

15. Charging System/Alternator

| | | | |
|------------------------------|------|---------------------------------|------|
| Service Information | 15-1 | Charging System Inspection | 15-5 |
| System Location | 15-2 | Regulator/Rectifier Inspection | 15-6 |
| Troubleshooting | 15-3 | Alternator Inspection | 15-7 |
| Battery Removal/Installation | 15-4 | Alternator Removal/Installation | 15-8 |

Service Information

⚠ WARNING

- The battery gives off explosive gases; keep sparks, flames, and cigarettes away. Provide adequate ventilation when charging or using the battery in an enclosed space.
- The battery contains sulfuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.
 - If electrolyte gets on your skin, flush with water.
 - If electrolyte gets in your eyes, flush with water for at least 15 minutes and call a physician immediately.
- Electrolyte is poisonous. If swallowed, drink large quantities of water or milk and follow with milk of magnesia or vegetable oil and call a physician.
- **KEEP OUT OF REACH OF CHILDREN.**

- Always turn off the ignition switch before disconnecting any electrical component.

CAUTION

- Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is ON and current is present.

- For extended storage, remove the battery, give it a full charge, and store it in a cool, dry place.
- For battery remaining in a stored motorcycle, disconnect the negative battery cable from the battery terminal.

NOTE

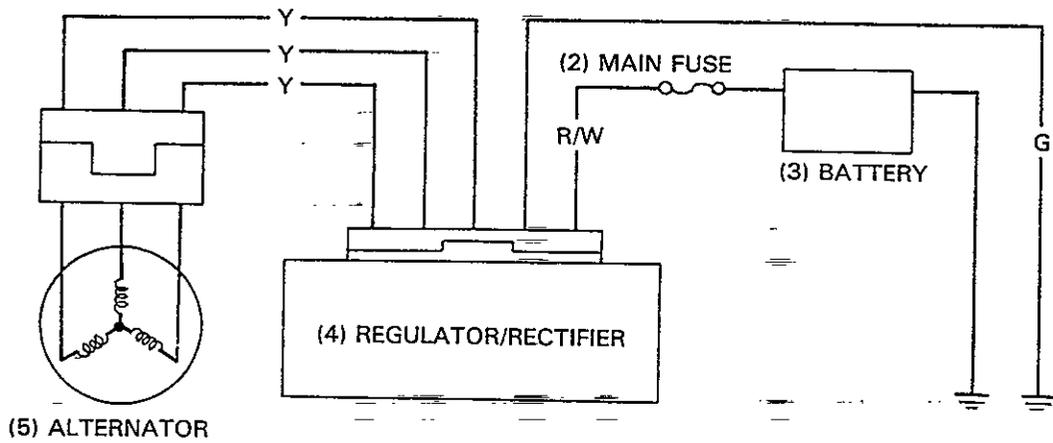
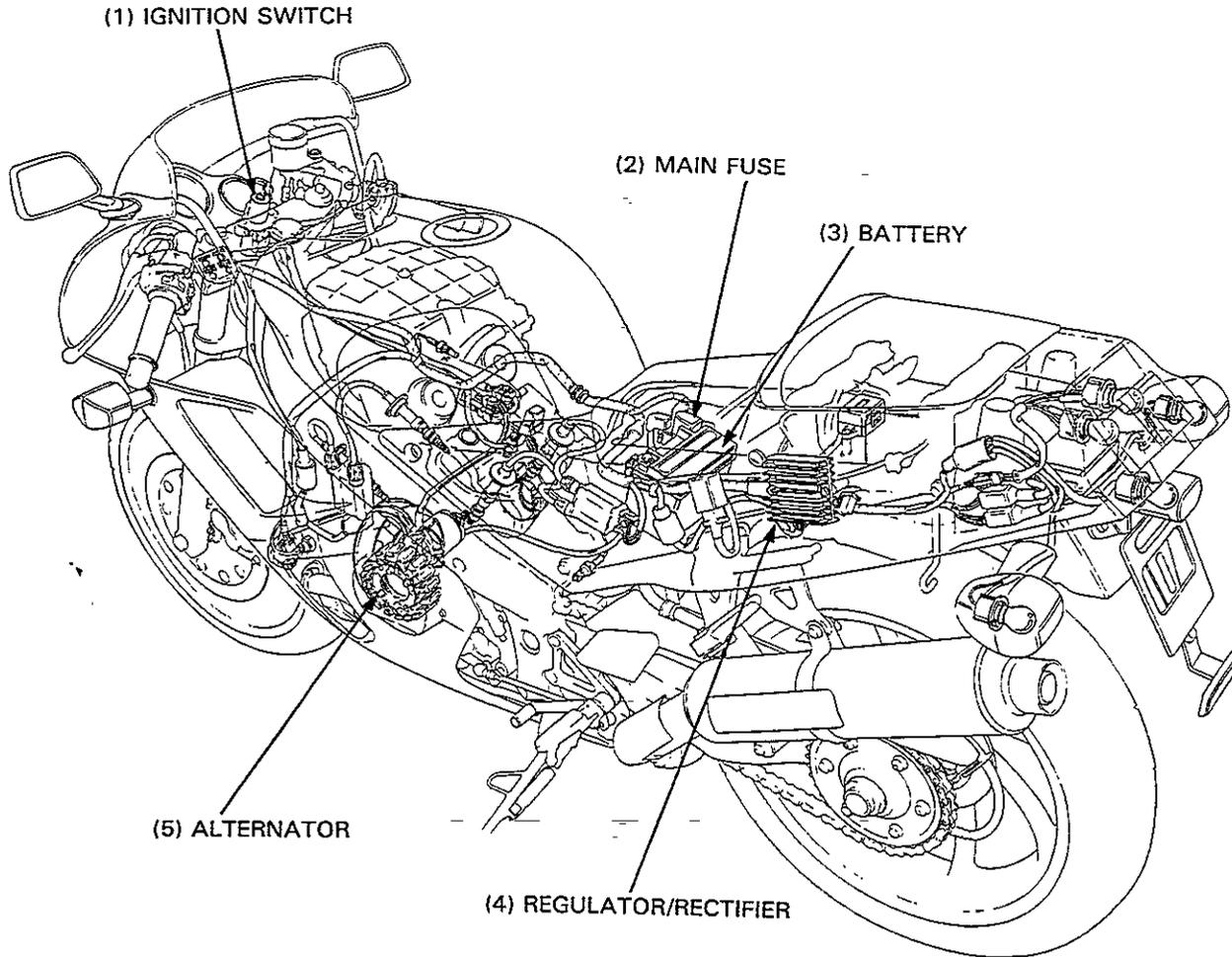
- The maintenance free battery must be replaced when it reaches the end of its service life.

CAUTION

- The battery caps should not be removed. Attempting to remove the sealing caps from the cells may damage the battery.

- Battery can be damaged if overcharged or undercharged, or if left to discharge for long periods. These same conditions contribute to shortening the "life span" of the battery. Even under normal use, the performance of battery deteriorates after 2–3 years.
- Battery voltage may recover after battery charging, but under heavy load, battery voltage will drop quickly and eventually die out. For this reason, the charging system is often suspected to be the problem. Battery overcharge often results from problems in the battery itself, which may appear to be an overcharge symptom. If one of the battery cells is shorted and battery voltage does not increase, the regulator/rectifier supplies excess voltage to the battery. Under these conditions, the electrolyte level goes down quickly.
- Before troubleshooting the charging system, check for proper use and maintenance of the battery. Check if the battery is frequently under heavy load, such as having the headlight and taillight ON for long periods of time without riding the motorcycle.
- The battery will self-discharge when the motorcycle is not in use. For this reason, charge the battery every two weeks to prevent sulfation from forming.
- Filling a new battery with electrolyte will produce some voltage, but in order to achieve its maximum performance, always charge the battery. Also, the battery life is lengthened when its is initial-charged.
- When checking the charging system, always follow the steps in the troubleshooting flow chart (page 15-3).
- For battery testing/charging, refer to section 22 of the Common Service Manual.
- For charging system location, see page 15-2.

System Location



T
B
E
I

Troubleshooting

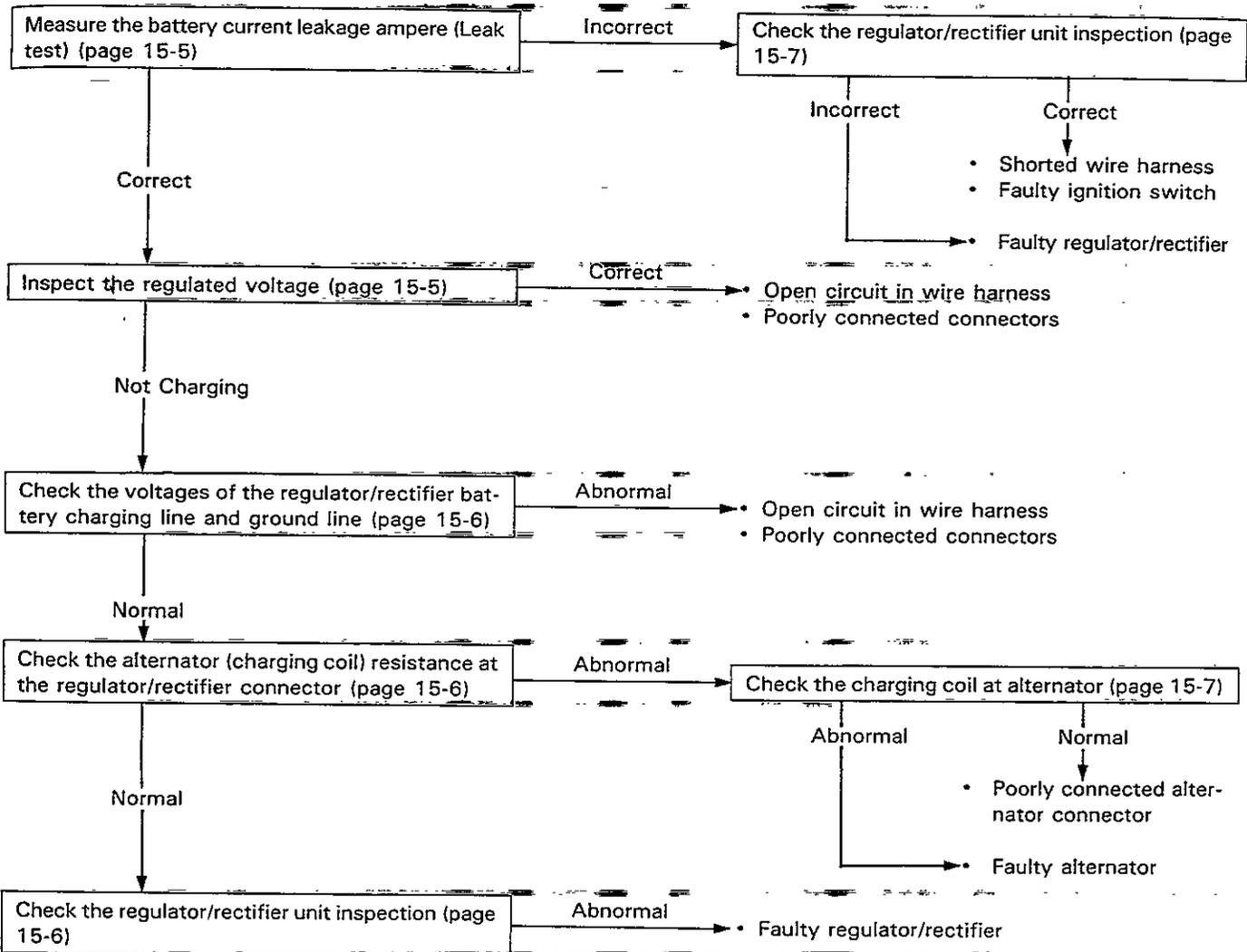
Battery Overcharging

- Faulty regulator/rectifier

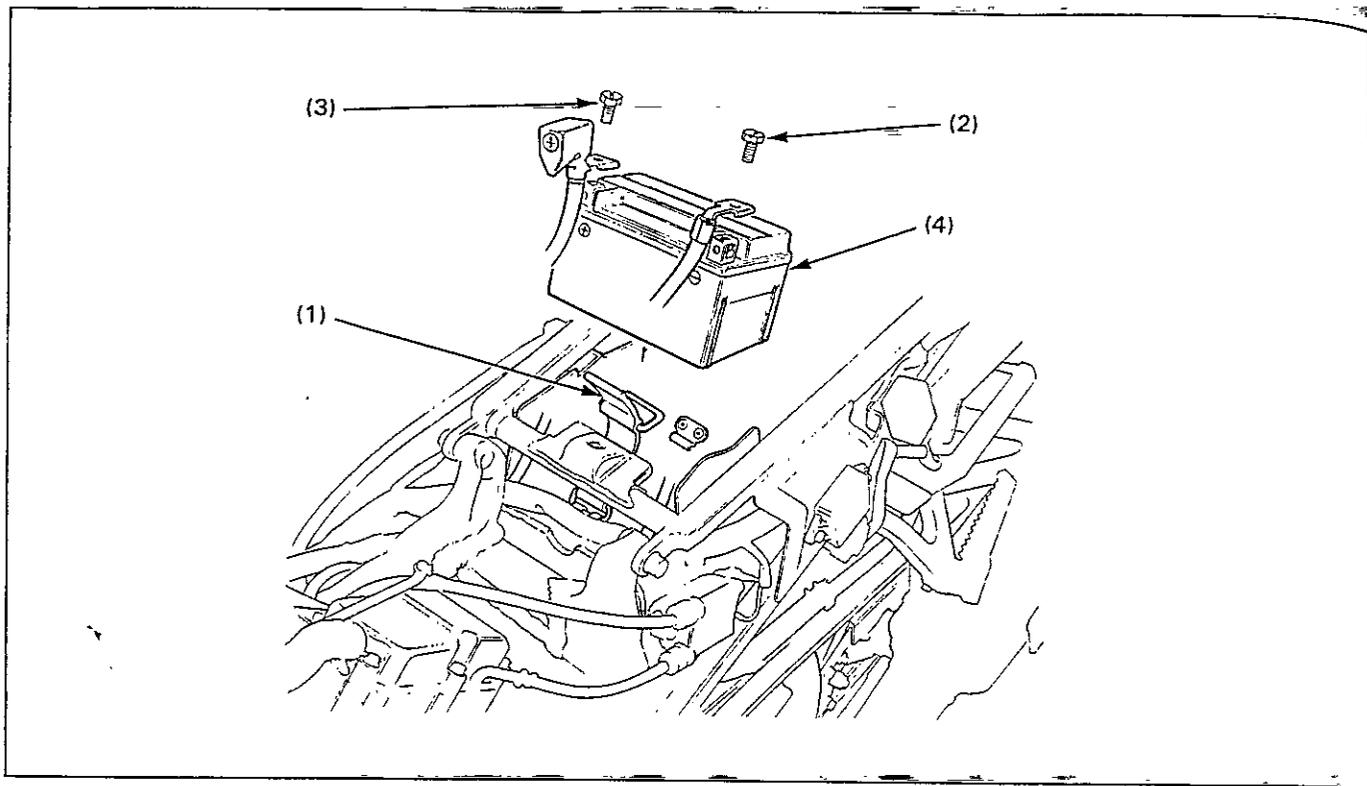
Battery Undercharging

NOTE

• In order to obtain accurate test readings when charging system, the battery must be fully charged and in good condition. See Common Service Manual section 22 for check the battery condition.



Battery Removal/Installation



CAUTION

- Turn the ignition switch off.

Requisite Service

- Seat cowling removal/installation (page 2-2)

| Procedure | | Q'ty | Remarks |
|-----------|----------------------|------|---|
| | Removal Order | | Installation is in the reverse order of removal. |
| (1) | Battery holder band | 1 | Remove the bolt and disconnect the cable. NOTE • At installation, connect the positive (+) cable first, apply grease and cover the terminal. |
| (2) | Negative (-) cable | 1 | |
| (3) | Positive (+) cable | 1 | |
| (4) | Battery | 1 | |

Charging System Inspection

Leak Test

Remove the seat cowling (page 2-2).
Turn the ignition switch off, and disconnect the negative (-) cable from the battery.

Connect the ammeter (+) probe to the negative (-) cable and the ammeter (-) probe to the battery negative (-) terminal.

With the ignition switch off, check for current leakage.

NOTE

- When measuring current using a tester, set it to a high range, and then bring the range down to an appropriate level. Current flow larger than the range selected may blow out the fuse in the tester.
- While measuring current, do not turn the ignition on. A sudden surge of current may blow out the fuse in the tester.

Specified current leakage: 1 mA

If current leakage exceeds the specified value, a shorted circuit is likely.
Locate the short by disconnecting connections one by one and measuring the current.

Regulated Voltage/Ampere Inspection

NOTE

- Before performing this test, be sure that the battery is fully charged and that the voltage between its terminals is greater than 12.8 V.

Start the engine and warm it up to operating temperature, then turn the ignition switch OFF.
Remove the seat cowling (page 2-2).

Connect the multitester between the battery terminals.

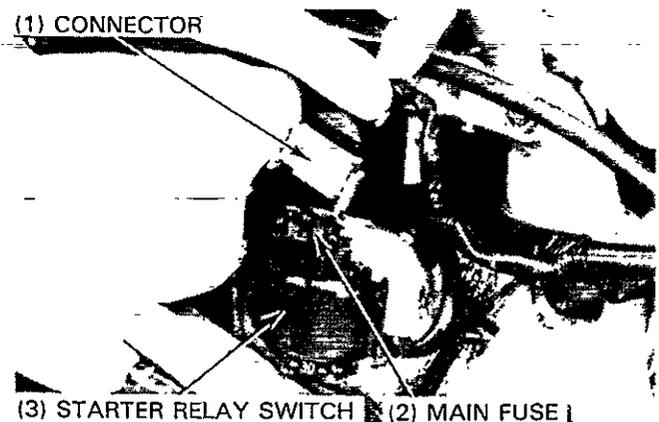
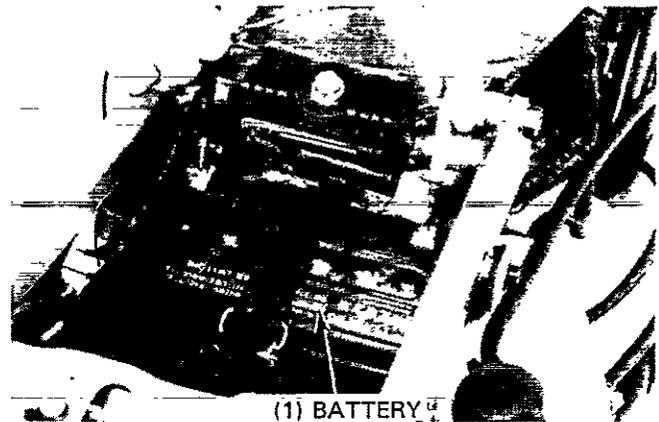
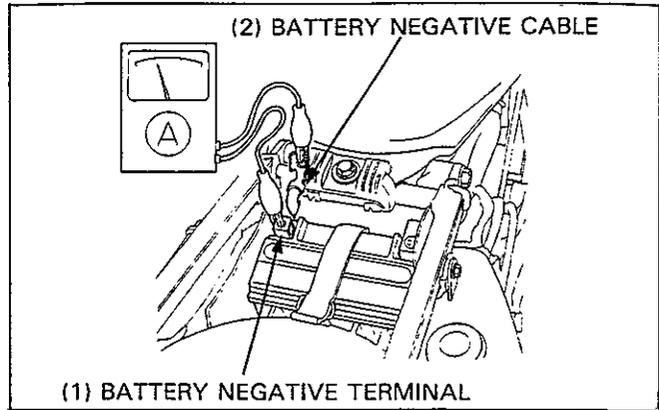
5 TOOL

Digital multitester 07411-0020000

⚠ WARNING

- If the engine must be running to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area.
- The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and lead to death.

Disconnect the starter relay switch connector and remove the main fuse.
Reconnect the connector securely.



Charging System/Alternator

Connect the ammeter between the main fuse terminals.

