 KPH)	40 MPH (60 KPH)	60 MPH (100 KPH)	80 MPH (130 KPH)
USA	606	1207	1803	2392
CAN	606	1208	1804	2393

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.

- 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.
- Six socket terminals (Part No. 72191-94).
- Six pin terminals (Part No. 72190-94).
- Two secondary locks (socket) (Part No. 72153-94).
- Two secondary locks (pin) (Part No. 72143-94).

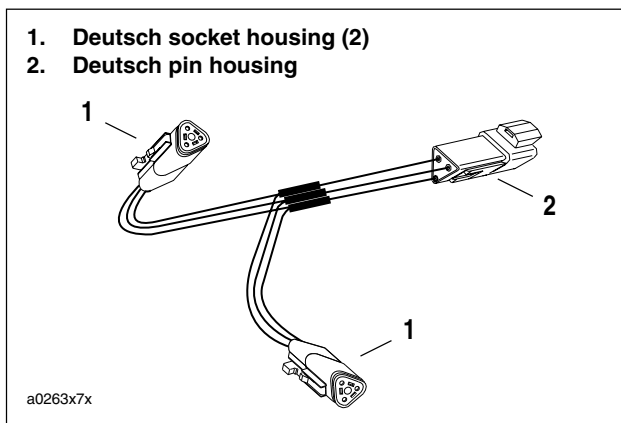


Figure 7-87. Test Harness

Before attempting the actual speedometer sensor check, two system checks must be made. Install the test harness at the speed sensor connector [65]. See [Figure 7-87](#).

- Test for voltage to sensor by checking for 8-12 VDC on red wire in connector [65B].
 - Then check for continuity to ground on black wire in connector [65B].
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 [65A] and [65B].
 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. Remove sensor and check for debris, clean, replace sensor and retest. If still non-functional, install a known, good speedometer sensor and test again for proper operation.

IMPORTANT NOTE

When using the speedometer troubleshooting diagnostic charts on the following pages, use the reference numbers below to correlate with those found on the diagnostic flow charts.

1. To enable diagnostic mode: press odometer reset switch and turn ignition/key switch to ON.
2. To clear codes: depress and hold reset switch for 5 seconds with set code displayed.
3. To return speedometer to normal operating state: cycle ignition/key switch.
4. Remove seat. See [2.28 SEAT](#).
5. Test results may be inaccurate if tester battery is low.
6. Refer to [7.27 SPEEDOMETER PERFORMANCE CHECK](#).
7. Sensor can also be tested with Speedometer Tester (HD-41354) and Test Harness. See SPEEDOMETER SENSOR TEST.
8. Remove sensor and check for accumulation of debris on sensor; if debris is not present, replace sensor. If debris is present, clean sensor and repeat test. Replace sensor as required. See [7.26 SPEEDOMETER SENSOR](#).
9. Sweep tool has frequency jumps in full scale sweeps. Perform sweep in 3 stages as described in speedometer tester manual.
10. Disconnecting speed sensor or install speedometer sensor will cause code **d02** to set.

