**IMPORTANT**

This manual was produced by the Yamaha Motor Company, Ltd. primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to include all the knowledge of a mechanic in one manual. Therefore, anyone who uses this book to perform maintenance and repairs on Yamaha vehicles should have a basic understanding of mechanics and the techniques to repair these types of vehicles. Repair and maintenance work attempted by anyone without this knowledge is likely to render the vehicle unsafe and unfit for use.

This model has been designed and manufactured to perform within certain specifications in regard to performance and emissions. Proper service with the correct tools is necessary to ensure that the vehicle will operate as designed. If there is any question about a service procedure, it is imperative that you contact a Yamaha dealer for any service information changes that apply to this model. This policy is intended to provide the customer with the most satisfaction from his vehicle and to conform to federal environmental quality objectives.

Yamaha Motor Company, Ltd. is continually striving to improve all of its models. Modifications and significant changes in specifications or procedures will be forwarded to all authorized Yamaha dealers and will appear in future editions of this manual where applicable.

**TIP**

- This Service Manual contains information regarding periodic maintenance to the emission control system. Please read this material carefully.
- Designs and specifications are subject to change without notice.

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**IMPORTANT MANUAL INFORMATION**

Particularly important information is distinguished in this manual by the following notations.

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<td><img src="symbol/safety_alert.png" alt="Safety Alert" /></td>
<td>This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.</td>
</tr>
<tr>
<td><img src="symbol/warning.png" alt="Warning" /> <strong>WARNING</strong></td>
<td>A WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.</td>
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<tr>
<td><img src="symbol/notice.png" alt="Notice" /> <strong>NOTICE</strong></td>
<td>A NOTICE indicates special precautions that must be taken to avoid damage to the vehicle or other property.</td>
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<tr>
<td><img src="symbol/tip.png" alt="Tip" /> <strong>TIP</strong></td>
<td>A TIP provides key information to make procedures easier or clearer.</td>
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HOW TO USE THIS MANUAL

This manual is intended as a handy, easy-to-read reference book for the mechanic. Comprehensive explanations of all installation, removal, disassembly, assembly, repair and check procedures are laid out with the individual steps in sequential order.

- The manual is divided into chapters and each chapter is divided into sections. The current section title “1” is shown at the top of each page.
- Sub-section titles “2” appear in smaller print than the section title.
- To help identify parts and clarify procedure steps, there are exploded diagrams “3” at the start of each removal and disassembly section.
- Numbers “4” are given in the order of the jobs in the exploded diagram. A number indicates a disassembly step.
- Symbols “5” indicate parts to be lubricated or replaced. Refer to “SYMBOLS”.
- A job instruction chart “6” accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.
- Jobs “7” requiring more information (such as special tools and technical data) are described sequentially.

---

**Cylinder and Pistons**

**Removing the cylinder and pistons**

1. **Order**

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2. **Symbols**

   - **Piston pin**
   - **Piston ring**
   - **Oil ring**

3. **Tips**

   - Do not use a hammer to drive the piston pin out.
   - Before removing the piston pin clip, cover the clearance opening with a cloth (to prevent the piston pin from falling into the engine casing).
   - For reference during installation, put an identification mark on each piston crown.
   - Before removing the piston pin, deduce the piston pin from the groove and the piston pin bore area. If such areas are deformed and the piston pin is difficult to remove, remove it with the piston pin puller set “1”.

4. **Job Instruction Chart**

   - Please refer to “SYMBOLS”.

5. **Checking the cylinder and piston**

   - **Diameter of cylinder bore**
     - Measure the cylinder bore “1” with the caliper, inside in between, and/or check measurements of both cylinders. Then, find the average of the measurements.