CAUTION

- Be careful not to short any tester probes.
- Although the current could be measured when the ammeter is connected between the battery positive terminal and positive cable, a sudden surge of current to the starter motor could damage the ammeter.
- Always turn the ignition switch off when connecting and disconnecting the ammeter. Disconnecting the ammeter or wires when current is flowing may damage the ammeter.

Start the engine and increase the engine speed gradually.

Regulated voltage: 13.5–15.5 V/5,000 min⁻¹ (rpm)

Regulated current: 0–9 A/5,000 min⁻¹ (rpm)

Regulator/Rectifier Inspection

Wire Harness Inspection

Remove the seat cowling (page 2-2).

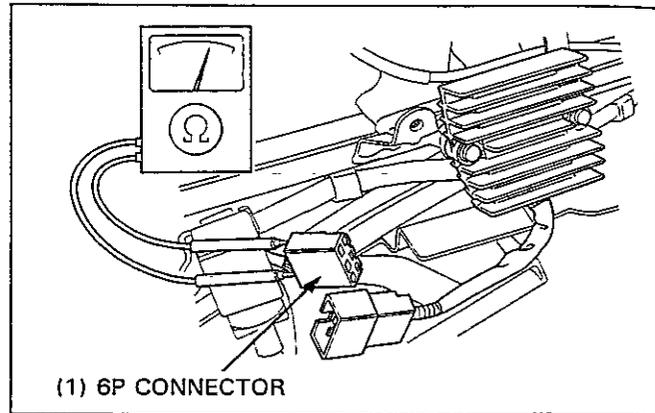
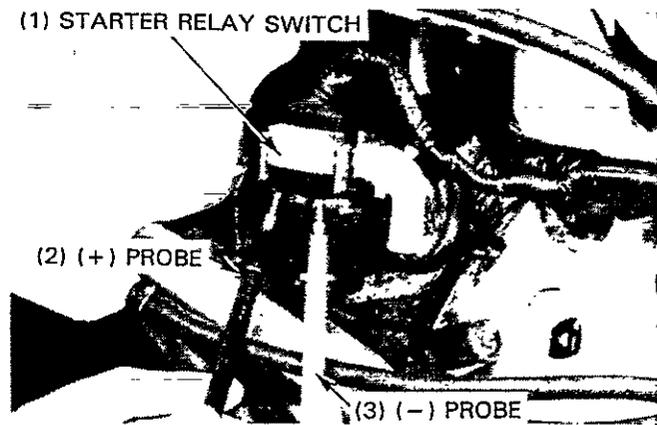
Disconnect the 6P (white) connector from the regulator/rectifier and check it for loose or corroded terminals.

Measure the following between connector terminals of the wire harness side.

| Item | Terminals | Specification |
|-----------------------|------------------------------|----------------------------------|
| Battery charging line | Red/white (+) and ground (-) | Battery voltage should register. |
| Ground line | Green and ground | Continuity exist. |
| Charging coil line | Yellow and yellow | 0.1–1.0 Ω (20°C/68°F) |

If the charging coil line reading is out of specification, check the alternator (page 15-7).

(1) STARTER RELAY SWITCH



Unit Inspection

The circuits on the wire harness side are normal and there are no loose connections at the connector, inspect the regulator/rectifier unit by measuring the resistance between the terminals.

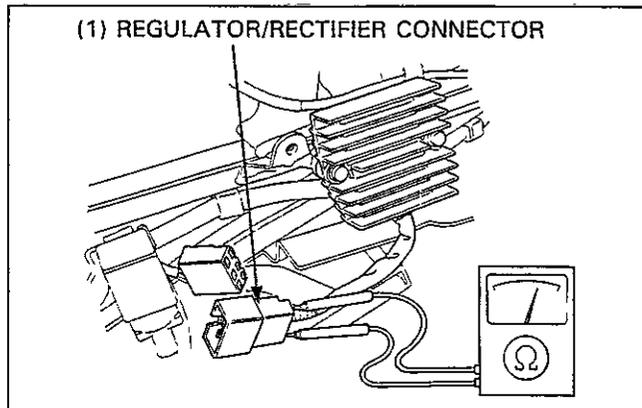
NOTE

- You'll get false readings if the probes touch your fingers.
- Use the specified multitesters. Using other equipment may not allow you to obtain the correct results. This is due to the characteristic of semiconductors, which have different resistance values depending on the applied voltage.

Specified multitester

- 07411-0020000 (KOWA Digital type)
- 07308-0020001 (SANWA Analogue type)
- TH-5H (KOWA Analogue type)

- Select the following range:
SANWA: kΩ
KOWA: x 100Ω
- An old battery stored in the multitester could cause inaccurate readings. Check the battery if the multitester registers incorrectly.
- When using the KOWA multitester, remember that all readings should be multiplied by 100.



Replace the regulator/rectifier unit if the resistance value between the terminals is abnormal.

Ω

| ⊕ probe | Red/white | Yellow | Yellow | Yellow | Green |
|-----------|-----------|----------|----------|----------|----------|
| ⊖ probe | | | | | |
| Red/white | | ∞ | ∞ | ∞ | ∞ |
| Yellow | 0.5-10K | | 30K-500K | 30K-500K | 10K-200K |
| Yellow | 0.5-10K | 30K-500K | | 30K-500K | 10K-200K |
| Yellow | 0.5-10K | 30K-500K | 30K-500K | | 10K-200K |
| Green | 1K-20K | 0.5-10K | 0.5-10K | 0.5-10K | |

Alternator Inspection

NOTE

- It is not necessary to remove the stator coil to make this test.

Remove the seat cowling (page 2-2).

Disconnect the alternator 3P (white) connector.

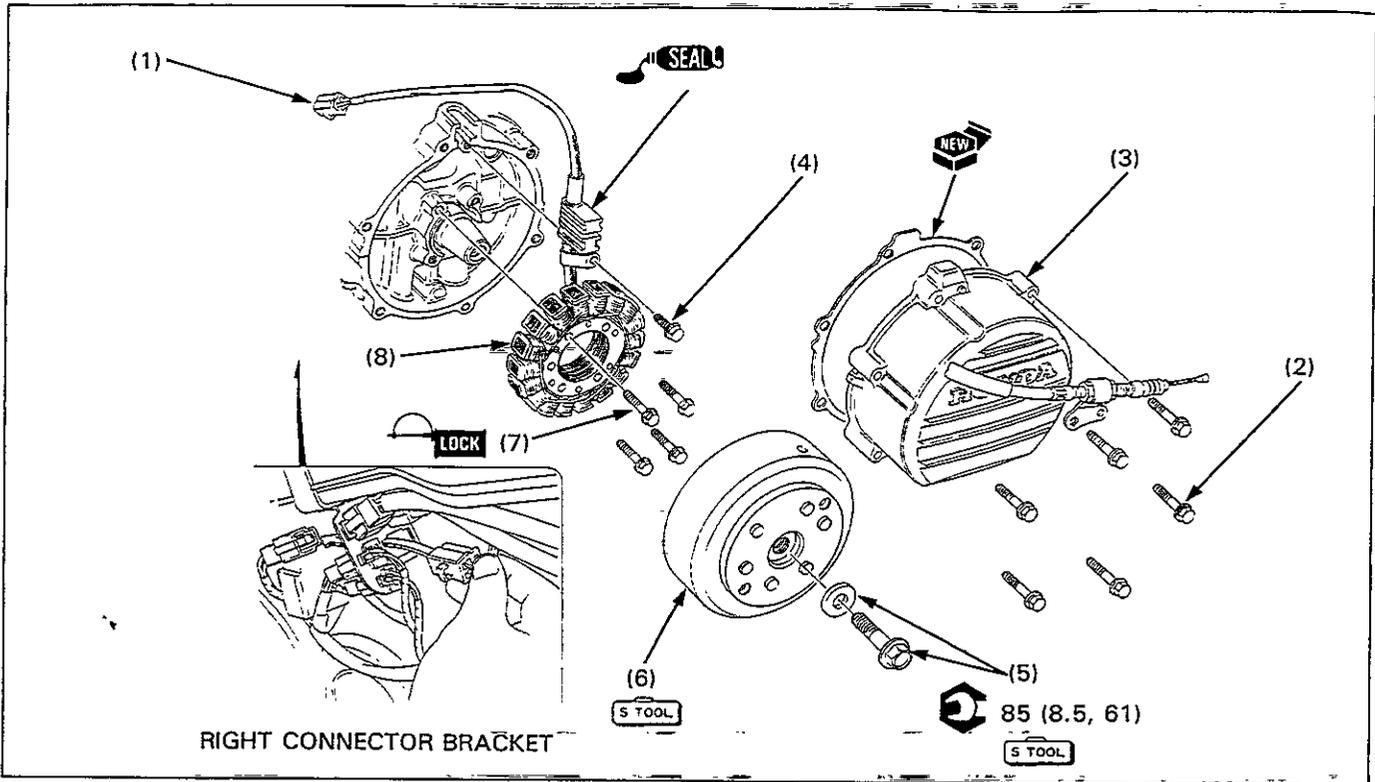
Measure the resistance between the yellow wire terminals and check for no continuity between each terminal and ground.

Standard: 0.1-1.0 Ω (20°C/68°F)

Replace the stator if the resistance is out of specification or if there is continuity between any yellow wire terminal and ground.



Alternator Removal/Installation



NOTE

- The engine oil will spill out when the left crankcase cover is removed. Place a clean oil pan under the engine to catch the oil and add the recommended oil to the specified level after installing the cover.

Requisite Service

- Lower fairing removal/installation (page 2-4)

| Procedure | Q'ty | Remarks |
|-------------------------------|------|--|
| Removal Order | | Installation is in the reverse order of removal. |
| (1) Alternator wire connector | 1 | Disconnect the connector. |
| (2) Left crankcase cover bolt | 6 | |
| (3) Left crankcase cover | 1 | |
| (4) Wire clamp/bolt | 1/1 | |
| (5) Flywheel bolt/washer | 1/1 | Hold the flywheel with the universal holder (07725-0030000) and remove the bolt. Use the rotor puller (07733-0020001). |
| (6) Flywheel | 1 | |
| (7) Stator mounting bolt | 4 | |
| (8) Stator | 1 | |

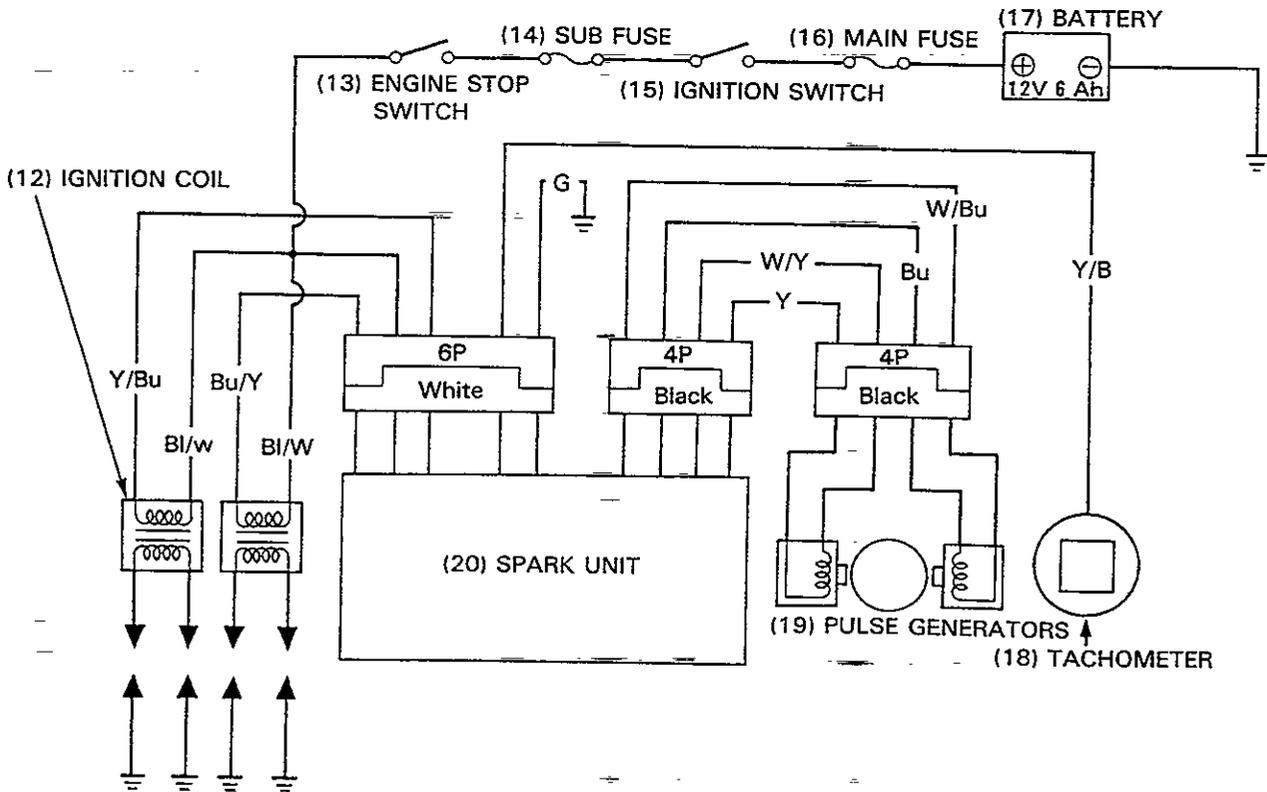
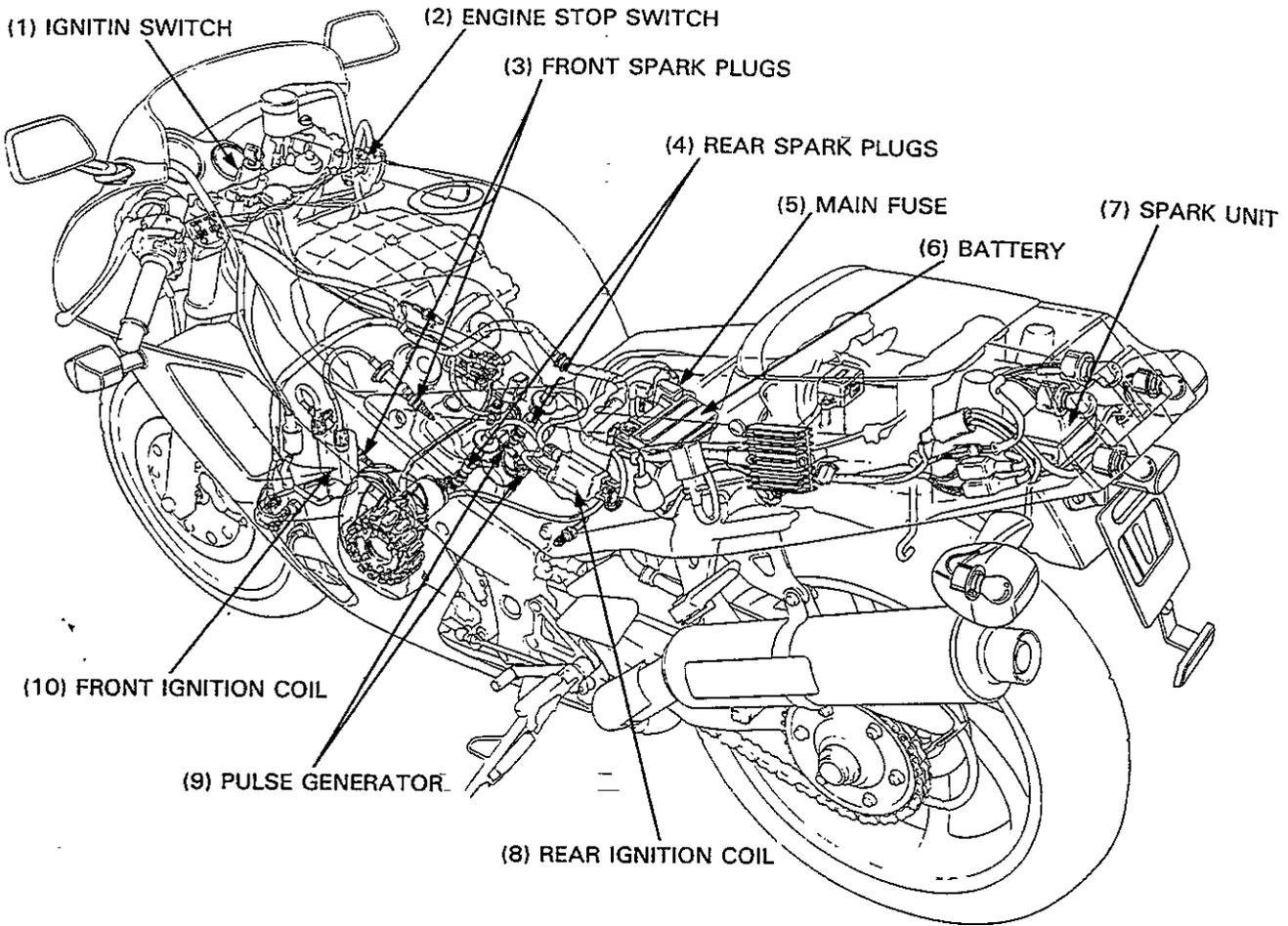
16. Ignition System

| | | | |
|----------------------------|------|---|------|
| Service Information | 16-1 | Pulse Generator Inspection | 16-6 |
| System Location | 16-2 | Ignition Timing | 16-7 |
| Troubleshooting | 16-3 | Pulse Generator Removal/Installation | 16-8 |
| Ignition System Inspection | 16-4 | | |
| Ignition Coil Inspection | 16-6 | | |

Service Information

- The digital transistorized ignition system uses an electrically controlled ignition timing system. No adjustments can be made to the ignition timing.
- A rough diagnosis can be made by identifying the cylinder whose spark timing is incorrect.
- The spark unit may be damaged if dropped. Also, if the connector is disconnected when current is flowing, the excessive voltage may damage the unit. Always turn off the ignition switch before servicing.
- A faulty ignition system is often related to poorly connected connectors. Check those connections before proceeding.
- Make sure the battery is adequately charged. Using the starter motor with a weak battery results in a slower engine cranking speed as well as no spark at the spark plugs.
- Use spark plugs of the correct heat range. Using spark plugs with an incorrect heat range can damage the engine. Refer to section 2 of the Common Service Manual.
- For the ignition switch and engine stop switch inspection, check for continuity on the continuity chart of the Wiring Diagram, page 19-1. Disconnect the ignition and engine stop switch connectors on the right connector bracket (page 1-24) and check them.

System Location



Troubleshooting

- Before troubleshooting, check that no spark jumps at the spark plug using a known good spark plug (to ensure that the plug does not cause the problem).
Moreover, check for proper spark plug gap and loose spark plug wire as well as for leakage of the ignition coil secondary current caused by moisture.
- If no spark jumps at one part of the ignition system, exchange the ignition coil with the other good one and perform the spark test. If good sparks jump, the exchanged ignition coil is faulty.
- As for peak voltage inspection, first measure the primary coil voltage of the ignition coil. If the voltage is abnormal, check each item in numerical order in the "Probable Cause" column described on the Troubleshooting chart.
- "Initial voltage" of the ignition primary coil is the voltage measured with the ignition switch ON and engine stop switch at RUN (when the engine is not cranking with the starter motor).