Speedometer Test: Chart 1

ODOMETER, TRIP ODOMETER AND RESET SWITCH TESTING

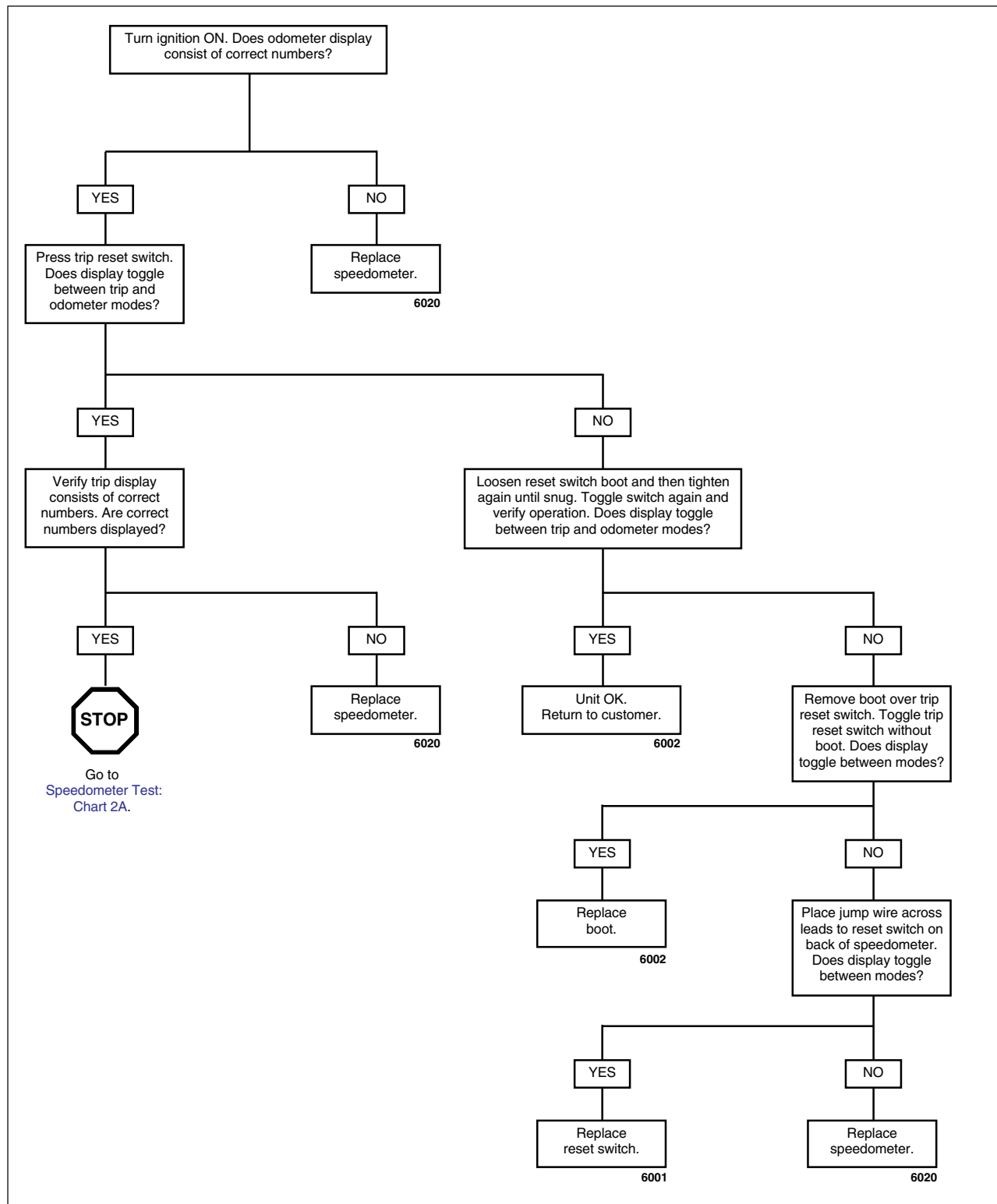


Figure 7-88. Speedometer Test Chart 1

Speedometer Test: Chart 2A

INOPERATIVE, INACCURATE OR ERRATIC SPEEDOMETER