   - **Diameter of piston pin**
     - Measure cylinder bore “1” by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

---

**Cylinder and Piston**

**Removing the pistons**

1. **Removal**

   - 1. Remove:
     - Piston pin clips “1”
     - Piston pins “2”
     - Piston “3”

2. **Tightening specifications**

   - 1. Remove:
     - Piston ring
     - Cylinder wall

3. **Vertical scratches. Repair or replace the cylinder wall and piston rings as a set.**

4. **Measurements**

   - **Cylinder bore**
     - Maximum (D) and minimum (Dx)
     - Maximum (D) - Minimum (Dx) = Average (D)
     - Minimum (Dx) - Maximum (D) = Average (Dx)

---

5. **Checking the cylinder and piston**

   - **Diameter of cylinder bore**
     - Measure cylinder bore “1” by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

   - **Diameter of piston pin**
     - Measure cylinder bore “1” by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.
SYMBOLS

The following symbols are used in this manual for easier understanding.

**TIP**

The following symbols are not relevant to every vehicle.

1. Serviceable with engine mounted
2. Filling fluid
3. Lubricant
4. Special tool
5. Tightening torque
6. Wear limit, clearance
7. Engine speed
8. Electrical data
9. Engine oil
10. Gear oil
11. Molybdenum disulfide oil
12. Brake fluid
13. Wheel bearing grease
14. Lithium-soap-based grease
15. Molybdenum disulfide grease
16. Silicone grease
17. Apply locking agent (LOCTITE®).
18. Replace the part with a new one.
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IDENTIFICATION

VEHICLE IDENTIFICATION NUMBER
The vehicle identification number “1” is stamped into the right side of the frame.

MODEL LABEL
The model label “1” is affixed to the storage box. This information will be needed to order spare parts.
OUTLINE OF FI SYSTEM
The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions. In a conventional carburetor system, the air-fuel ratio of the mixture that is supplied to the combustion chamber is created by the volume of the intake air and the fuel that is metered by the jet used in the respective chamber. Despite the same volume of intake air, the fuel volume requirement varies with the engine operating conditions, such as acceleration, deceleration, or operation under a heavy load. Carburetors that meter the fuel through the use of jets have been provided with various auxiliary devices, so that an optimum air-fuel ratio can be achieved to accommodate the constant changes in the operating conditions of the engine.

As the requirements for engines to deliver more performance and cleaner exhaust gases increase, it becomes necessary to control the air-fuel ratio in a more precise and finely tuned manner. To accommodate this need, this model has adopted an electronically controlled fuel injection (FI) system in place of a conventional carburetor system. This system can achieve an optimum air-fuel ratio required by the engine at all times by using a microprocessor that regulates the fuel injection volume according to the engine operating conditions detected by various sensors.

Adoption of the FI system has resulted in a highly precise fuel supply, improved engine response, better fuel economy, and reduced exhaust emissions.
**FI SYSTEM**

The fuel pump delivers fuel to the fuel injector via the fuel filter. The pressure regulator (in the fuel pump) maintains the fuel pressure that is applied to the fuel injector at 240–260 kPa (2.40–2.60 kg/cm², 34.1–37.0 psi) higher than the intake manifold pressure. Accordingly, when the energizing signal from the ECU (engine control unit) energizes the fuel injector, the fuel passage opens, causing the fuel to be injected into the intake manifold only during the time the passage remains open. Therefore, the longer the length of time the fuel injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the fuel injector is energized (injection duration), the lesser the volume of fuel that is supplied.

The injection duration and the injection timing are controlled by the ECU (engine control unit). Signals that are input from the throttle position sensor, crankshaft position sensor, intake air pressure sensor, intake air temperature sensor, coolant temperature sensor, and O₂ sensor enable the ECU (engine control unit) to determine the injection duration. The injection timing is determined through the signals from the crankshaft position sensor. As a result, the volume of fuel that is required by the engine can be supplied at all times in accordance with the driving conditions.

Illustration is for reference only.
WARNING

Be sure to stop the vehicle before making any setting changes to the multi-function display. Changing settings while riding can distract the operator and increase the risk of an accident.