No Spark At All Plugs

| Unusual condition | | Probable cause (Check in numerical order) |
|-------------------------------|---|--|
| Ignition coil primary voltage | No initial voltage with the ignition switch ON and engine stop switch at RUN. (Other electrical components are normal.) | <ol style="list-style-type: none"> 1. Faulty engine stop switch. 2. Open circuit in BI/W wire between the ignition coil and engine stop switch. 3. Loose or poor connection of the ignition coil primary wire terminal or open circuit in primary coil. 4. Faulty spark unit, when the initial voltage is normal with the spark unit connectors disconnected. |
| | Initial voltage is normal, but it drops by 2–4 volts while cranking the engine. | <ol style="list-style-type: none"> 1. Incorrect peak voltage adaptor connections. 2. Battery is undercharged. (Voltage drops largely when the engine is started.) 3. No voltage at BI/W wire of the spark unit 6P white connector, or loose or poorly connected spark unit connector. 4. Poor connection or open circuit in G wire of the spark unit 6P white connector. 5. Loose or poor connection, or open circuit in Y/Bu or Bu/Y wire between the ignition coil and spark unit. 6. Short circuit in the ignition primary coil. 7. Faulty pulse generator. (Measure the peak voltage.) 8. Faulty spark unit (when above No. 1–7 are normal). |
| | Initial voltage is normal, but no peak voltage exists while cranking the engine. | <ol style="list-style-type: none"> 1. Incorrect peak voltage adaptor connections. 2. Faulty peak voltage adaptor. 3. Faulty spark unit (when above No. 1 and 2 are normal). |
| | Initial voltage is normal, but peak voltage is lower than the standard value. | <ol style="list-style-type: none"> 1. The multimeter impedance is too low. 2. Cranking speed is too slow. (Battery is undercharged.) 3. The sample timing of the tester and measured pulse were not synchronized. (System is normal if measured voltage is over the standard voltage at least once.) 4. Faulty spark unit (when above No. 1–3 are normal). |
| | Initial voltage and peak voltage are normal, but no spark jumps at plug. | <ol style="list-style-type: none"> 1. Faulty spark plug or leaking ignition coil secondary current ampere. 2. Faulty ignition coil. |
| Pulse generator | Peak voltage is lower than the standard value. | <ol style="list-style-type: none"> 1. The multimeter impedance is too low. 2. Cranking speed is too slow. (Battery is undercharged.) 3. The sample timing of the tester and measured pulse were not synchronized. (System is normal if measured voltage is over the standard voltage at least once.) 4. Faulty pulse generator (when above No. 1–3 are normal). |
| | No peak voltage. | <ol style="list-style-type: none"> 1. Faulty peak voltage adaptor. 2. Faulty pulse generator. |

Ignition System Inspection

NOTE

- If no spark jumps at all plugs, check all connections for loose or poor contact before measuring each peak voltage.
- The reading differs depending on the multimeter input impedance. Use only genuine digital multimeter or commercially available multimeter with the input impedance higher than 10 M Ω /DCV.

Connect the peak voltage adaptor to the digital multimeter.

TOOL

Peak voltage adaptor 07HGJ-0020100
Digital multimeter 07411-0020000

Ignition Coil Primary Voltage Inspection

Ignition Coil Primary Voltage Inspection

NOTE

- Check all system connections before this inspection. Poor connected connectors can cause incorrect readings.
- Make sure that all cylinder compressions are normal and check that the spark plugs are installed correctly in all cylinders.

Place the motorcycle on its side stand and shift the transmission into neutral.

Remove the seat cowling (page 2-2) and the lower fairing (page 2-4).

Disconnect all spark plug caps from the spark plugs. Leave the spark plugs installed in all cylinder heads, install good known spark plugs into the spark plug caps and ground them to the engine.

NOTE

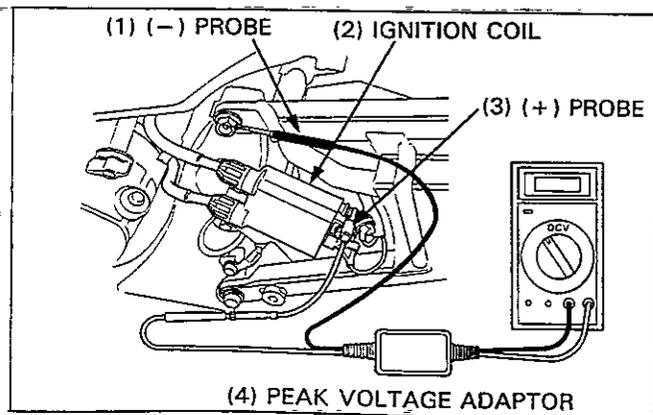
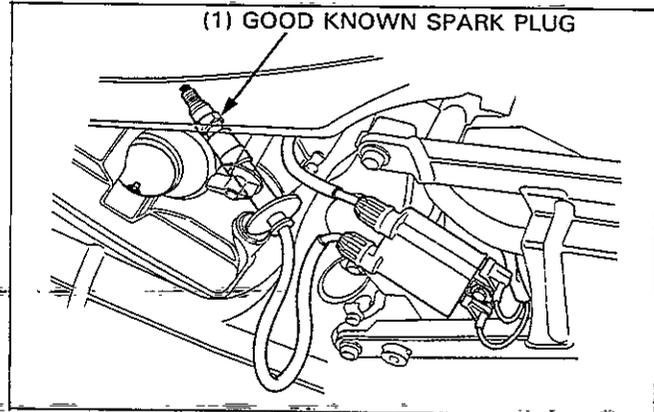
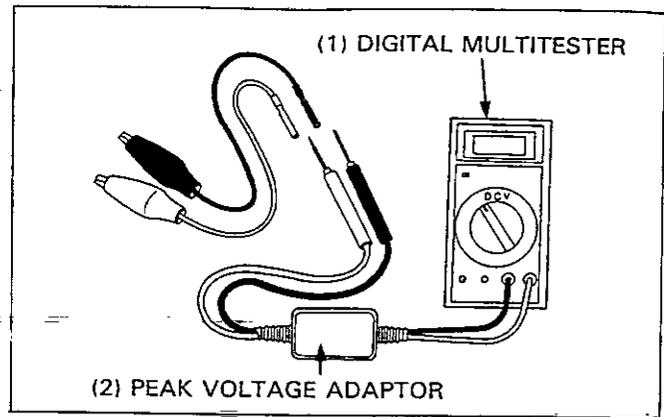
- The peak voltage must be measured under the normal cylinder compressions and with the ignition secondary circuits closed.

Connect the peak voltage adaptor probes between the primary ignition coil terminal and ground with the connector connected.

Connection:

Front ignition coil: Bu/Y terminal (+) and ground (-)
Rear ignition coil: Y/Bu terminal (+) and ground (-)

Turn the ignition switch ON and engine stop switch to RUN position, and measure the initial voltage. The battery voltage should be registered.



Measure the ignition coil primary peak voltage while cranking the engine with the starter motor.

Connection:

- Front ignition coil: Bu/Y terminal (+) and ground (-)
- Rear ignition coil: Y/Bu terminal (+) and ground (-)

Peak voltage: 140 V minimum

⚠ WARNING

- To avoid possible electrical shock during voltage measurements, do not touch the tester probe metal parts.

NOTE

- As long as the measured voltage exceed the specified value, the system is normal.

Pulse Generator Peak Voltage Inspection

NOTE

- The peak voltage must be measured with all spark plugs installed in the cylinder heads and under normal cylinder compression.

Remove the seal cowling (page 2-2).

Disconnect the spark unit 4P black connector.
Connect the peak voltage adaptor probes to the pulse generator wire terminals of the wire harness side connector.

Connection:

- Pulse generator 1: W/Y terminal (+) and Y terminal (-)
- Pulse generator 2: W/Bu terminal (+) and Bu terminal (-)

Measure the pulse generator peak voltage while cranking the engine with the starter motor.

Peak voltage: 1.8V minimum

⚠ WARNING

- To avoid possible electrical shock during voltage measurements, do not touch the tester probe metal parts.

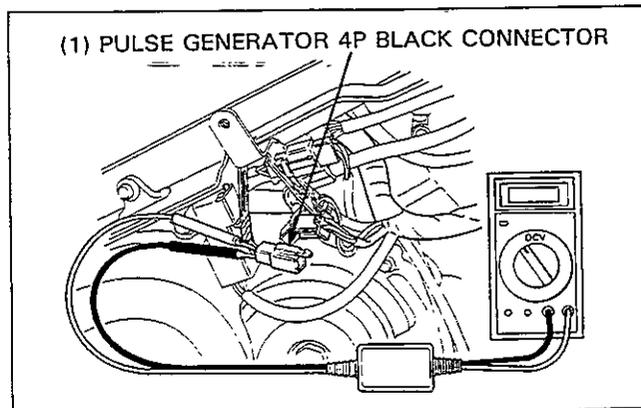
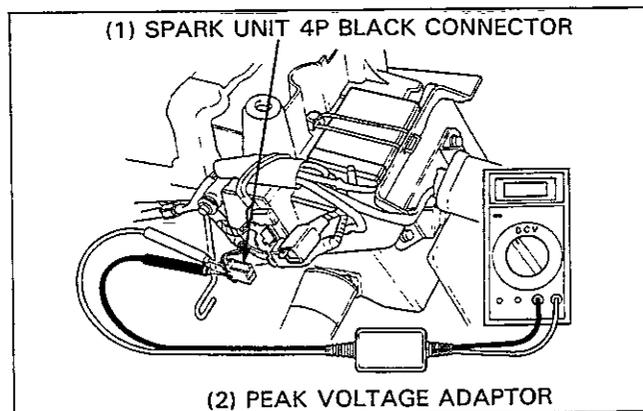
If the peak voltage is abnormal, disconnect the pulse generator 4P black connector on the right connector bracket (page 1-24).

Connect the peak voltage adaptor probes to the pulse generator wire terminals.

Connection:

- Pulse generator 1: W/Y terminal (+) and Y terminal (-)
- Pulse generator 2: W/Bu terminal (+) and Bu terminal (-)

Measure the pulse generator peak voltage while cranking the engine with the starter motor.



Ignition System

If the peak voltage measured at the spark unit is abnormal and the one measured at the pulse generator wire connector is normal, the wire harness has an open circuit or loose connection.

NOTE

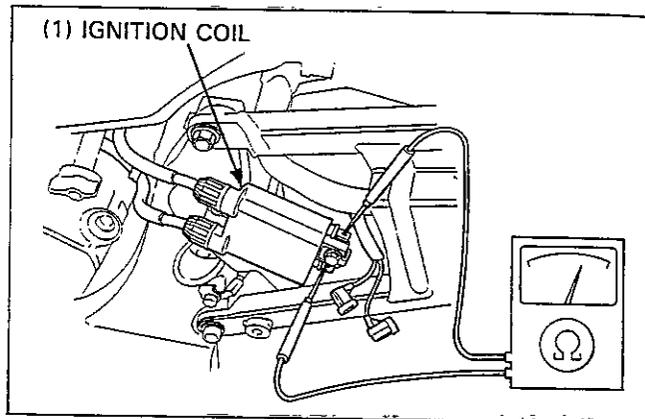
- As long as the measured voltage exceeds the specified value, the system is normal.

Ignition Coil Inspection

Remove the seat cowling (page 2-2) and the lower fairing (page 2-4).

Disconnect the primary wire connectors and measure the primary coil resistance between the terminals.

Standard: 2.5 – 3.5 Ω (20°C/68°F)

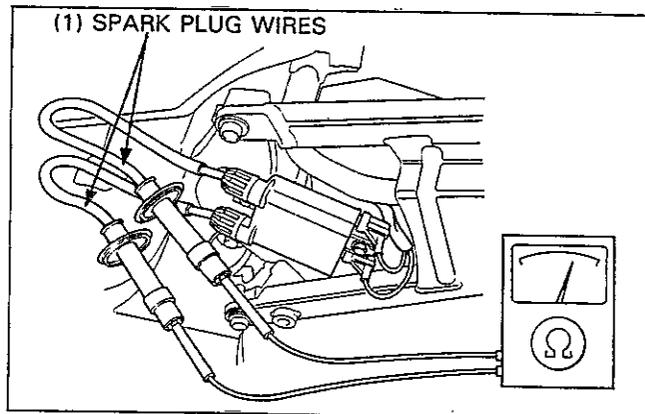


Remove the spark plug caps from the plugs and measure the secondary coil resistance between the spark plug caps.

Standard: 14 – 25 k Ω (20°C/68°F)

If the resistance is out of range, remove the ignition coil, remove the spark plug wires from the ignition coil and measure the secondary coil resistance.

Standard: 11 – 14 k Ω (20°C/68°F)



Pulse Generator Inspection

NOTE

- It is not necessary to remove the pulse generator to make this inspection.

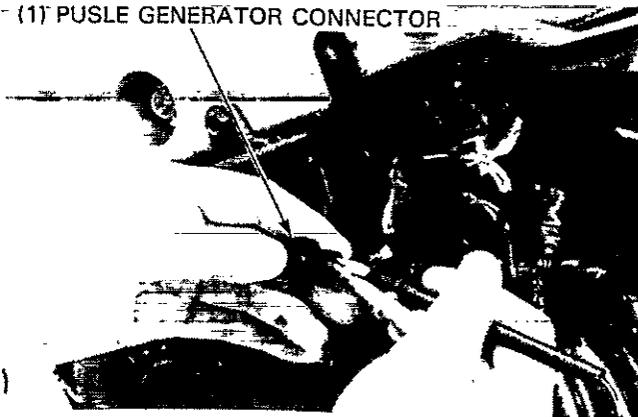
Remove the lower fairing (page 2-4).

Disconnect the pulse generator wire connector on the right connector bracket (page 1-24).

Measure the pulse generator coil resistance between the W/Y and Y wire terminals and between the W/Bu and Bu wire terminals.

Standard: 450 – 550 Ω (20°C/68°F)

(1) PULSE GENERATOR CONNECTOR



Ignition Timing

NOTE

- The spark unit system is factory pre-set and cannot be adjusted. Ignition timing inspection procedures are given to inspect the function of the spark unit components.
- Connect the timing light to the other spark plug wire it you see that the ignition timing is incorrect, and you might be able to see the timing is correct.

Warm up the engine to operating temperature.

⚠ WARNING

- If the engine must be running to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area.
- The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and lead to death.

Remove the lower fairing (page 2-2).

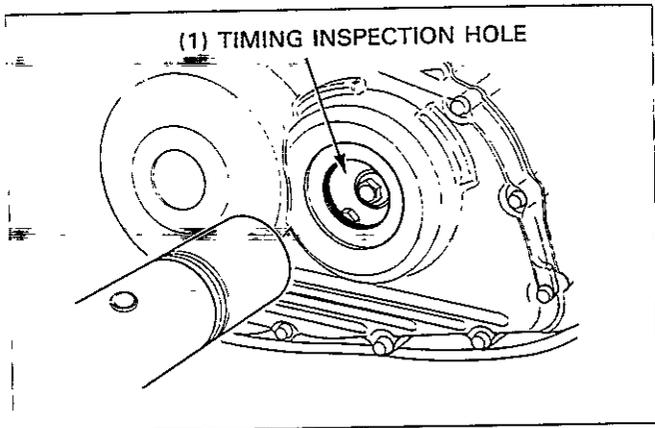
Remove the timing hole cap from the right crankcase cover. Connect the timing light to the No. 1 cylinder spark plug wire. The timing is correct if the "F" mark of the "T1" mark side aligns with the index mark at idle.

Idle speed: 1,300 min⁻¹(rpm)

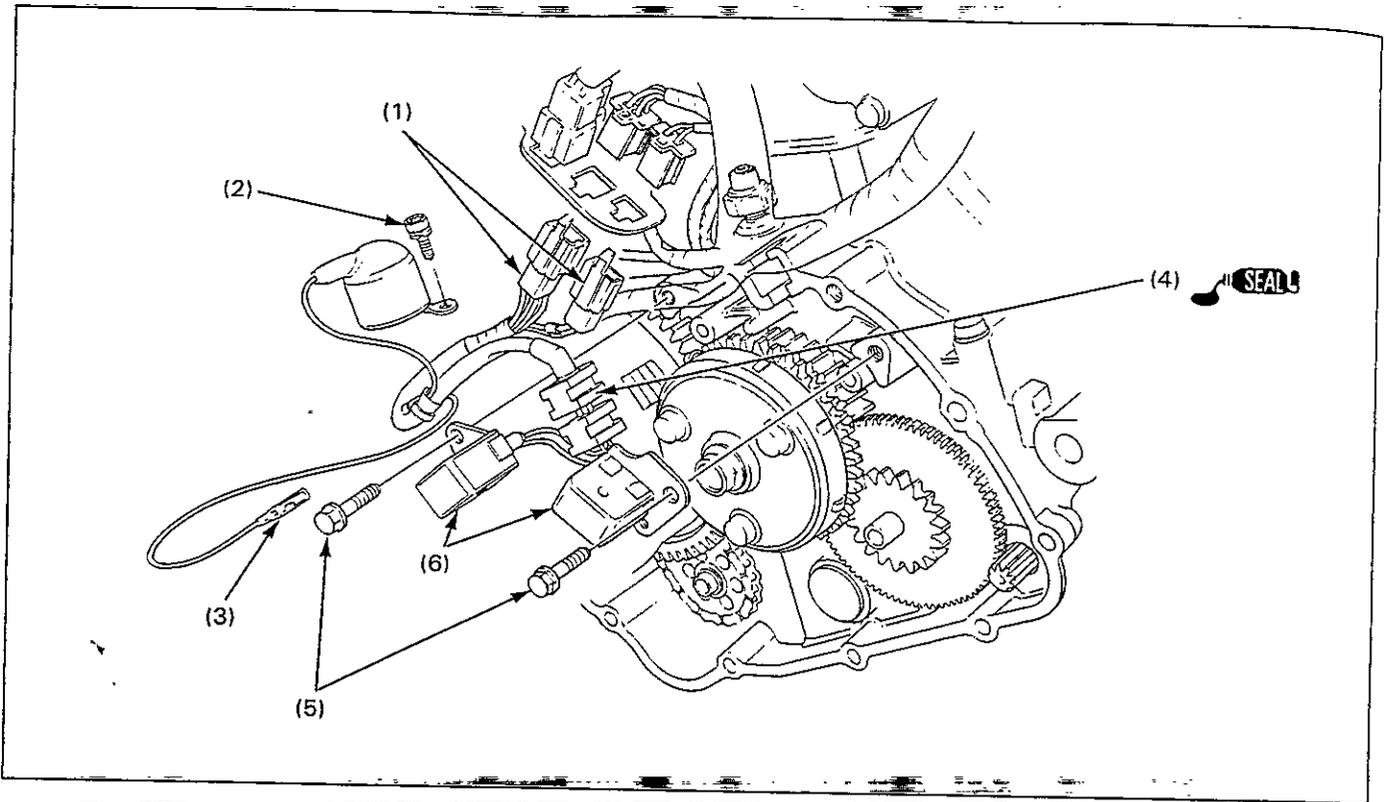
Increase the engine speed and check the "F" mark begins to move to the left side.

Apply molybdenum disulfide oil to the O-ring and timing hole cap threads, and install the timing hole cap.

Torque: 18 N·m (1.8 kg·m, 13 ft·lb)



Pulse Generator Removal/Installation



NOTE

- Route the pulse generator wires above the wire guide.