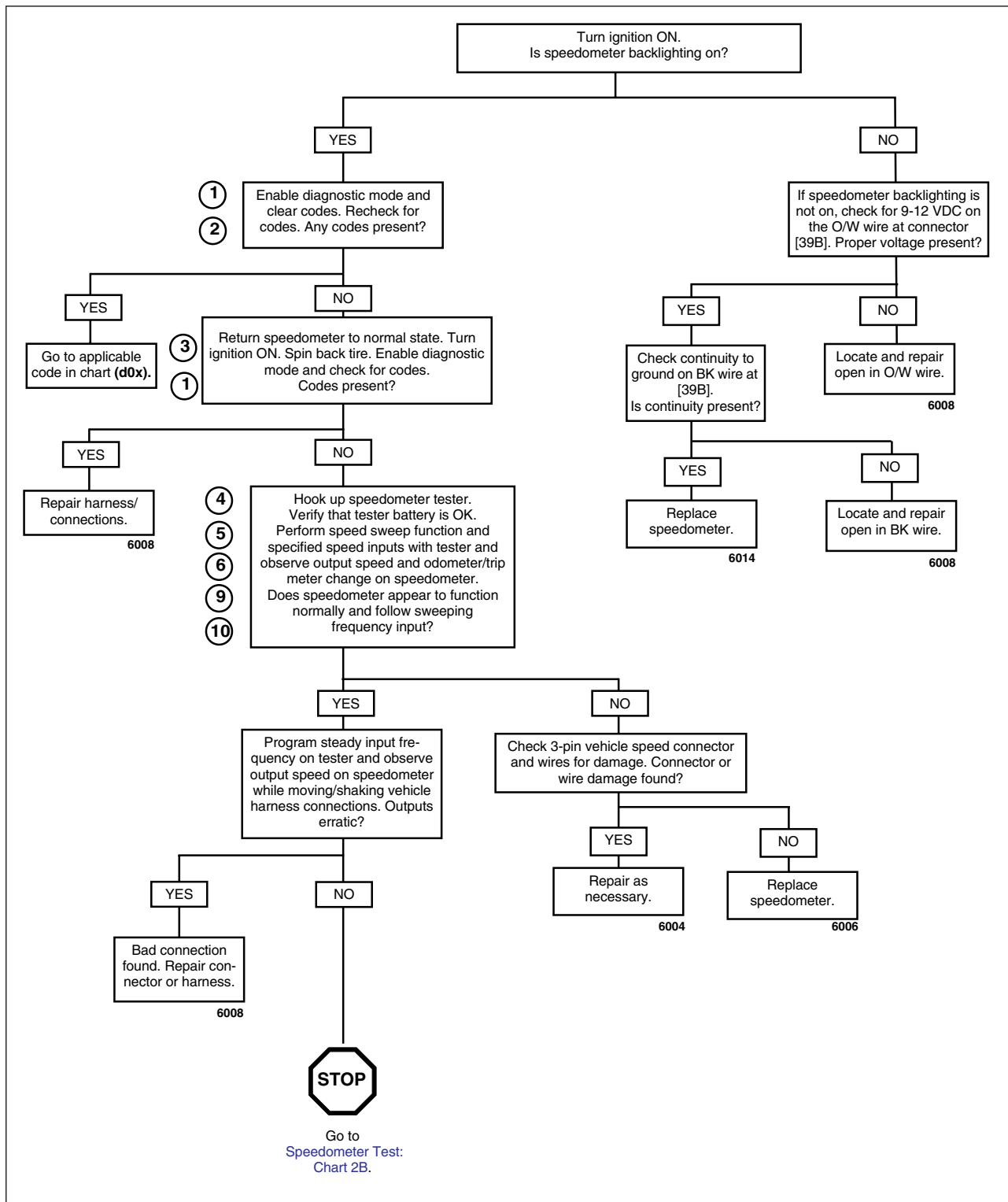


Figure 7-89. Speedometer Test Chart 2A

Speedometer Test: Chart 2B

INOPERATIVE, INACCURATE OR ERRATIC SPEEDOMETER

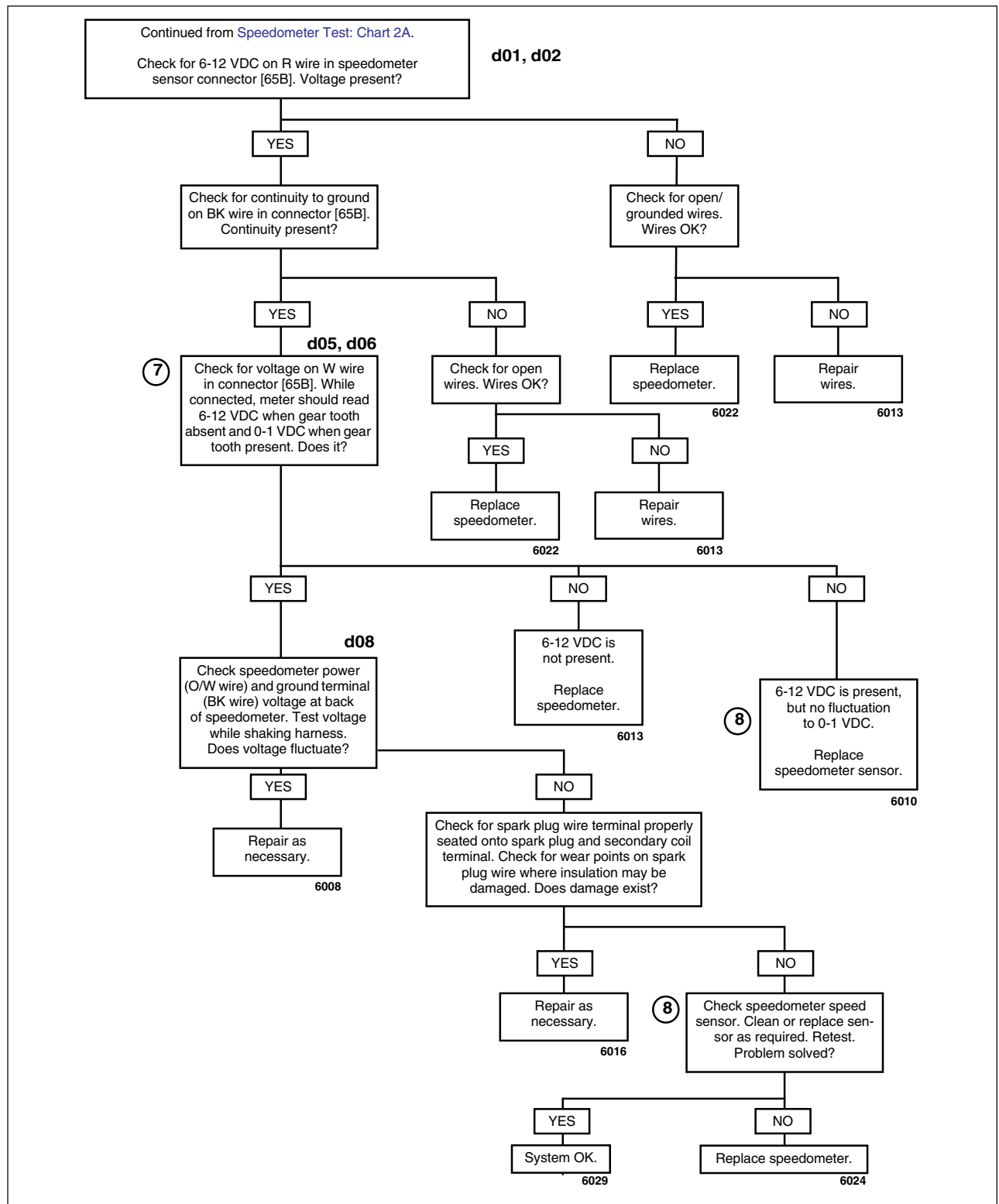


Figure 7-90. Speedometer Test Chart 2B

GENERAL