The multi-function display is equipped with the following:

- a tachometer (which shows engine speed)
- an odometer (which shows the total distance traveled)
- two tripimeters (which show the distance traveled since they were last set to zero)
- a fuel reserve tripimeter (which shows the distance traveled when the remaining fuel in the fuel tank reaches approximately 3.0 L (0.79 US gal) (0.66 Imp.gal))
- a self-diagnosis device
- a clock
- an oil change tripimeter (which shows the distance traveled since the last engine oil change)
- a V-belt replacement tripimeter (which shows the distance traveled since the last V-belt replacement)

TIP

- Be sure to turn the key to “ON” before using the “SELECT” and “RESET” buttons.
- When the key is turned to “ON”, all of the display segments of the multi-function display will appear one after the other and then disappear, in order to test the electrical circuits.

1. Clock
2. Oil change indicator “OIL”

Tachometer

The tachometer allows the rider to monitor the engine speed and keep it within the ideal power range.

NOTICE

Do not operate the engine in the tachometer red zone.
Red zone: 8250 r/min and above

Clock

To set the clock:
1. Push the “SELECT” button and “RESET” button together for at least two seconds.
2. When the hour digits start flashing, push the “RESET” button to set the hours.
3. Push the “SELECT” button, and the minute digits will start flashing.
4. Push the “RESET” button to set the minutes.
5. Push the “SELECT” button and then release it to start the clock.

1. “RESET” button
2. “SELECT” button

The multi-function display is equipped with the following:

1. Tachometer
2. Tachometer red zone
3. V-belt replacement indicator “V-BELT”
4. Odometer/tripimeters
Odometer and tripmeter modes

1. Odometer/tripmeters

Pushing the “SELECT” button switches the display between the odometer mode and the tripmeter modes in the following order:

Odo → Trip-A → Trip-B → OIL Trip → V-BELT Trip → Odo

When approximately 3.0 L (0.79 US gal) (0.66 Imp.gal) of fuel remains in the fuel tank, the display will automatically change to the fuel reserve tripmeter mode "F Trip" and start counting the distance traveled from that point. In that case, pushing the “SELECT” button switches the display between the various tripmeter and odometer modes in the following order:

Odo → F Trip → Trip-A → Trip-B → OIL Trip → V-BELT Trip → Odo

1. Fuel reserve tripmeter

To reset a tripmeter, select it by pushing the “SELECT” button until “F Trip”, “Trip-A” or “Trip-B” is displayed. While “F Trip”, “Trip-A” or “Trip-B” is displayed, push the “RESET” button for at least one second. If you do not reset the fuel reserve tripmeter manually, it will reset itself automatically and the display will return to the prior mode after refueling and traveling 5 km (3 mi).

TIP

The display cannot be changed back to “F Trip” after pushing the “RESET” button.

Oil change indicator “OIL”

1. Oil change indicator “OIL”

This indicator flashes at the initial 1000 km (600 mi), then at 5000 km (3125 mi) and every 5000 km (3125 mi) thereafter to indicate that the engine oil should be changed.

After changing the engine oil, reset the oil change indicator. To reset the oil change indicator, select it by pushing the “SELECT” button until “OIL Trip” is displayed, and then push the “RESET” button at least 1 second. When pushing the “RESET” button, “OIL Trip” starts flashing. While “OIL Trip” is flashing, push the “RESET” button for at least 3 seconds.

If the engine oil is changed before the oil change indicator “OIL” flashes (i.e. before the periodic oil change interval has been reached), the indicator...
“OIL” must be reset after the oil change for the next periodic oil change to be indicated at the correct time.

The electrical circuit of the indicator can be checked according to the following procedure.

1. Set the engine stop switch to “○” and turn the key to “ON”.
2. Check that the oil change indicator comes on for a few seconds and then goes off.
3. If the oil change indicator does not come on, check the electrical circuit.
   Refer to “SIGNALING SYSTEM” on page 8-19.