Requisite Service

- Right crankcase cover removal/installation (page 9-2)

| Procedure | Q'ty | Remarks |
|---------------------------------------|------|--|
| Removal Order | | |
| (1) Wire connectoe | 2 | Installation is in the reverse order of removal. Disconnect the connectors. |
| (2) Oil pressue switch terminal screw | 1 | |
| (3) Neutral switch wire connector | 1 | Disconnect the connector. |
| (4) Wire grommet | 1 | |
| (5) Pulse generator mounting bolt | 2 | |
| (6) Pluse generator | 2 | |

17. Electric Starter/Starter Clutch

| | | | |
|---|------|-------------------------------------|------|
| Service Information | 17-1 | Starter Clutch Disassembly/Assembly | 17-6 |
| System Location | 17-2 | Starter Motor Removal/Installation | 17-7 |
| Troubleshooting | 17-3 | Starter Motor Disassembly/Assembly | 17-8 |
| Starter Clutch, Primary Drive Gear Removal/Installation | 17-4 | | |

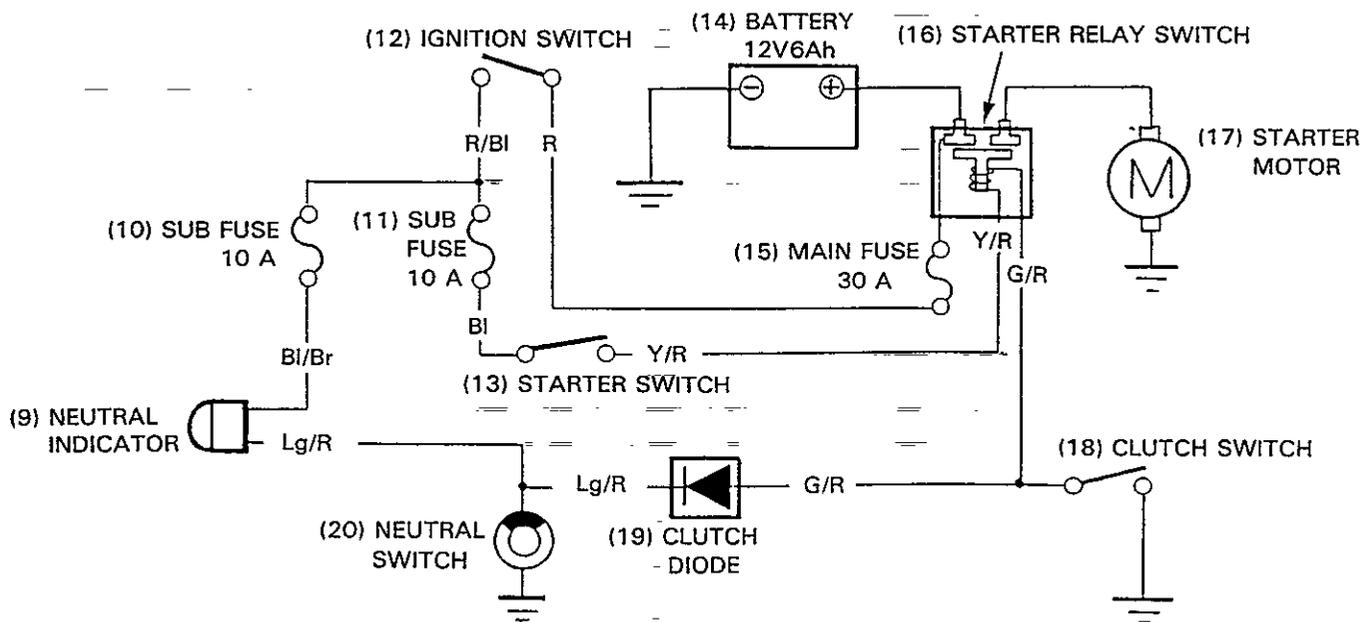
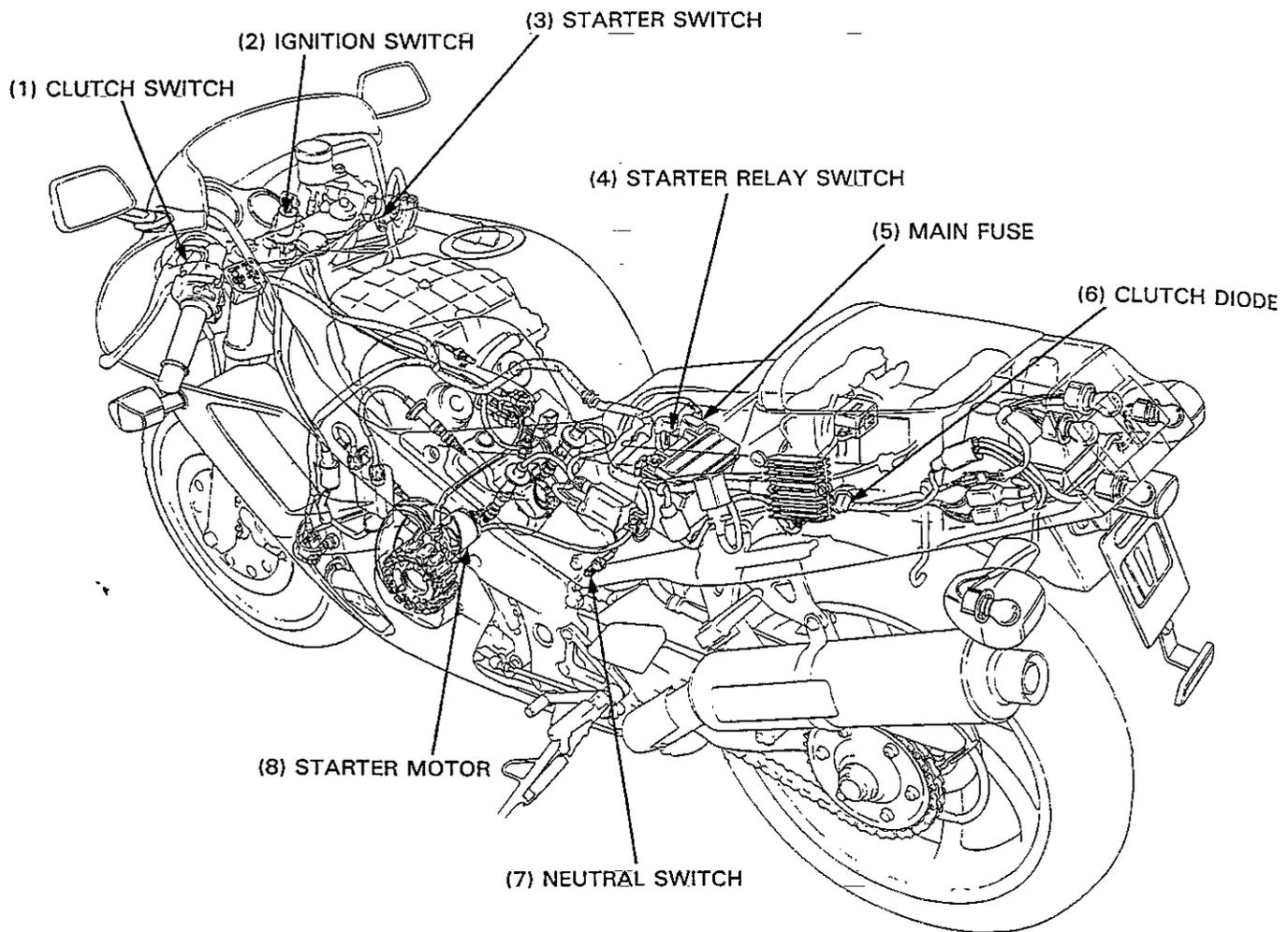
Service Information

⚠ WARNING

- Always turn the ignition switch OFF before servicing the starter motor. The motor could suddenly start, causing serious injury.
- A weak battery may be unable to turn the starter motor quickly enough, or supply adequate ignition current.
- If the current is allowed to flow to the starter motor to turn it while the engine is not cranking over, the starter motor may be damaged.
- For the following component in sections, refer to the following pages; for the parts locations, see page 17-2 of this manual (System Location).

| | |
|---------------------|---|
| Clutch switch diode | Section 24 of the Common Service Manual. |
| Starter motor | Section 24 of the Common Service Manual. |
| Clutch switch | Section 25 of the Common Service Manual. |
| Neutral switch | Section 25 of the Common Service Manual. |
| Ignition switch | Check for continuity on the continuity chart of the Wiring Diagram, page 19-1. Disconnect the switch connector on the right connector bracket (page 1-24) and check it. |

System Location

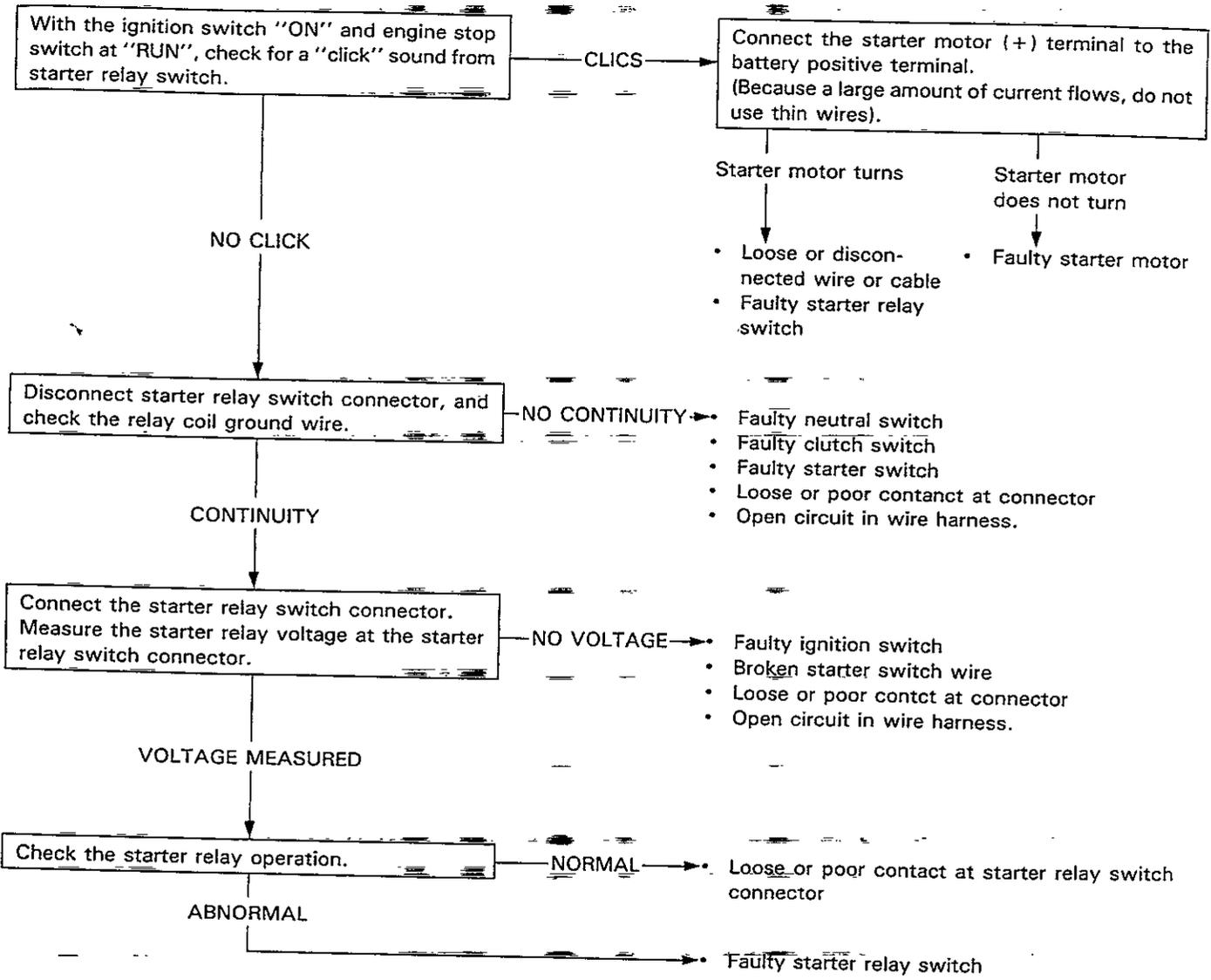


Troubleshooting

NOTE

- Check for a blown main or sub fuse before servicing.
- Make sure the battery is fully charged and in good condition.

Starter Motor Will Not Turn.



Starter Motor Turns Slowly

- Low specific gravity in battery (or Dead battery)
- Poorly connected battery terminal cable
- Poorly connected starter motor cable
- Faulty starter motor
- Poorly connected battery ground cable

Starter Motor Turns, but Engine Does Not Turn

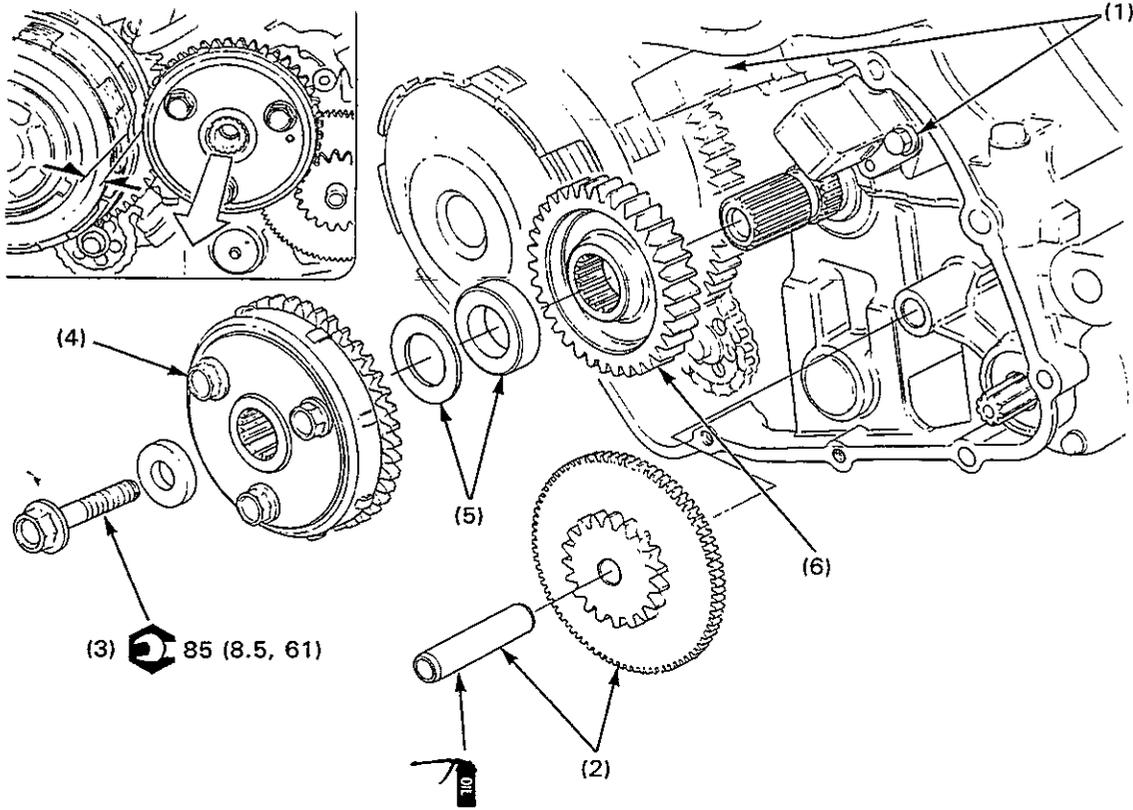
- Starter motor is running backwards
 - Brushes assembled improperly
 - Case assembled improperly
 - Terminals connected improperly
- Faulty starter clutch
- Damaged idler gear or reduction gear

Starter Motor Relay "clicks", but Engine Does Not Turn Over

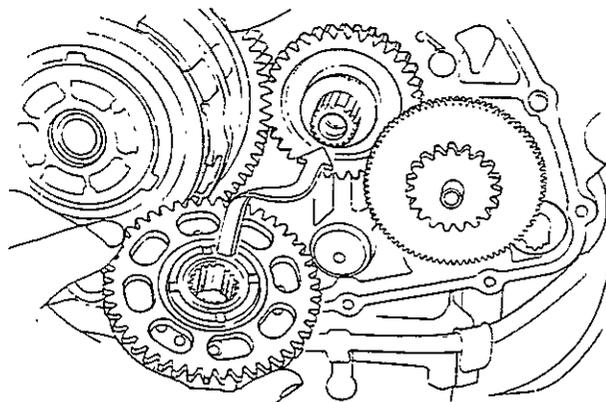
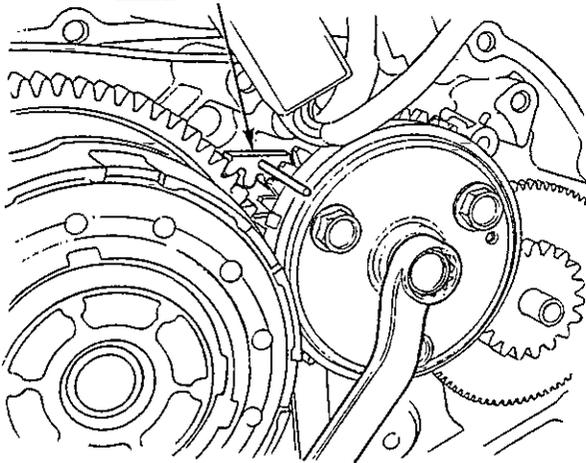
- Crankshaft does not turn due to engine problems
- Excessive reduction gear friction

Starter Clutch/Primary Drive Gear Removal/Installation

Remove through the recessed portion of the clutch outer.



S TOOL GEAR HOLDER



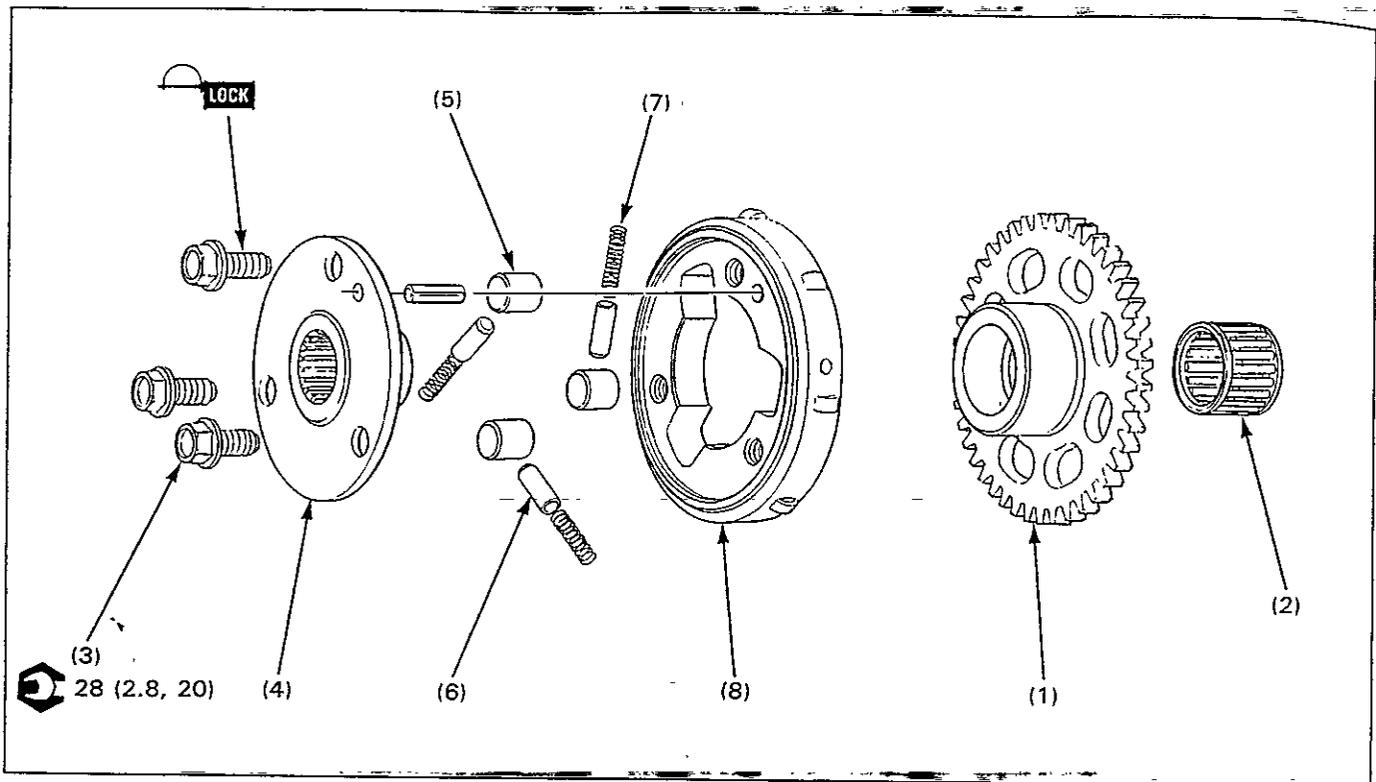
At installaiton, align the wide groove with the wide tooth.