Indicators are Light Emitting Diodes (LEDs) located in the speedometer. LEDs are non-repairable. Replace the speedometer if an LED fails.

DIAGNOSTICS

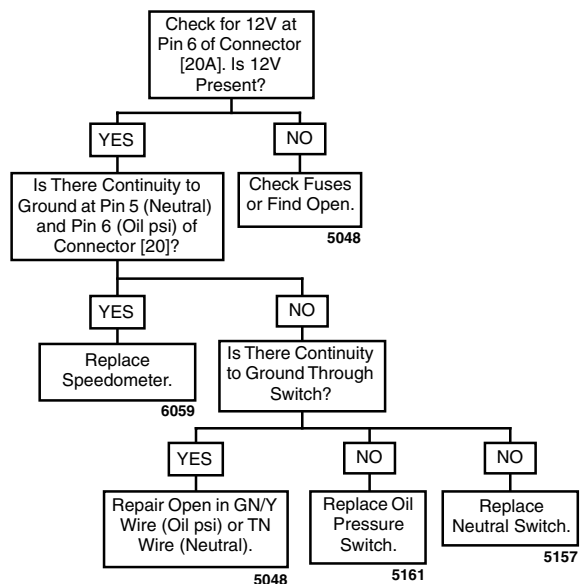
See diagnostic tables below.

Indicator Lights

Problem: Light(s) inoperative.