V-belt replacement indicator “V-BELT”

This indicator flashes every 20000 km (12500 mi) when the V-belt needs to be replaced. After changing the V-belt, reset the V-belt replacement indicator. To reset the V-belt replacement indicator, select it by pushing the “SELECT” button until “V-BELT Trip” is displayed, and then push the “RESET” button at least 1 second. When pushing the “RESET” button, “V-BELT Trip” starts flashing. While “V-BELT Trip” is flashing, push the “RESET” button for at least 3 seconds.

If the V-belt is changed before the V-belt replacement indicator “V-BELT” flashes (i.e. before the periodic V-belt change interval has been reached), the indicator “V-BELT” must be reset after the V-belt change for the next periodic V-belt change to be indicated at the correct time.

The electrical circuit of the indicator can be checked according to the following procedure.

1. Turn the key to “ON” and make sure that the engine stop switch is set to “○”.
2. If the V-belt replacement indicator does not come on, check the electrical circuit.
   Refer to “SIGNALING SYSTEM” on page 8-19.

Self-diagnosis device

This model is equipped with a self-diagnosis device for various electrical circuits. If any of those circuits are not working correctly, the engine trouble warning light will come on, and then the display will indicate a two-digit fault code.

Refer to “FUEL INJECTION SYSTEM” on page 8-29.

NOTICE

If the display indicates a fault code, the vehicle should be checked as soon as possible in order to avoid engine damage.
PREPARATION FOR REMOVAL AND DISASSEMBLY

1. Before removal and disassembly, remove all dirt, mud, dust and foreign material.

2. Use only the proper tools and cleaning equipment. Refer to “SPECIAL TOOLS” on page 1-10.

3. When disassembling, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been “mated” through normal wear. Mated parts must always be reused or replaced as an assembly.

4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.

5. Keep all parts away from any source of fire.

REPLACEMENT PARTS

Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.

GASKETS, OIL SEALS AND O-RINGS

1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.

2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.

LOCK WASHERS/PLATES AND COTTER PINS

After removal, replace all lock washers/plates “1” and cotter pins. After the bolt or nut has been tightened to specification, bend the lock tabs along a flat of the bolt or nut.
**BEARINGS AND OIL SEALS**

Install bearings “1” and oil seals “2” so that the manufacturer’s marks or numbers are visible. When installing oil seals, lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.

**NOTICE**

Do not spin the bearing with compressed air because this will damage the bearing surfaces.

**CIRCLIPS**

Before reassembly, check all circlips carefully and replace damaged or distorted circlips. Always replace piston pin clips after one use. When installing a circlip “1”, make sure the sharp-edged corner “2” is positioned opposite the thrust “3” that the circlip receives.
CHECKING THE CONNECTIONS

Check the leads, couplers, and connectors for stains, rust, moisture, etc.

1. Disconnect:
   - Lead
   - Coupler
   - Connector

2. Check:
   - Lead
   - Coupler
   - Connector
   Moisture → Dry with an air blower.
   Rust/stains → Connect and disconnect several times.

3. Check:
   - All connections
   Loose connection → Connect properly.

**TIP**

If the pin “1” on the terminal is flattened, bend it up.

4. Connect:
   - Lead
   - Coupler
   - Connector

**TIP**

Make sure all connections are tight.

5. Check:
   - Continuity
     (with the pocket tester)

**Pocket tester**

90890-03112
Analog pocket tester
YU-03112-C

**TIP**

- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (3).
- As a quick remedy, use a contact revitalizer available at most part stores.
SPECIAL TOOLS

The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country. When placing an order, refer to the list provided below to avoid any mistakes.

**TIP**
- For U.S.A. and Canada, use part numbers starting with “YM-”, “YU-”, or “ACC-”.
- For others, use part numbers starting with “90890-”.