Requisite Service

- Right crankcase cover removal/installation (page 9-2)

| Procedure | | Q'ty | Remarks |
|-----------|-------------------------------|------|--|
| | Removal Order | | Installation is the reverse order of removal. |
| (1) | Pulse generator mounting bolt | 2 | Remove the pulse generators. |
| (2) | Starte idle gear/shaft | 1/1 | |
| (3) | Primary drive gear bolt | 1 | Use the gear holder (00724-001010) as shown. |
| (4) | Starter clutch | 1 | Disassembly/assembly (page 17-6) |
| | | | NOTE |
| | | | <ul style="list-style-type: none"> • Remove the clutch through the recessed portion of the clutch outer. • At installation, align the wide groove with the wide tooth of the crankshaft. |
| (5) | Spacer | 2 | |
| (6) | Primary drive gear | 1 | |

Starter Clutch Disassembly/Assembly

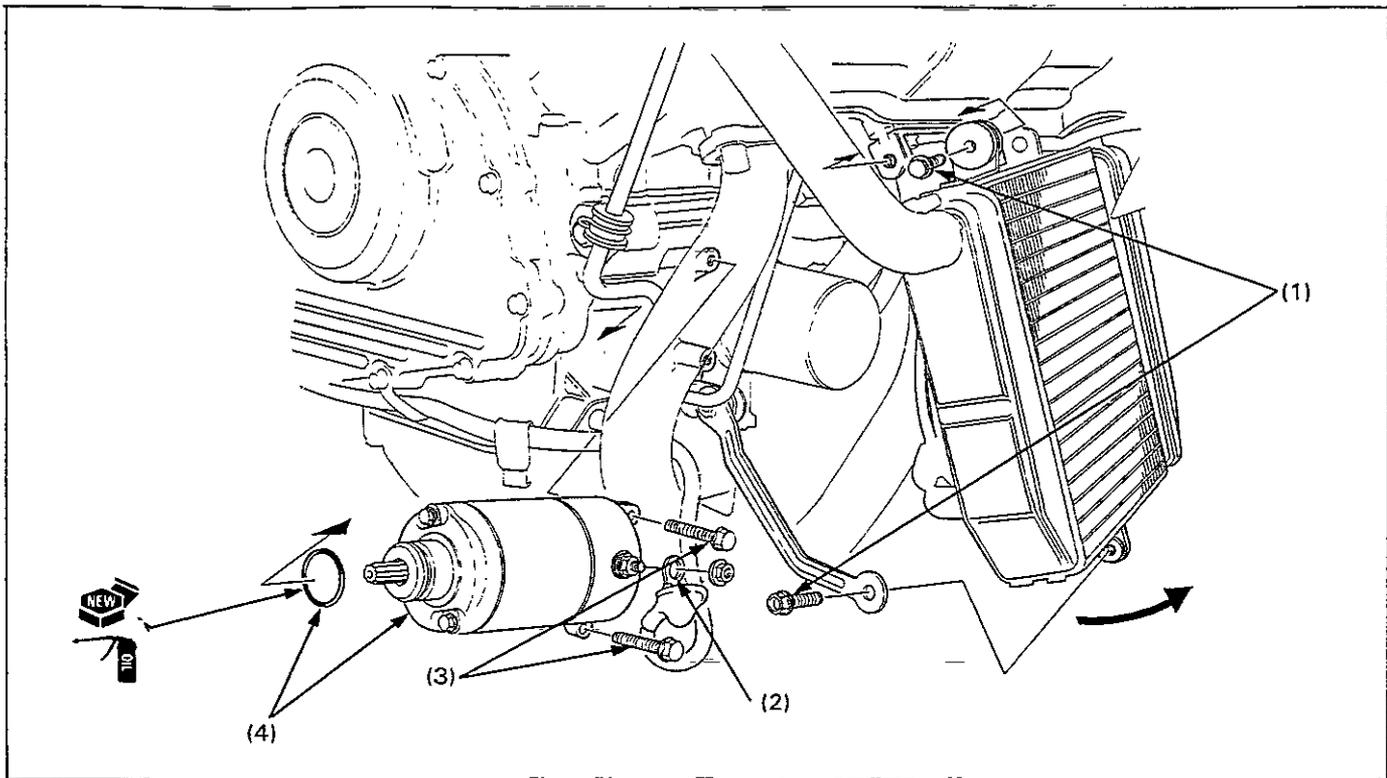


Requisite Service

- Starter clutch removal/installation (page 17-4)

| Procedure | Q'ty | Remarks |
|---|------|--|
| (1) Removal Order Starter driven gear | 1 | Assembly is in the reverse order of disassembly. NOTE • At installation, install the gear into the clutch while turning it clockwise. |
| (2) Needle bearing | 1 | |
| (3) Clutch cover bolt | 3 | |
| (4) Clutch cover | 1 | NOTE • At installation, align the hole with the locating pin. |
| (5) Roller | 3 | |
| (6) Plunger | 3 | |
| (7) Spring | 3 | |
| (8) Starter clutch body | 1 | |

Starter Motor Removal/Installation



⚠ WARNING

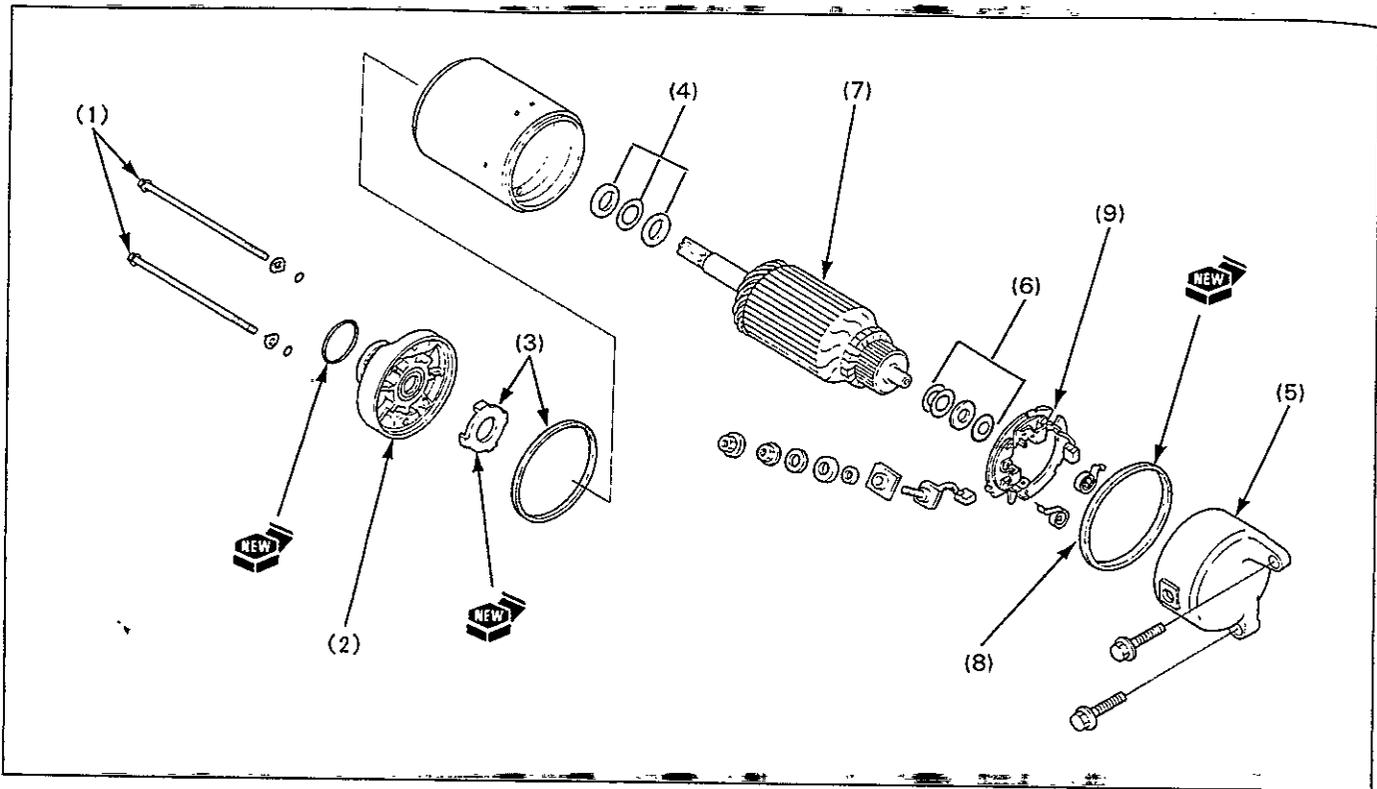
• With the ignition switch OFF, remove the negative cable from the battery before servicing the starter motor.

Requisite Service

- Lower fairing removal/installation (page 2-4)

| Procedure | Q'ty | Remarks |
|--|------|---|
| (1) Removal Order Lower radiator mounting bolt | 2 | Installation is in the reverse order of removal. NOTE • Remove the bolts and move the lower radiator forward. CAUTION • Cover the radiator fins to prevent them from damage when servicing. |
| (2) Starter motor cable | 1 | Disconnect the cable. NOTE • Install the rubber cap securely after installing. |
| (3) Starter motor mounting bolt | 2 | |
| (4) Starter motor/O-ring | 1/1 | Disassembly/assembly (page 17-8) |

Starter Motor Disassembly/Assembly



NOTE

- Note the location and number of the shims when disassembly.

Requisite Service

- Starter motor removal/installation (page 17-7)

| Procedure | Q'ty | Remarks |
|----------------------------|------|--|
| Removal Order | | Assembly is in the reverse order of disassembly. |
| (1) Case bolt | 2 | |
| (2) Front cover | 1 | |
| (3) Dust seal/Thrust plate | 1/1 | |
| (4) Shim | — | |
| (5) Rear cover | 1 | |
| (6) Shim | — | |
| (7) Armature | 1 | |
| (8) O-ring | 1 | |
| (9) Brush holder assembly | 1 | |

18. Lights/Meters/Switches

| | | | |
|--------------------------------------|------|--|------|
| Service Information | 18-1 | Turn Signal Light Bulb Replacement | 18-5 |
| System Location | 18-2 | Headlight Bulb Replacement | 18-6 |
| Oil Pressure Switch Inspection | 18-3 | Ignition Switch Removal/Installation | 18-7 |
| Fan Motor Switch Inspection | 18-3 | Instruments, Headlight Unit Removal/Installation | 18-8 |
| Coolant Temperature Gauge Inspection | 18-4 | | |
| Headlight Relay Inspection | 18-5 | | |

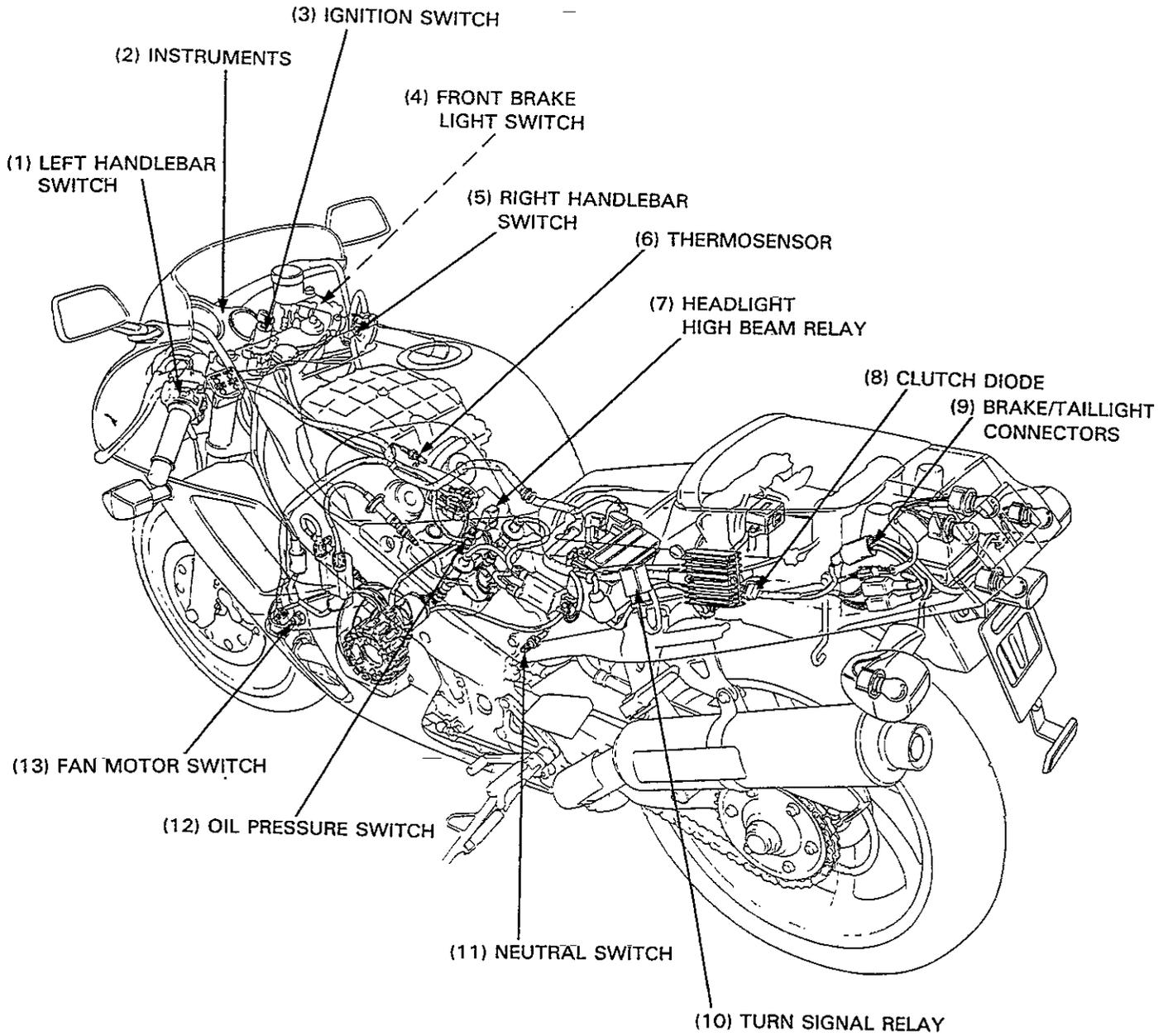
Service Information

⚠ WARNING

- A halogen headlight bulb becomes very hot while the headlight is ON, and remain hot for a while after it is turned OFF. Be sure to let it cool down before servicing.
- Use a heat element to heat water/coolant mixture for thermosensor inspection. Keep all flammable materials away from the burner. Wear protective clothing, gloves and eye protection.

- Note the following when replacing the halogen headlight bulb.
 - Wear clean gloves while replacing the bulb. Do not put finger prints on the headlight bulb, as they may create hot spots on the bulb and cause it to break.
 - If you touch the bulb with your bare hands, clean it with a cloth mistened with alcohol to prevent its early failure.
 - Be sure to install the dust cover after replacing the bulb.
- Check the battery condition before performing any inspection that requires proper battery voltage.
- A continuity test can be made with the switches installed on the motorcycle.

System Location

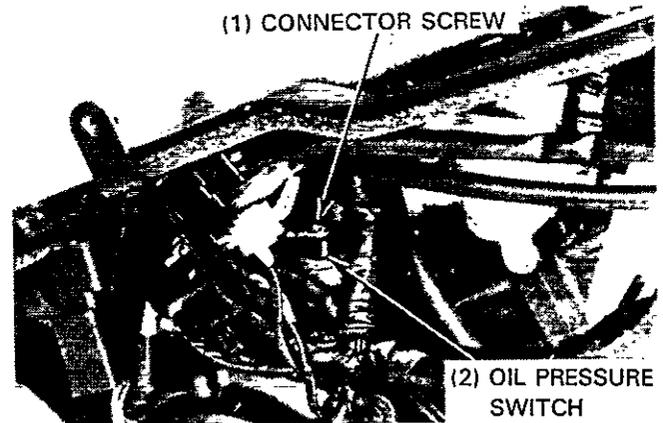
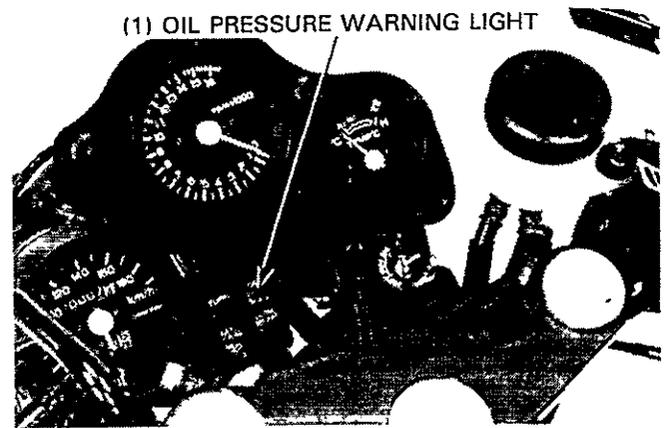


Oil Pressure Switch Inspection

Remove the lower fairing (page 2-4).

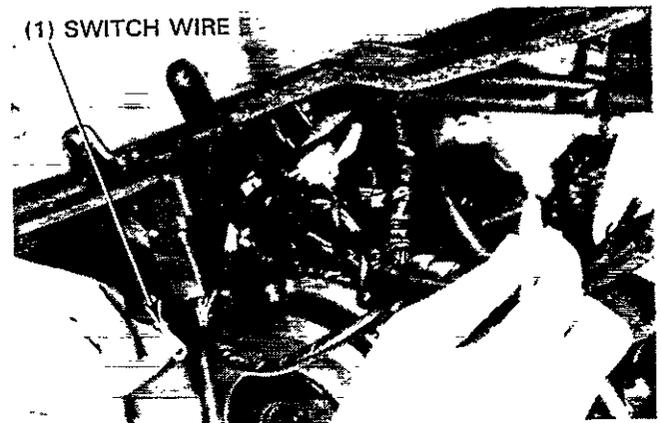
If the oil pressure warning light does not come on with the ignition switch turned ON:

1. Disconnect the oil pressure switch wire from the switch and ground it.
2. Turn the ignition switch ON and check that the oil pressure warning light comes on.
 - If the light comes on, the oil pressure switch is faulty. Replace the switch.
 - If the light does not come on, the bulb is blown or wire harness has an open circuit. Check them.



If the oil pressure warning light stays on while the engine is running.

1. Check the engine oil level and add the recommended oil if the level is low.
2. Disconnect the oil pressure switch wire from the switch and check that the oil pressure warning light does not come on with the ignition switch turned ON.
 - If the light comes on, the wire harness between the light and switch is shorted to the ground.
 - If the light does not come on, measure the oil pressure. If the pressure is normal, replace the oil pressure switch.



Fan Motor Switch Inspection

NOTE

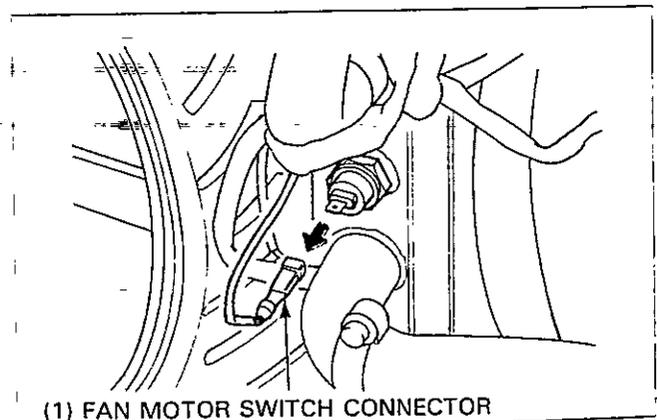
- Perform this inspection while the engine is cold.

Turn the ignition switch OFF.

Remove the lower fairing (page 2-4).