Follow the diagnostic flow charts below. If replacement is necessary, replace speedometer. See [7.25 ELECTRONIC SPEEDOMETER](#).

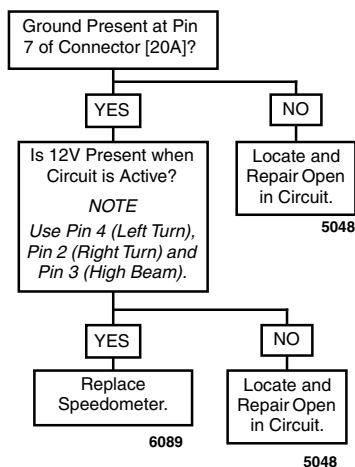
① Oil Pressure or Neutral Indicator Will Not Function



NOTE

Oil Pressure Indicator	Ground Through Switch
Neutral Indicator	Ground Through Switch
High Beam Indicator	12V When Active
R/L Turn Indicator	12V When Active

② High Beam or R/L Turn Signal Indicator Will Not Function



Instrument Connector [20]

Terminal	Wire Color	Indicator
1	Orange/White	Power
2	Brown	Right Turn
3	White	High Beam
4	Violet	Left Turn
5	Tan	Neutral
6	Green/Yellow	Oil Pressure
7	Black	Right/Left Turn/High Beam
8	Not Used	Not Used
9	Red	Sensor Power
10	White	Sensor Return
11	Black	Sensor Ground
12	Not Used	Not Used

Figure 7-91. Diagnostics

GENERAL

The main wiring harness runs from the front of the motorcycle (behind dash) to the rear of the frame tray under the seat where it connects to the tail lamp/turn signal mini-harness.

REMOVAL

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

WARNING

To prevent accidental vehicle start-up, which could cause death or serious injury, disconnect negative (-) battery cable before proceeding. (00048a)

WARNING

Disconnect negative (-) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00049a)

2. Disconnect battery cables, negative cable first.
3. Remove battery. See [7.16 BATTERY](#).
4. Remove fuel tank. See [4.2 FUEL TANK COVER/FUEL TANK](#).
5. Remove windscreen. See [2.26 WINDSCREEN](#).
6. Remove headlamp housing and disconnect connector [38]. See [7.17 HEADLAMP](#).
7. Note location of cable straps and cut three cable straps on frame backbone that secure main wiring harness to frame. Disconnect harness from T-studs.
8. Disconnect speedometer connector [39].
9. Disconnect right and left handlebar switch connectors [22] and [24], front brake switch blade connectors [170] and clutch switch connector [95].
10. Tag and disconnect right and left front turn signal bullet connectors.
11. Disconnect ignition switch connector [33].
12. Note location of cable strap and cut cable strap on horn wire and remove two blade connectors [122] from horn.

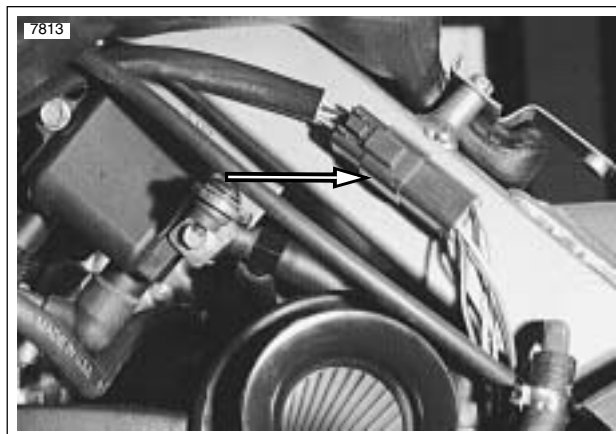


Figure 7-92. Ignition Connector [10]

13. See [Figure 7-92](#). Unhook connector [10] from the T-stud on the left side of the frame backbone.
14. Note location of cable strap and cut cable strap on ignition coil and TP sensor/auto-enrichener and ignition module harness.