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<tr>
<td>YM-04113</td>
<td></td>
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<tr>
<td>Piston pin puller set</td>
<td></td>
<td>5-27</td>
</tr>
<tr>
<td>90890-01304</td>
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<tr>
<td>Piston pin puller</td>
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<tr>
<td>YU-01304</td>
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<tr>
<td>Sheave holder</td>
<td></td>
<td>5-41, 5-44, 5-45</td>
</tr>
<tr>
<td>90890-01481</td>
<td></td>
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<tr>
<td>Locknut wrench</td>
<td></td>
<td>5-41, 5-44</td>
</tr>
<tr>
<td>90890-01348</td>
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<tr>
<td>YM-01348</td>
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<tr>
<td>Tool name/Tool No.</td>
<td>Illustration</td>
<td>Reference pages</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
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</tr>
<tr>
<td>Sheave spring compressor 90890-04134 YM-04134</td>
<td><img src="image1.png" alt="Image" /></td>
<td>5-41, 5-44</td>
</tr>
<tr>
<td>Sheave fixed block 90890-04135 Sheave fixed bracket YM-04135</td>
<td><img src="image2.png" alt="Image" /></td>
<td>5-41, 5-44</td>
</tr>
<tr>
<td>Oil seal guide (ø41) 90890-01396</td>
<td><img src="image3.png" alt="Image" /></td>
<td>5-43</td>
</tr>
<tr>
<td>Sheave holder 90890-01701 Primary clutch holder YS-01880-A</td>
<td><img src="image4.png" alt="Image" /></td>
<td>5-50, 5-51, 5-52</td>
</tr>
<tr>
<td>Flywheel puller 90890-01362 Heavy duty puller YU-33270-B</td>
<td><img src="image5.png" alt="Image" /></td>
<td>5-50</td>
</tr>
<tr>
<td>Rotor holding tool 90890-01235 Universal magneto &amp; rotor holder YU-01235</td>
<td><img src="image6.png" alt="Image" /></td>
<td>5-57, 5-61</td>
</tr>
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<td>Tool name/Tool No.</td>
<td>Illustration</td>
<td>Reference pages</td>
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<tr>
<td>Clutch spring compressor 90890-01482</td>
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<td>5-57, 5-60</td>
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<tr>
<td>Universal clutch holder 90890-04086 YM-91042</td>
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<td>5-57, 5-60</td>
</tr>
<tr>
<td>Plane bearing installer 90890-04139</td>
<td></td>
<td>5-73, 5-76</td>
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<tr>
<td>Radiator cap tester 90890-01325</td>
<td></td>
<td>6-3</td>
</tr>
<tr>
<td>Radiator pressure tester YU-24460-01</td>
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<tr>
<td>Radiator cap tester adapter 90890-01352</td>
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<td>6-3</td>
</tr>
<tr>
<td>Radiator pressure tester adapter YU-33984</td>
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<td>Tool name/Tool No.</td>
<td>Illustration</td>
<td>Reference pages</td>
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<tr>
<td>Mechanical seal installer 90890-04078</td>
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<tr>
<td>Water pump seal installer YM-33221-A</td>
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<tr>
<td>Middle driven shaft bearing driver 90890-04058</td>
<td></td>
<td>6-12</td>
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<tr>
<td>Bearing driver 40 mm YM-04058</td>
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<tr>
<td>Fuel pressure adapter 90890-03181</td>
<td></td>
<td>7-4</td>
</tr>
<tr>
<td>Ignition checker 90890-06754</td>
<td></td>
<td>8-72</td>
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<tr>
<td>Opama pet-4000 spark checker YM-34487</td>
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<th>4B54 (USA)</th>
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<table>
<thead>
<tr>
<th>Dimensions</th>
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<tbody>
<tr>
<td>Overall length</td>
<td>2195 mm (86.4 in)</td>
</tr>
<tr>
<td>Overall width</td>
<td>775 mm (30.5 in)</td>
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<tr>
<td>Overall height</td>
<td>1445 mm (56.9 in)</td>
</tr>
<tr>
<td>Seat height</td>
<td>800 mm (31.5 in)</td>
</tr>
<tr>
<td>Wheelbase</td>
<td>1580 mm (62.2 in)</td>
</tr>
<tr>
<td>Ground clearance</td>
<td>125 mm (4.92 in)</td>
</tr>
<tr>
<td>Minimum turning radius</td>
<td>2800 mm (110.2 in)</td>
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<table>
<thead>
<tr>
<th>Weight</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>With oil and fuel</td>
<td>222.0 kg (489 lb)</td>
</tr>
<tr>
<td>Maximum load</td>
<td>193 kg (425 lb)</td>
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## ENGINE SPECIFICATIONS