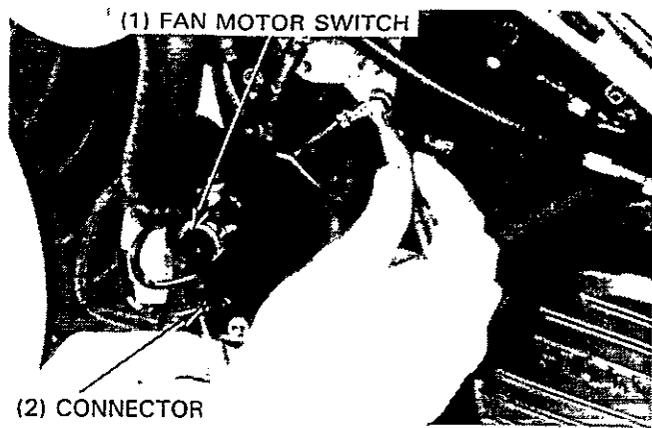
If the fan motor does not stop:

1. Disconnect the fan motor switch connector from the switch and turn the ignition switch ON.
 - If the starter motor does not start, the fan motor switch is faulty. Replace the switch.
 - If the fan motor starts, the wire between the motor and switch is shorted to the ground.



If the fan motor does not start:

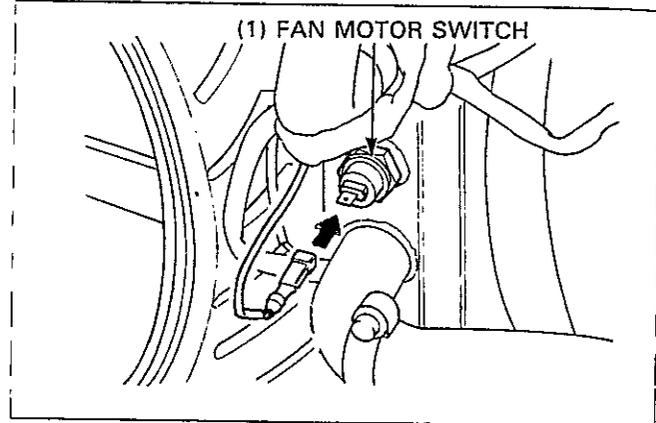
1. Disconnect the fan motor switch connector from the switch and ground it with a jumper wire.
2. Turn the ignition switch ON, and check the fan motor.
 - If the motor turns, the fan motor switch is faulty or switch connector is loose or poorly connected.
 - If the motor does not turn, check for voltage between the connector and ground.
 - If the battery voltage exists, the fan motor is faulty.
 - If no voltage, the wire harness has an open circuit.



When installing a new fan motor switch, apply sealant to the threads and tighten it to the specified torque.

Torque: 18 N·m (1.8 kg-m, 13 ft-lb)

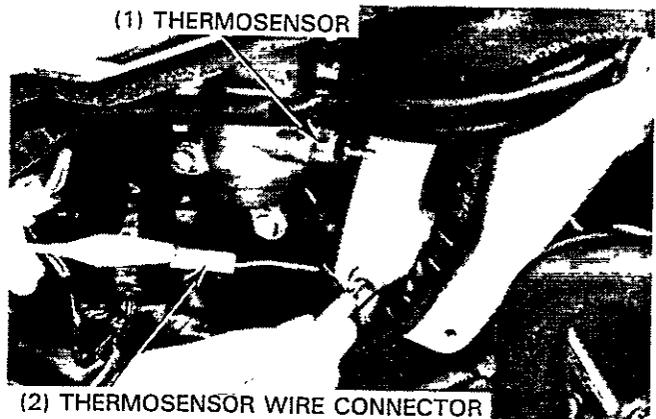
Connect the fanmotor switch connector.
Install the lower fairing (page 2-4).



Coolant Temperature Gauge Inspection

Remove the lower fairing (page 2-4) and the fuel tank (page 2-5).

Disconnect the thermosensor wire connector from the sensor and ground it with a jumper wire.



Turn the ignition switch ON and check the coolant temperature gauge. Disconnect the thermosensor wire from the ground immediately when the gauge needle moves jully to H.

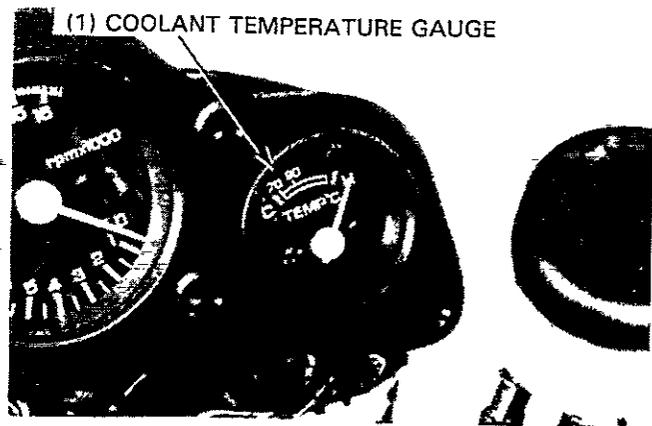
CAUTION

- Do not ground the thermosensor wire longer than 5 seconds to prevent damage to the gauge.

If the needle does not move to H, check the wire harness between the switch and gauge.

If the wire harness is normal, replace the coolant temperature gauge.

Install the removed parts in the reverse order of removal.



Headlight Relay Inspection

High Beam Relay

Remove the lower fairing (page 2-4).

Turn the ignition switch ON and the headlight switch to "H". Turn the dimmer switch to "HI" and check for a "click" sound from the high beam relay.

- If the relay click, measure the voltage between the Bl/R wire (+) and ground with the ignition switch ON.
 - If the battery voltage exists, replace the relay.
 - If no voltage, check the wire harness.

- If the relay does not click, measure the voltage between the Bu/W (+) and G (-) wire terminals at the relay connector.

The battery voltage should be registered when the headlight switch is turned to "H" and the dimmer switch is turned to "HI".

- If the battery voltage exists, replace the relay.
- If no voltage, check the wire harness, lighting switch and dimmer switch.

Low Beam Relay

Remove the upper fairing (page 2-2).

Turn the ignition switch ON and the headlight switch to "H". Turn the dimmer switch to "LO" and check for a "click" sound from the high beam relay.

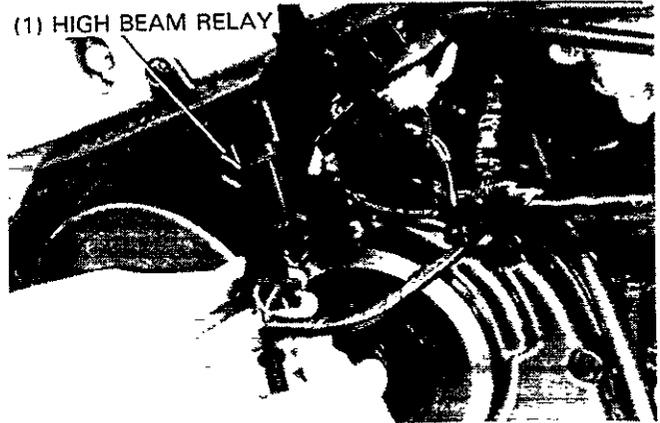
- If the relay clicks, measure the voltage between the Bl/R wire (+) and ground with the ignition switch ON.
 - If the battery voltage exists, replace the relay.
 - If no voltage, check the wire harness

- If the relay does not click, measure the voltage between the W/Bu (+) and G (-) wire terminals at the relay connector.

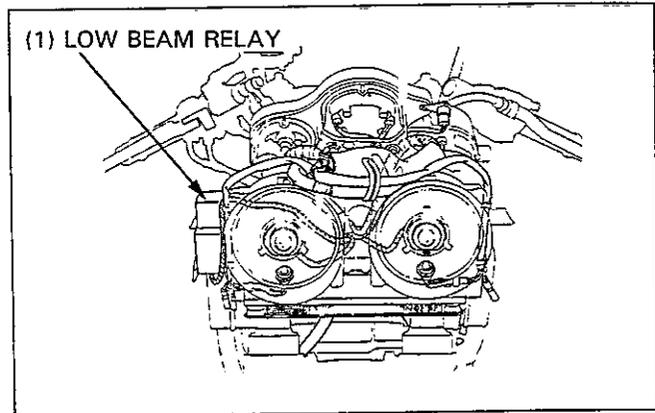
The battery voltage should be registered when the headlight switch is turned to "H" and the dimmer switch is turned to "LO".

- If the battery voltage exists, replace the relay.
- If no voltage, check the wire harness, lighting switch and dimmer switch.

(1) HIGH BEAM RELAY



(1) LOW BEAM RELAY



Turn Signal Light Bulb Replacement

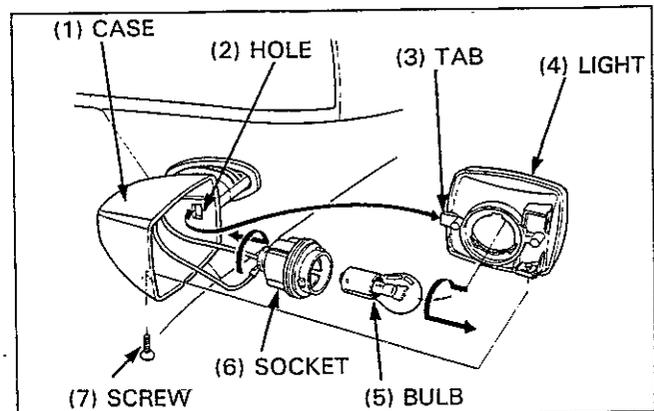
Remove the screw and the turn signal light from the case. Remove the bulb socket from the light by turning it counterclockwise.

Remove the bulb from the socket by pushing it in and turning it counterclockwise.

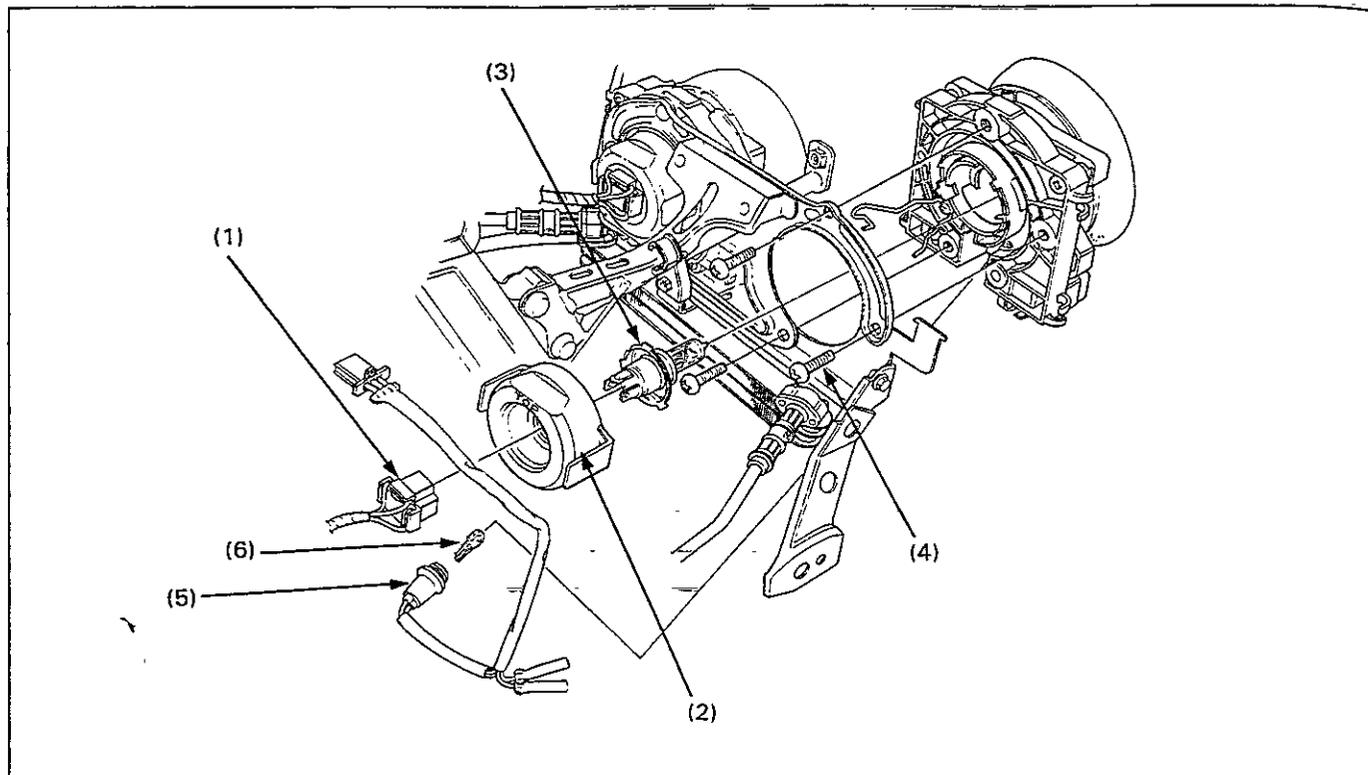
Install the new bulb in the reverse order of removal.

NOTE

- Align the tab of the turn signal light with the hole in the case properly.



Headlight Bulb Replacement



WARNING

- A halogen headlight bulb becomes very hot while the headlight is ON, and remain hot for a while after it is turned OFF. Be sure to let it cool down before servicing.

CAUTION

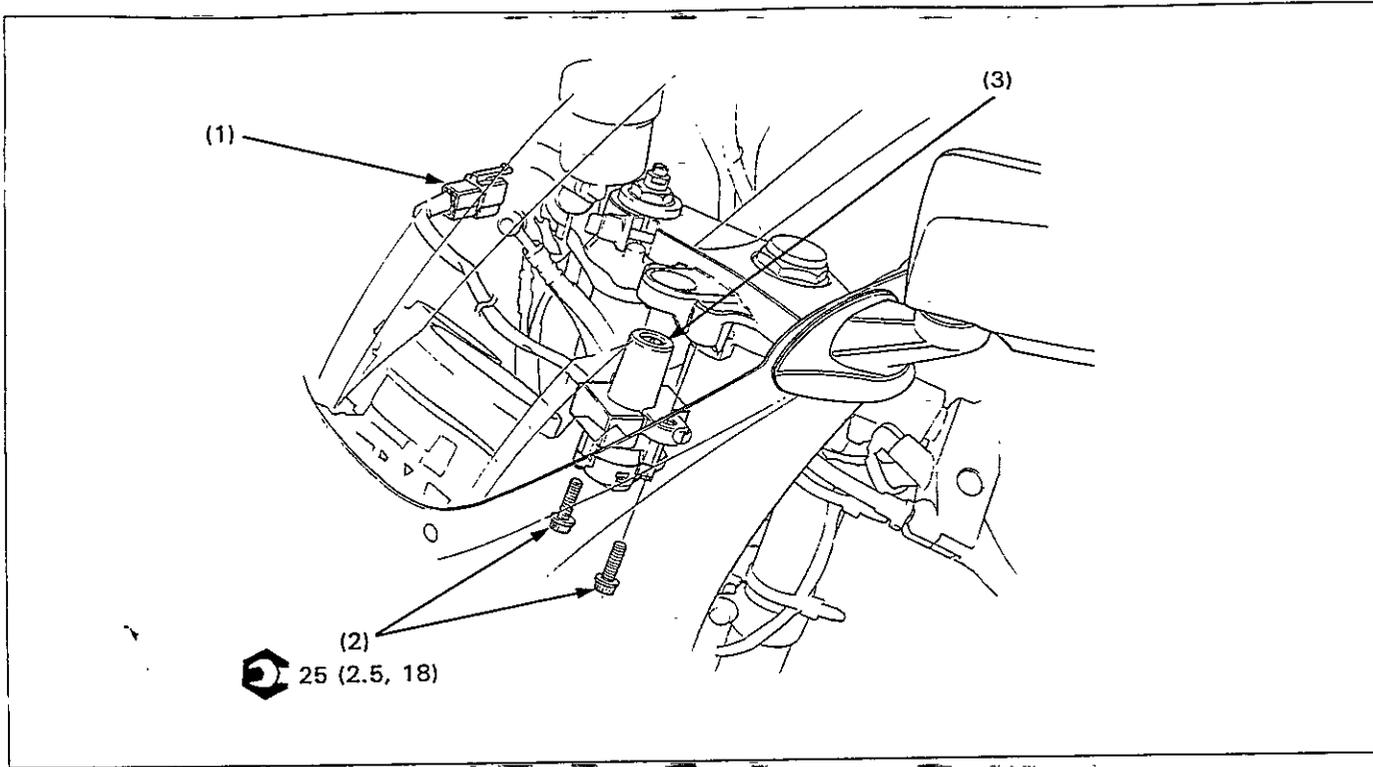
- If you touch the bulb with your bare hands, clean it with a cloth moistened with alcohol to prevent early failure.

Requisite Service

- Upper fairing removal/installation (page 2-2)
- Instruments removal/installation (page 18-8)

| Procedure | | Q'ty | Remarks |
|-----------|-------------------------------|------|---|
| (1) | Headlight connector | 1 | Installation is in the reverse order of removal. NOTE Install the cap securely with the "TOP" mark facing up. |
| (2) | Rubber cap | 1 | |
| (3) | Headlight bulb | 1 | |
| (4) | Headlight unit mounting screw | 3 | |
| (5) | Position light socket | | |
| (6) | Position light bulb | 1 | |

Ignition Switch Removal/Installation

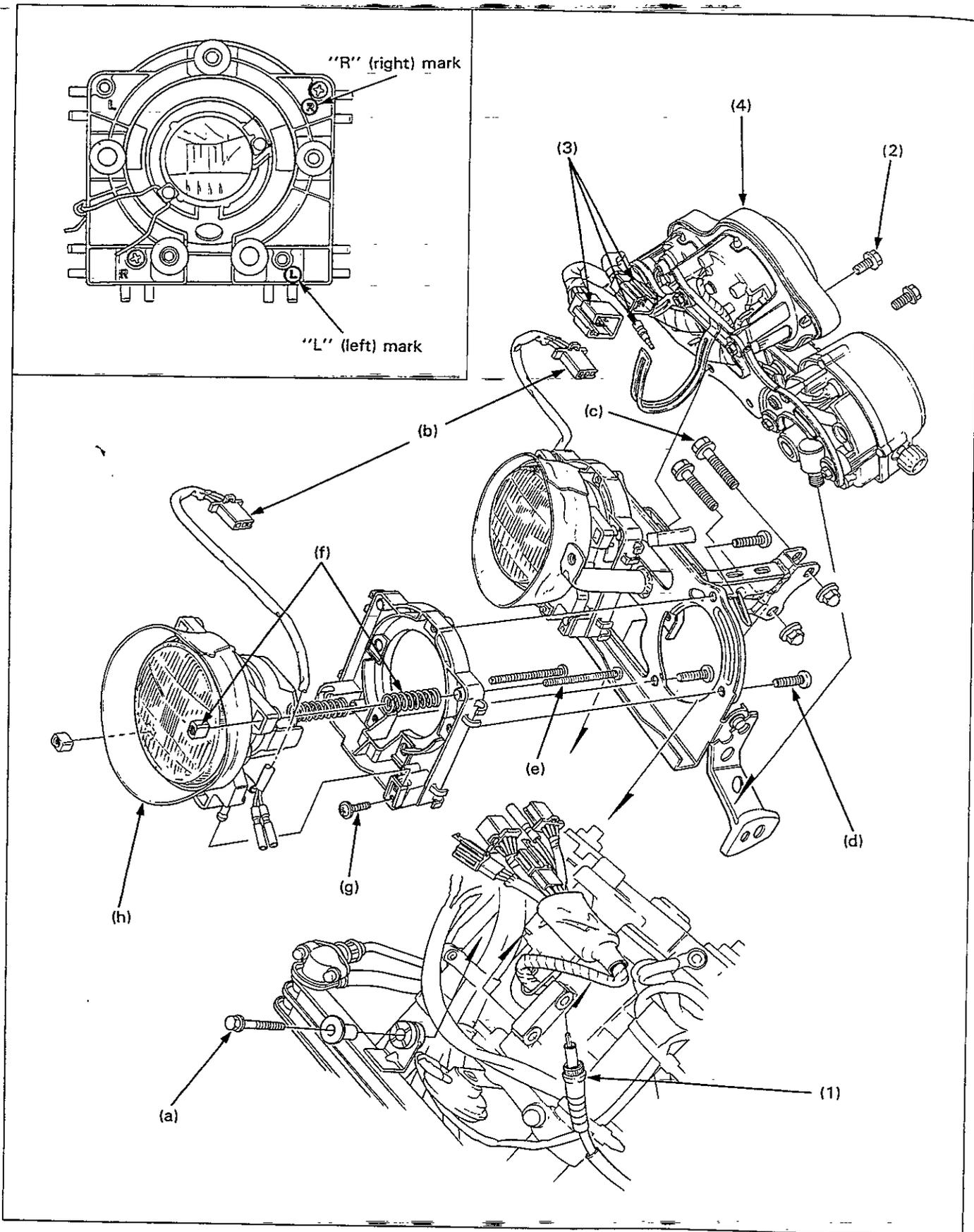


NOTE

- Route the ignition switch wire harness properly (see page 1-21).