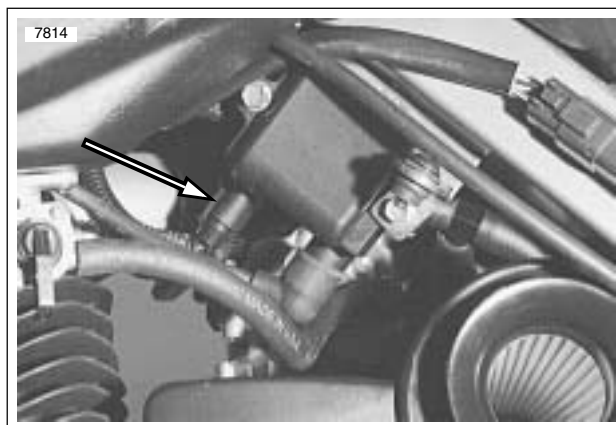


Figure 7-93. Coil Connector [83]

15. See [Figure 7-93](#). Disconnect ignition coil connector [83] at coil.

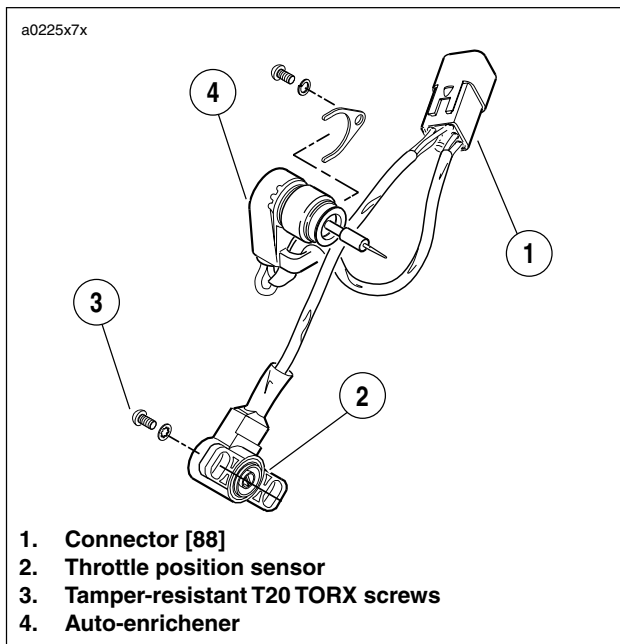


Figure 7-94. TP Sensor/Auto-Enrichener Connector [88]

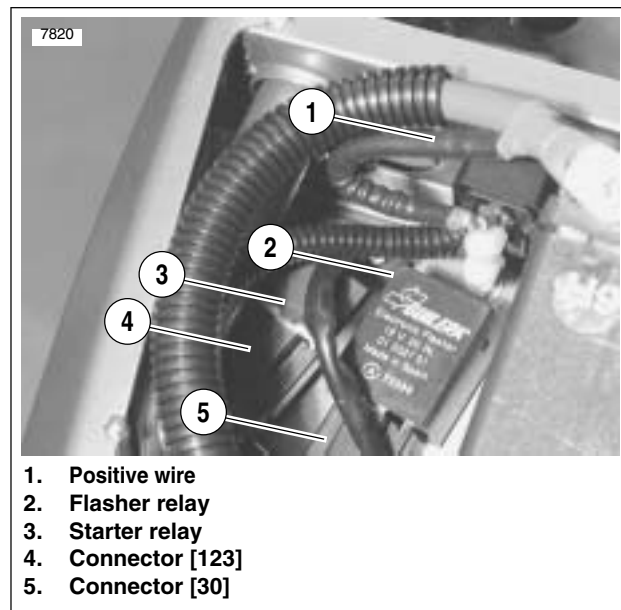


Figure 7-95. Flasher Relay Connector [30]