### Engine

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine type</td>
<td>Liquid cooled 4-stroke, DOHC</td>
</tr>
<tr>
<td>Displacement</td>
<td>499.0 cm³</td>
</tr>
<tr>
<td>Cylinder arrangement</td>
<td>Forward-inclined parallel 2-cylinder</td>
</tr>
<tr>
<td>Bore × stroke</td>
<td>66.0 × 73.0 mm (2.60 × 2.87 in)</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>11.00 :1</td>
</tr>
<tr>
<td>Standard compression pressure (at sea level)</td>
<td>1400 kPa/360 r/min (199.1 psi/360 r/min) (14.0 kgf/cm²/360 r/min)</td>
</tr>
<tr>
<td>Minimum–maximum</td>
<td>1220–1570 kPa (173.5–223.3 psi) (12.2–15.7 kgf/cm²)</td>
</tr>
<tr>
<td>Starting system</td>
<td>Electric starter</td>
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### Fuel

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>Recommended fuel</td>
<td>Premium unleaded gasoline only</td>
</tr>
<tr>
<td>Fuel tank capacity</td>
<td>15.0 L (3.96 US gal) (3.30 Imp.gal)</td>
</tr>
<tr>
<td>Fuel reserve amount</td>
<td>3.0 L (0.79 US gal) (0.66 Imp.gal)</td>
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</table>

### Engine oil

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lubrication system</td>
<td>Dry sump</td>
</tr>
<tr>
<td>Type</td>
<td>YAMALUBE 4 (10W-40) or SAE 10W-40, YAMALUBE 4 (20W-50) or SAE 20W-50</td>
</tr>
<tr>
<td>Recommended engine oil grade</td>
<td>API service SG type or higher, JASO standard MA</td>
</tr>
<tr>
<td>Engine oil quantity</td>
<td></td>
</tr>
<tr>
<td>Total amount</td>
<td>3.60 L (3.81 US qt) (3.17 Imp.qt)</td>
</tr>
<tr>
<td>Without oil filter cartridge replacement</td>
<td>2.80 L (2.96 US qt) (2.46 Imp.qt)</td>
</tr>
<tr>
<td>With oil filter cartridge replacement</td>
<td>2.90 L (3.07 US qt) (2.55 Imp.qt)</td>
</tr>
<tr>
<td>Oil pressure (hot)</td>
<td>150.0 kPa/1200 r/min (21.8 psi/1200 r/min) (1.50 kgf/cm²/1200 r/min)</td>
</tr>
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### Chain drive oil

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>SAE 80 API GL-4 Hypoid gear oil</td>
</tr>
<tr>
<td>Quantity</td>
<td>0.70 L (0.74 US qt) (0.62 Imp.qt)</td>
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</table>

### Oil filter

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil filter type</td>
<td>Paper</td>
</tr>
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</table>

### Oil pump

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil pump type</td>
<td>Trochoid</td>
</tr>
<tr>
<td>Inner-rotor-to-outer-rotor-tip clearance</td>
<td>0.040–0.120 mm (0.0016–0.0047 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.20 mm (0.0079 in)</td>
</tr>
<tr>
<td>Outer-rotor-to-oil-pump-housing clearance</td>
<td>0.045–0.085 mm (0.0018–0.0033 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.155 mm (0.0061 in)</td>
</tr>
<tr>
<td>Oil-pump-housing-to-inner-and-outer-rotor clearance</td>
<td>0.11–0.23 mm (0.0043–0.0091 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.30 mm (0.0118 in)</td>
</tr>
<tr>
<td>Bypass valve opening pressure</td>
<td>80.0–120.0 kPa (11.6–17.4 psi) (0.80–1.20 kgf/cm²)</td>
</tr>
<tr>
<td>Relief valve operating pressure</td>
<td>450.0–550.0 kPa (65.3–79.8 psi) (4.50–5.50 kgf/cm²)</td>
</tr>
</tbody>
</table>
### ENGINE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Pressure check location</th>
<th>MAIN GALLERY</th>
</tr>
</thead>
</table>