| Procedure | Q'ty | Remarks |
|------------------------------------|------|--|
| Removal Order | | Installation is in the reverse order of removal. Disconnect at right connector bracket (page 1-24). |
| (1) Ignition switch wire connector | 1 | |
| (2) Ignition switch mounting bolt | 2 | |
| (3) Ignition switch | 1 | |

Instruments, Headlight Unit Removal/Installation



NOTE

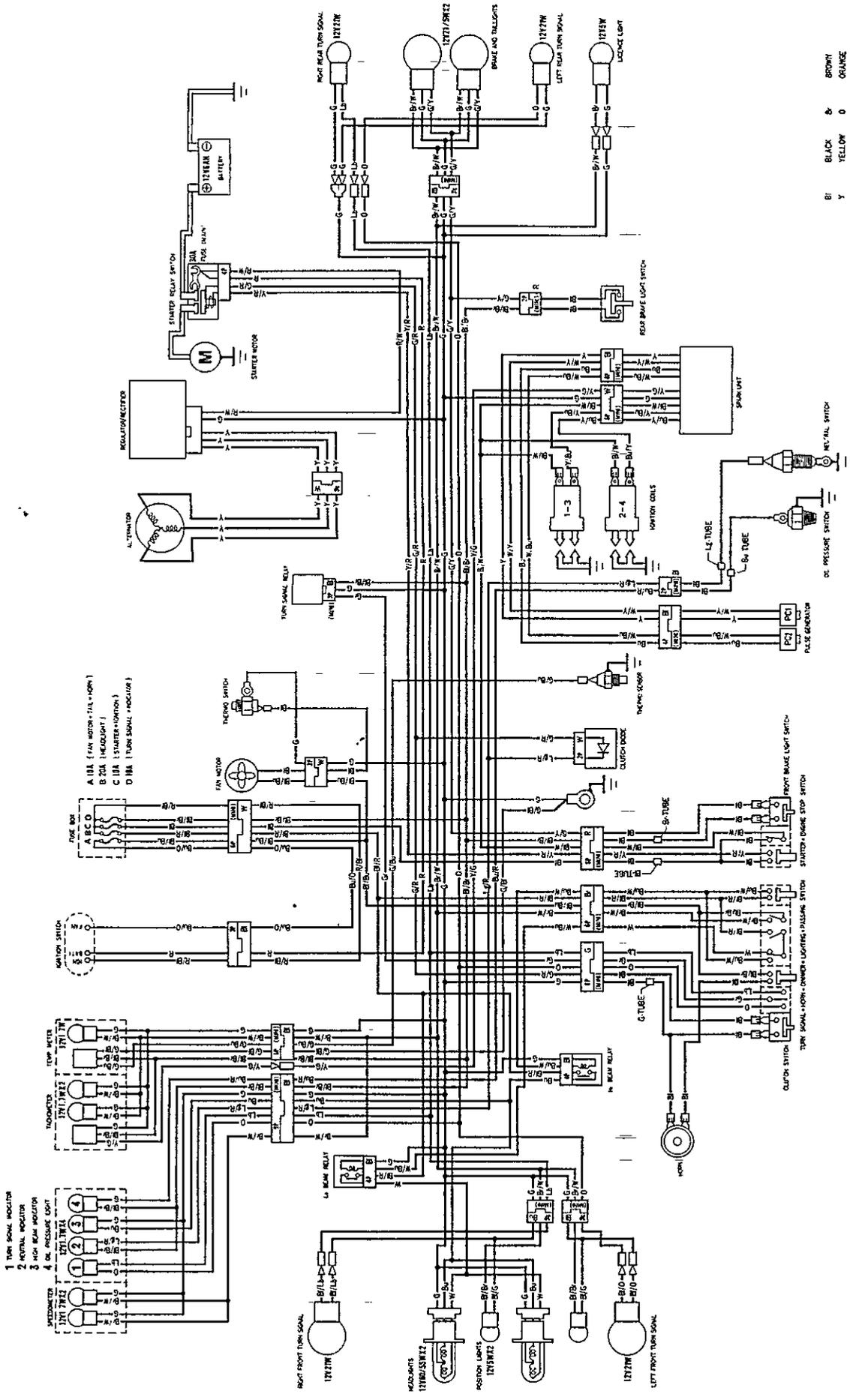
- Instruments can be removed with the upper fairing installed.
- the right and left mounting brackets are different. When replacing the bracket, install the headlight aim adjusting screws in the marked locations as shown.

Requisite Service

- Upper fairing removal/installation (page 2-2)

| Procedure | | Q'ty | Remarks |
|-----------|---|------|---|
| (1) | Instrument Removal Order Speedometer cable | 1 | Installation is in the reverse order of removal. Disconnect the connectors. |
| (2) | Instrument mounting bolt | 2 | |
| (3) | Instrument wire connector | 3 | |
| (4) | Instrument unit | 1 | |
| (a) | Headlight Removal Order Oil cooler mounting bolt | 1 | Installation is in the reverse order of removal. Disconnect the connectors. |
| (b) | Headlight wire connector | 2 | |
| (c) | Headlight stay mounting bolt | 2 | |
| (d) | Headlight mounting screw | 3 | |
| (e) | Headlight Disassembly Order Headlight aim adjusting screw | 2 | Assembly is in the reverse order of disassembly. Remove the screw and open the holder cover. |
| (f) | Headlight aim adjusting spring/nut | 2/2 | |
| (g) | Headlight pivot holder screw | 1 | |
| (h) | Headlight | 1 | |

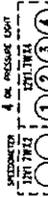
19. Wiring Diagram



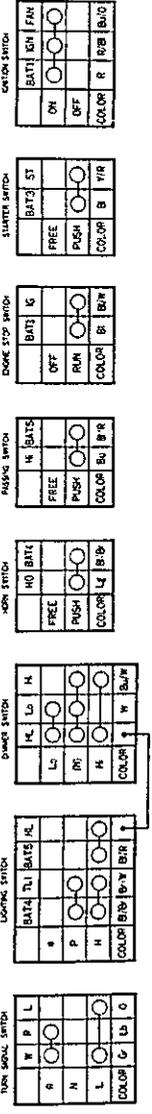
- BI BLACK
- Y YELLOW
- B BLUE
- G GREEN
- R RED
- W WHITE
- BR BROWN
- O ORANGE
- LB LIGHT BLUE
- LG LIGHT GREEN
- P PINK
- GR GRAY

0030Z-MR 8-6000

- 1 TURN SIGNAL INDICATOR
- 2 HORN INDICATOR
- 3 HORN RELAY INDICATOR
- 4 DC PRESSURE SWITCH



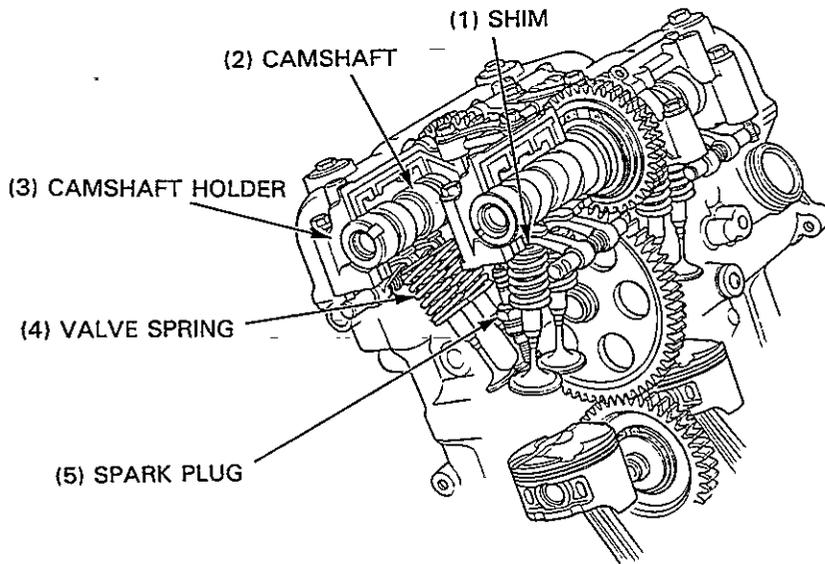
WIRING CONTINUED



20. Technical Feature

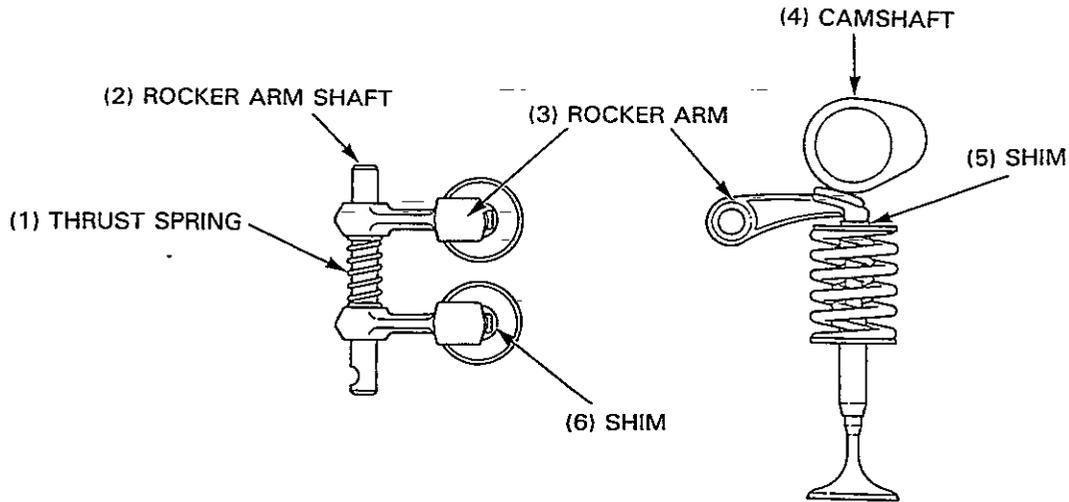
| | | | |
|--|------|---------------------------|------|
| Cylinder Head | 20-1 | Newly Designed Spark Plug | 20-2 |
| Shim Direct Push Mechanism With Rocker Arm | 20-2 | | |

Cylinder Head



The new design does not require the rocker arm which is positioned thru the rocker arm shaft and the thrust spring, the camshaft which is located on the same shaft as the valve stem, and the valve lifter. This achieves a larger valve diameter and higher valve lift amount for the newly designed cylinder head. The part supporting the valve lifter is not required, because a mechanism directly pushes the shim and the newly designed special spark plug (details are described on the next page) is used. The resulting compact cylinder head yields a higher performance. Compared with conventional models, the installation position of the new engine can be shifted further toward the front. Thus, the new design contributes to an improved rotation performance, driving safety and load balance of the front and rear wheels by shifting load to the front wheels, and simultaneously decreasing the required wheel base.

Shim Direct Push Mechanism With Rocker Arm



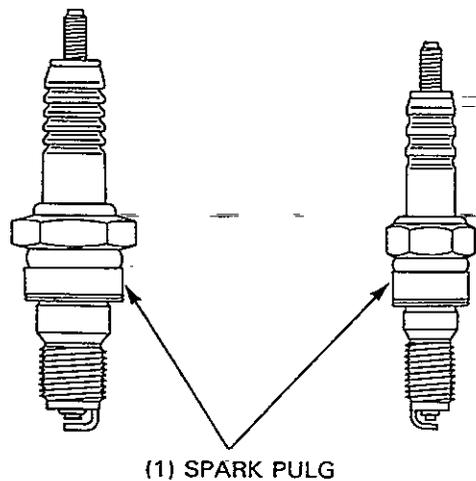
The new design is a compact cylinder head, using a shim direct push mechanism with rocker arm for easier maintenance, without any valve lifter.

In conventional designs, the direct push type shim is located inside the valvelifter. Therefore, the valve lifter including the camshaft must be removed/installed when the shim is replaced. The new direct shim push mechanism used in the VFR4004R facilitates easier maintenance than with the valve adjuster method, however, without requiring any valve adjuster. The decreased operating mass Thanks to the reduced weight of the rocker arm, the decreased operating mass results in better valve performance during high speed, as well as in enhanced durability and reliability.

Newly Designed Spark Plug

[Conventional Type]

[Screw Diameter: 8 mm]

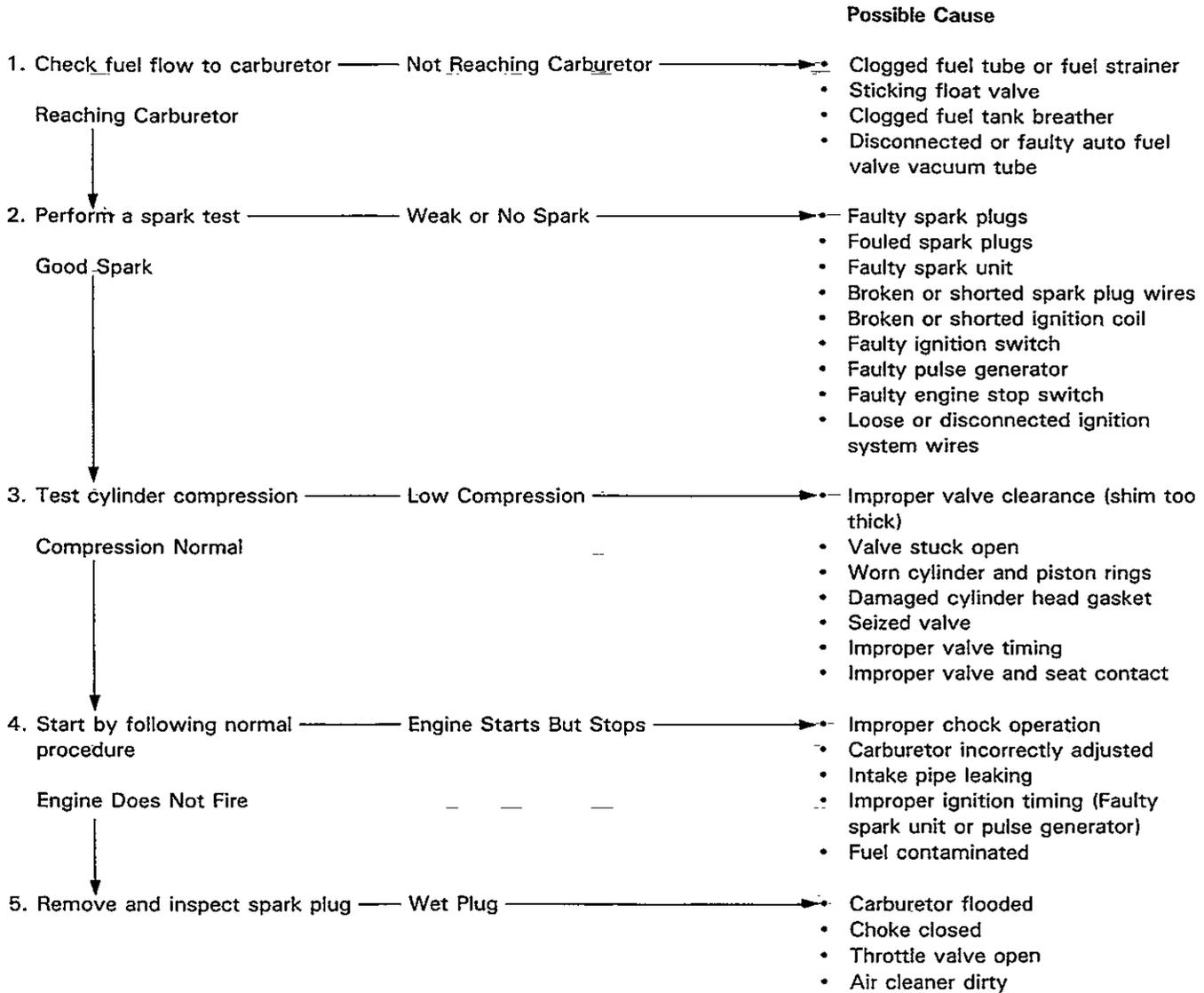


The newly designed dedicated spark plugs (diameter: 8 mm) maintain a balanced combustion and use a valve with larger diameter. Greater charging efficiency and higher gas speed are attained, resulting in a better acceleration response.