16. See [Figure 7-94](#). Disconnect TP sensor/auto-enrichener connector [88] under frame backbone.
17. Disconnect starter connector [128] at starter solenoid.
18. See [Figure 7-92](#). Disconnect ignition connector [10] on left side of frame backbone.
19. Feed harness through frame and upper tie bar mount.
20. Remove nut and clamp that secures oil hoses and wiring harness on right side of motorcycle.
21. Disconnect neutral switch bullet connector [172].
22. Disconnect speed sensor connector [65] located in frame tray on right side.
23. Disconnect sidestand switch connector [60] above swing arm.
24. Disconnect oil pressure switch connector [120].
25. Disconnect rear brake line switch connector [121] located above swingarm on right side of motorcycle.
26. See [Figure 7-95](#). Unplug flasher relay connector [30] and starter relay connector [123] located in frame tray on right hand side.
27. Unplug system relay connector [171] located in frame tray on left side.
28. See [Figure 7-95](#). Disconnect positive (+) wire from battery on circuit breaker (upper stud).
29. Disconnect tail lamp/turn signal mini harness connector [7] located under seat.
30. Unhook fuse block.
31. Note location, and cut two cable straps on wire to frame and wire on voltage regulator mount. Disconnect voltage regulator wire and wire attached to frame.
32. Pull main wiring harness out through rear of frame.

INSTALLATION

1. Feed main wiring harness through frame from back to front.
2. See [Figure 7-95](#). Connect flasher relay connector [30] to flasher relay and starter relay connector [123] to starter relay.

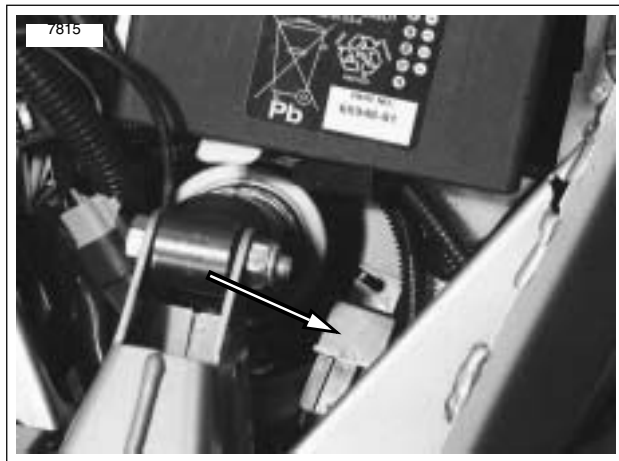


Figure 7-96. System Relay

3. See [Figure 7-96](#). Connect system relay connector [171] to system relay.
4. Install fuse block.
5. Connect positive (+) wire to circuit breaker. Tighten metal nut to 15-18 **in-lbs** (1.7-2 Nm). Tighten plastic acorn nut to 1-3 **in-lbs** (0.1-0.3 Nm).
6. Feed negative (-) wire across frame and connect to voltage regulator mount and frame. Use two cable straps to secure wires.

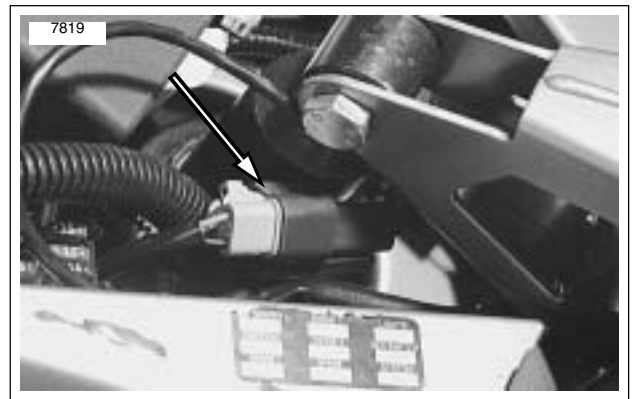


Figure 7-97. Speed Sensor Connector [65]

7. See [Figure 7-97](#). Mate speed sensor connector [65]. Tuck excess harness into right frame pocket.
8. Connect two blade terminals to stoplight switch above swingarm.
9. Mate sidestand switch connector [60] located above swingarm cable strap wires.
10. Install starter connector [128] located under starter solenoid.
11. Install neutral switch bullet connector [172].
12. Install oil pressure switch connector [120] to oil pressure switch. Route wire around oil pump.
13. Install hose clamp around hoses and oil pressure switch and neutral switch wires. Secure clamp with **new** locknut.
14. Attach main wiring harness to T-studs.
15. Feed wire harness through upper tie bar mount in two bundles.

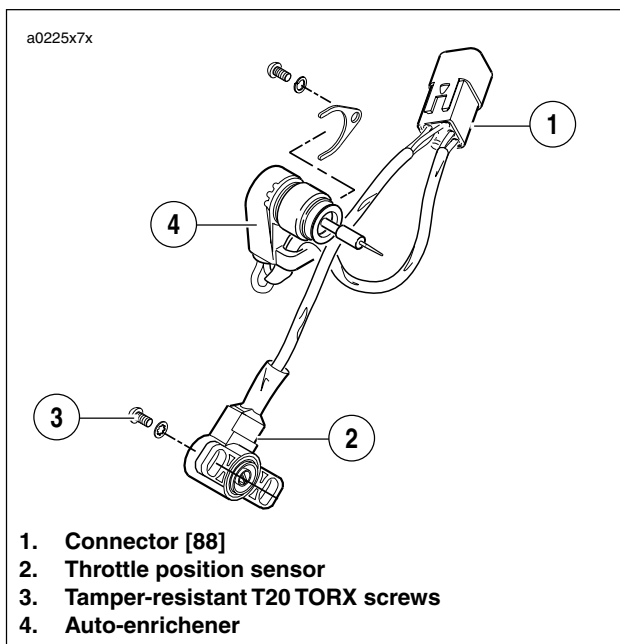


Figure 7-98. TP Sensor/Auto-Enrichener Connector [88]

16. See [Figure 7-98](#). Mate TP sensor/auto-enrichener connector [88] and secure with cable strap.
17. Install connector [83] to coil and secure with cable strap.
18. See [Figure 7-92](#). Mate ignition module connector [10] and attach to T-stud on left side of frame backbone.
19. Feed longer bundle at front through frame hole to left side of motorcycle. Attach harness to T-stud.
20. Hook right side of harness to two T-studs on right side of motorcycle.
21. Mate right handlebar switch connector [22], front brake lamp switch connector [170]. Secure wires with cable straps.
22. Mate left handlebar switch connector [24] and clutch switch connector [95]. Secure wires with cable straps.
23. Connect speedometer connector [39].
24. Mate ignition switch connector [33].
25. Install left and right front turn signal bullet connectors as marked during removal.

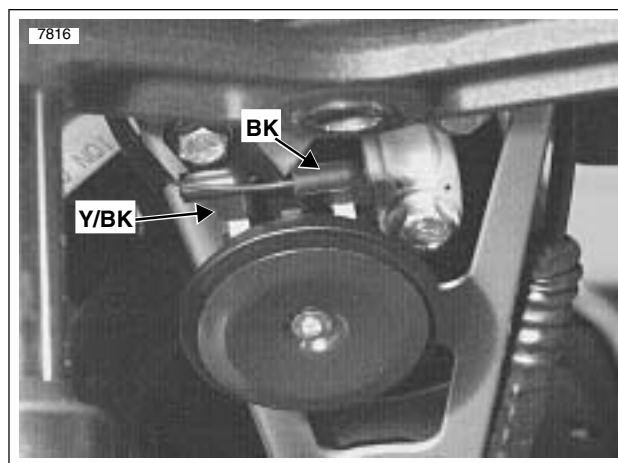


Figure 7-99. Horn Connector [122]

26. See [Figure 7-99](#). Feed horn wires through frame hole on right side and install connector [122] to horn. Cable strap wires to isolator mount.
27. Cable strap main wiring harness to frame backbone with three cable straps.
28. Connect headlamp connector [38] and install headlamp housing. See [7.17 HEADLAMP](#).
29. Install windscreen. See [2.26 WINDSCREEN](#).
30. Install fuel tank. [4.2 FUEL TANK COVER/FUEL TANK](#).

⚠ WARNING

Connect positive (+) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00068a)

31. Install battery and reconnect battery cables, positive cable first. See [7.16 BATTERY](#).

⚠ WARNING

After installing seat, pull upward on front of seat to be sure it is in locked position. While riding, a loose seat can shift causing loss of control, which could result in death or serious injury. (00070a)

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

⚠ WARNING

Be sure that all lights and switches operate properly before operating motorcycle. Low visibility of rider can result in death or serious injury. (00316a)

33. Check for proper operation of headlamp, turn signals, brake lamp and starting, charging and ignition systems.