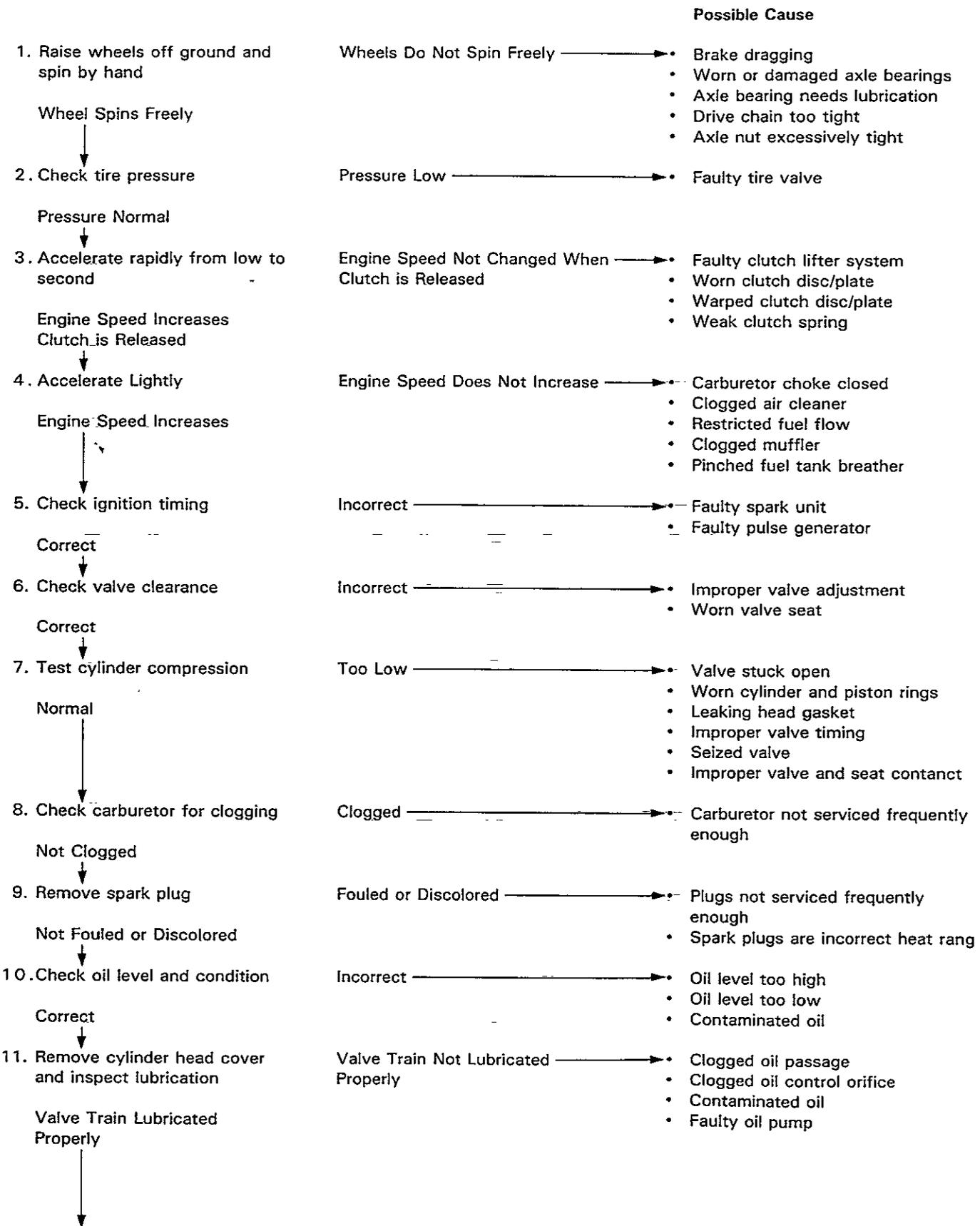
21. Troubleshooting

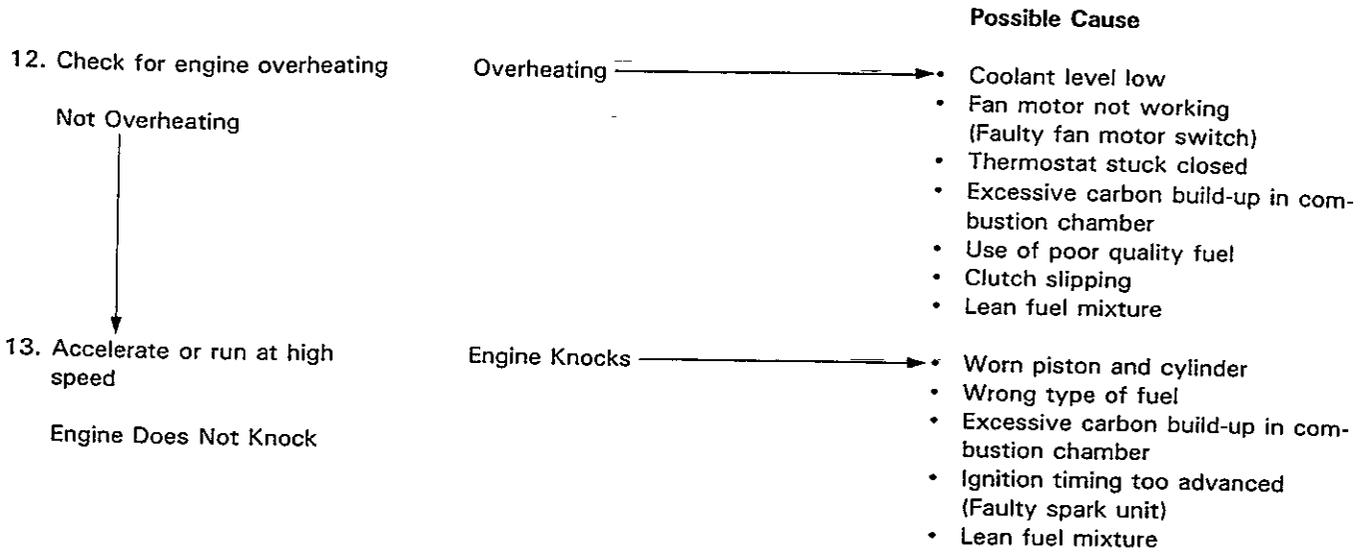
| | | | |
|---|------|--------------------------------|------|
| Engine Does Not Start or is Hard to Start | 21-1 | Poor Performance at High Speed | 21-3 |
| Engine Lacks Power | 21-2 | Poor Handling | 21-4 |
| Poor Performance at Low and Idle Speeds | 21-3 | | |

Engine Does Not Start or is Hard to Start

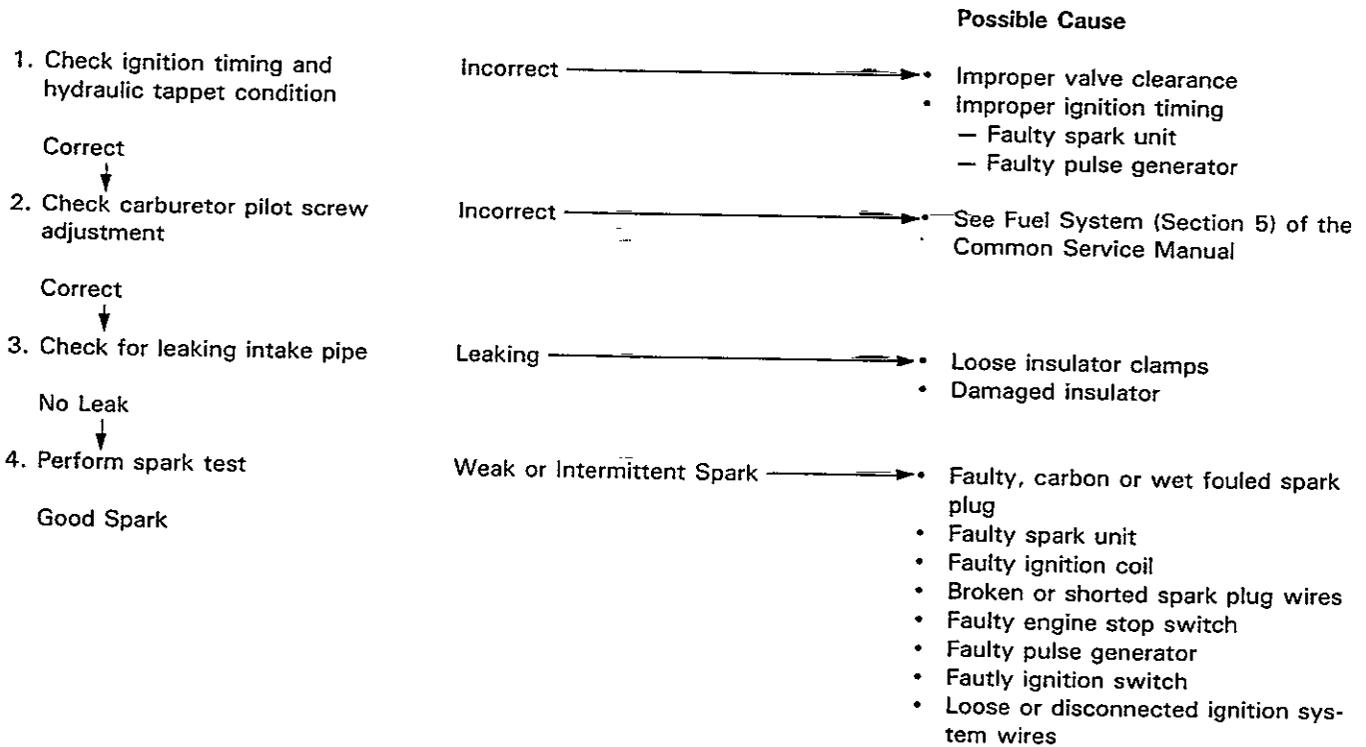


Engine Lacks Power

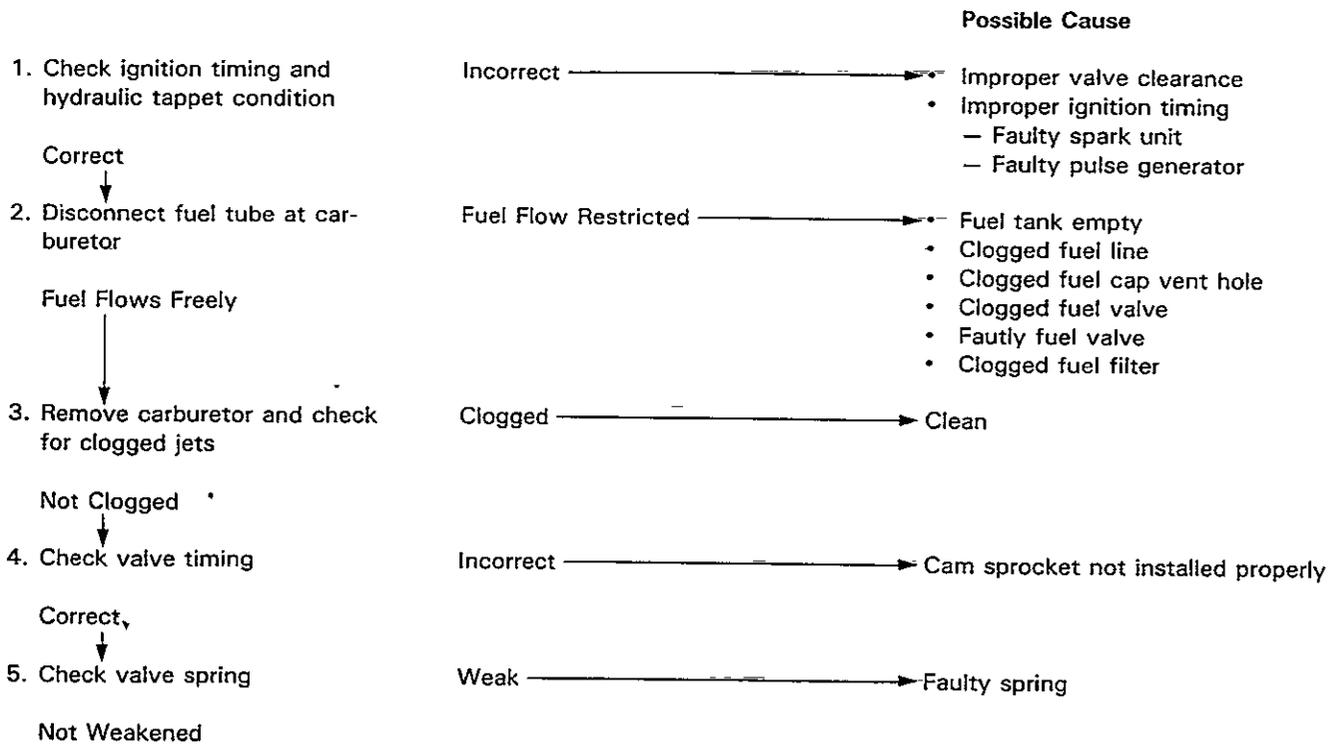




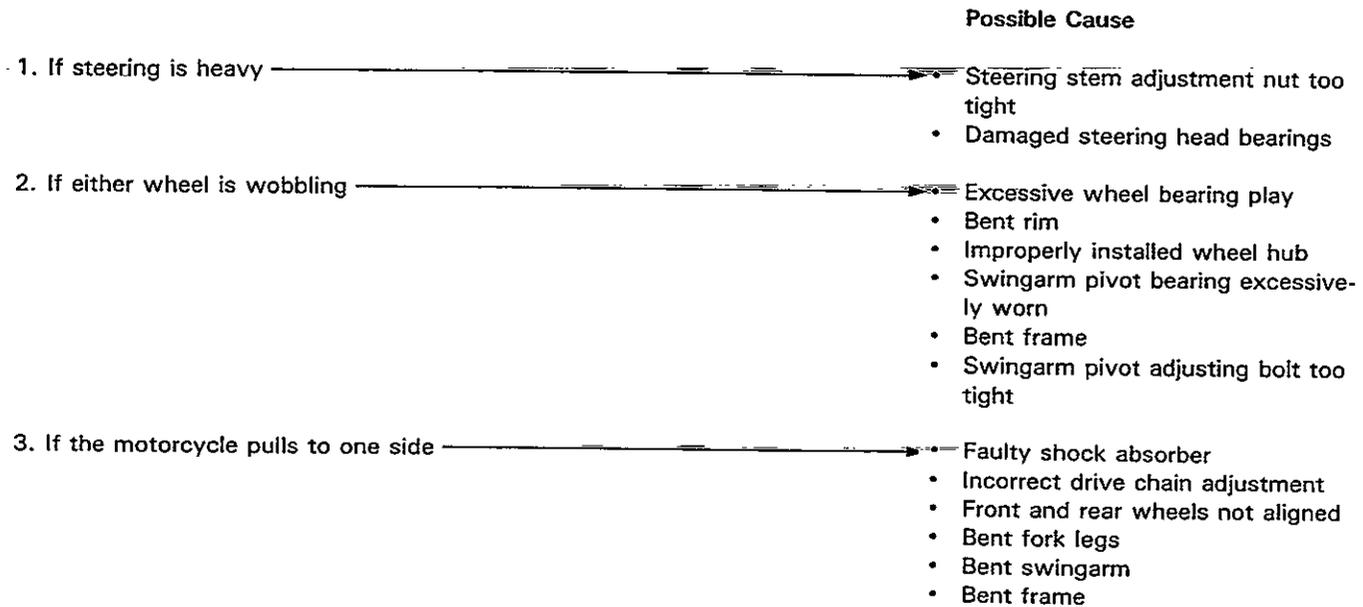
Poor Performance at Low and Idle Speeds



Poor Performance at High Speed



Poor Handling → Check tire pressure



22. Index

| | | | |
|--|-------|--|-------|
| Air Cleaner | 3-5 | Safety | 1-1 |
| Removal/Installation | 6-6 | Headlight Bulb Replacement | 18-6 |
| Alternator Inspection | 15-7 | Relay Inspection | 18-5 |
| Removal/Installation | 15-8 | Ignition System | 16-1 |
| Battery Removal/Installation | 15-4 | Coil Inspection | 16-6 |
| Bearing Holder Removal/Installation | 13-4 | Switch Removal/Installation | 18-7 |
| Holder, Axle Disassembly/Assembly | 13-6 | System Inspection | 16-4 |
| Selection | 11-10 | Timing | 16-7 |
| Brake System | 14-1 | Instruments, Headlight Unit Removal/ Installation | 18-8 |
| Cable & Harness Routing | 1-21 | Left Handlebar Disassembly/Assembly | 12-2 |
| Cam Gear Case Installation | 8-10 | Lights/Meters/Switches | 18-1 |
| Camshaft Installation | 8-11 | Lower Fairing Removal/Installation | 2-4 |
| Camshaft, Cam Gear Case Installation | 8-8 | Lubrication System | 4-1 |
| Camshaft/Cam Gear Case Removal | 8-2 | Lubrication & Seal Points | 1-19 |
| Carburetor Combination | 6-12 | System Diagram | 4-2 |
| Disassembly/Assembly | 6-14 | Mainshaft Disassembly/Assembly | 11-5 |
| Removal/Installation | 6-8 | Maintenance | 3-1 |
| Separation | 6-10 | Schedule | 3-4 |
| Synchronization | 3-10 | Model Identification | 1-3 |
| Charging System/Alternator | 15-1 | Muffler Removal/Installation | 2-8 |
| Inspection | 15-5 | Newly Designed Spark Plug | 20-2 |
| Clutch | 9-1 | Oil Cooler Removal/Installation | 4-3 |
| Installation | 9-6 | Pressure Switch Inspection | 18-3 |
| Removal | 9-4 | Oil Pump Disassembly/Assembly | 4-6 |
| Coolant Draining | 5-3 | Removal/Installation | 4-4 |
| Temperature Gauge Inspection | 18-4 | Piston Disassembly/Assembly | 11-8 |
| Cooling System | 5-1 | Pulse Generator Inspection | 16-6 |
| Countershaft Disassembly/Assembly | 11-6 | Removal/Installation | 16-8 |
| Crankcase Assembly | 11-12 | Radiator Disassembly/Assembly | 5-8 |
| Separation | 11-2 | Removal/Installation | 5-6 |
| Crankshaft/Piston/Transmission | 11-1 | Rear Wheel/Suspension | 13-1 |
| Cylinder Head/Valves | 8-1 | Rear Brake Caliper Disassembly/Assembly | 14-10 |
| Head | 20-1 | Pad Replacement | 14-3 |
| Cylinder Head Disassembly/Assembly | 8-6 | Pedal Removal/Installation | 14-12 |
| Removal/Installation | 8-4 | Rear Master Cylinder Disassembly/Assembly | 14-8 |
| Drive Chain | 3-11 | Wheel, Driven Sprocket Removal/ Installation | 13-2 |
| Sprocket Cover Removal/Installation | 10-2 | Regulator/Rectifier Inspection | 15-6 |
| Electric Starter/Starter Clutch | 17-1 | Right Crankcase Cover Removal/Installation | 9-2 |
| Engine Removal/Installation | 7-1 | Handlebar Disassembly/Assembly | 12-4 |
| Installation | 7-4 | Seat Cowling Removal/Installation | 2-2 |
| Removal | 7-2 | Service Access Guide | 3-2 |
| Exhaust Pipe Removal/Installation | 2-10 | Service Information | |
| Fan Motor Switch Inspection | 18-3 | Brake System | 14-1 |
| Fork Assembly | 12-13 | Charging System/Alternator | 15-1 |
| Disassembly | 12-12 | Clutch | 9-1 |
| Removal/Installation | 12-10 | Cooling System | 5-1 |
| Frame/Body Panels/Exhaust System | 2-1 | Crankshaft/Piston/Transmission | 11-1 |
| Front Wheel/Suspension/steering | 12-1 | Cylinder Head/Valves | 8-1 |
| Front Brake Caliper Disassembly/Assembly | 14-6 | Electric Starter/Starter Clutch | 17-1 |
| Pad Replacement | 14-2 | Engine Removal/Installation | 7-1 |
| Front Master Cylinder Disassembly/Assembly | 14-4 | Frame/Body Panels/Exhaust System | 2-1 |
| Front Wheel Disassembly/Assembly | 12-8 | Front Wheel/Suspension/steering | 12-1 |
| Removal/Installation | 12-6 | Fuel System | 6-1 |
| Fuel System | 6-1 | Gearshift Linkage | 10-1 |
| Fuel Tank Disassembly/Assembly | 6-3 | Ignition System | 16-1 |
| Removal/Installation | 2-5 | Lights/Meters/Switches | 18-1 |
| Fuel Valve Disassembly/Assembly | 6-4 | Lubrication System | 4-1 |
| Gearshift Linkage | 10-1 | Maintenance | 3-1 |
| Gearshift Linkage, Shift Drum Installation | 10-6 | Rear Wheel/Suspension | 13-1 |
| Removal | 10-4 | | |
| General Information | 1-1 | | |

Index

| | |
|--|------------------------|
| Shift Fork Installation | 11-4 |
| Shim Direct Push Mechanism With Rocker Arm | 20-2 |
| Shock Absorber Disassembly/Assembly | 13-12 |
| Absorber, Linkage Removal/Installation | 13-8 |
| Linkage Disassembly/Assembly | 13-14 |
| Side Fairing Removal/Installation | 2-3 |
| Stand | 3-12 |
| Spark Plug | 3-5 |
| Specifications | 1-4 |
| Starter Clutch Disassembly/Assembly | 17-6 |
| Clutch, Primary Drive Gear | |
| Removal/Installation | 17-4 |
| Starter Motor Disassembly/Assembly | 17-8 |
| Removal/Installation | 17-7 |
| Steering Stem Installation | 12-16 |
| Removal | 12-14 |
| Sub-frame Removal/Installation | 2-12 |
| Swingarm Disassembly/Assembly | 13-19 |
| Removal/Installation | 13-16 |
| System Flow Pattern | 5-2 |
| Location | 15-2, 16-2, 17-2, 18-2 |
| Technical Feature | 20-1 |
| Thermostat Removal/Installation | 5-4 |
| Tools | 1-17 |
| Torque Values | 1-14 |
| Troubleshooting | |
| Brake System | 14-1 |
| Charging System/Alternator | 15-3 |
| Clutch | 9-1 |
| Cooling System | 5-1 |
| Crankshaft/Piston/Transmission | 11-1 |
| Cylinder Head/Valves | 8-1 |
| Electric Starter/Starter Clutch | 17-3 |
| Front Wheel/Suspension/steering | 12-1 |
| Fuel System | 6-2 |
| Gearshift Linkage | 10-1 |
| Ignition System | 16-3 |
| Lubrication System | 4-1 |
| Rear Wheel/Suspension | 13-1 |
| Turn Signal Light Bulb Replacement | 18-5 |
| Upper Fairing Removal/Installation | 2-2 |
| Valve Clearance | 3-7 |
| Water Pump Disassembly/Assembly | 5-5 |
| Windshield Removal/Installation | 2-6 |