#### Cooling system
- **Radiator capacity (including all routes)**: 1.48 L (1.56 US qt) (1.30 Imp.qt)
- **Coolant reservoir capacity (up to the maximum level mark)**: 0.25 L (0.26 US qt) (0.22 Imp.qt)
- **Radiator cap opening pressure**: 107.9–137.3 kPa (15.6–19.9 psi) (1.08–1.37 kgf/cm²)

#### Thermostat
- **Model/manufacturer**: 4JH/NIPPON THERMOSTAT
- **Valve opening temperature**: 69.0–73.0 °C (156.20–163.40 °F)
- **Valve full open temperature**: 85.0 °C (185.00 °F)
- **Valve lift (full open)**: 8.0 mm (0.31 in)

#### Radiator core
- **Width**: 329.0 mm (12.95 in)
- **Height**: 135.4 mm (5.33 in)
- **Depth**: 24.0 mm (0.94 in)

#### Water pump
- **Water pump type**: Single suction centrifugal pump
- **Reduction ratio**: 23/19 (1.210)
- **Impeller shaft tilt limit**: 0.15 mm (0.0059 in)

#### Spark plug (s)
- **Manufacturer/model**: NGK/CR7E
- **Spark plug gap**: 0.7–0.8 mm (0.028–0.031 in)

#### Cylinder head
- **Volume**: 14.97–15.57 cm³ (0.91–0.95 cu.in)
- **Warpage limit**: 0.03 mm (0.0012 in)

#### Camshaft
- **Drive system**: Chain drive (left)
- **Camshaft cap inside diameter**: 23.000–23.021 mm (0.9055–0.9063 in)
- **Camshaft journal diameter**: 22.967–22.980 mm (0.9042–0.9047 in)
- **Camshaft-journal-to-camshaft-cap clearance**: 0.020–0.054 mm (0.0008–0.0021 in)
- **Camshaft lobe dimensions**
  - **Intake A**: 33.252–33.352 mm (1.3091–1.3131 in)
  - **Limit**: 33.152 mm (1.3052 in)
  - **Intake B**: 24.956–25.056 mm (0.9825–0.9865 in)
  - **Limit**: 24.856 mm (0.9786 in)
  - **Exhaust A**: 33.252–33.352 mm (1.3091–1.3131 in)
  - **Limit**: 33.152 mm (1.3052 in)
  - **Exhaust B**: 24.956–25.056 mm (0.9825–0.9865 in)
### ENGINE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Limit</th>
<th>24.856 mm (0.9786 in)</th>
</tr>
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<tbody>
<tr>
<td></td>
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<tr>
<td>Camshaft runout limit</td>
<td>0.030 mm (0.0012 in)</td>
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</tbody>
</table>

### Timing chain
- **Model/number of links**: SCR-0409 SV/132
- **Tensioning system**: Automatic

### Valve, valve seat, valve guide
- **Valve clearance (cold)**
  - Intake: 0.15–0.20 mm (0.0059–0.0079 in)
  - Exhaust: 0.25–0.30 mm (0.0098–0.0118 in)
- **Valve dimensions**
  - Valve head diameter A (intake): 24.90–25.10 mm (0.9803–0.9882 in)
  - Valve head diameter A (exhaust): 21.90–22.10 mm (0.8622–0.8701 in)
- **Valve face width B**
  - Intake: 1.140–1.980 mm (0.0449–0.0780 in)
  - Exhaust: 1.140–1.980 mm (0.0449–0.0780 in)
- **Valve seat width C**
  - Intake: 0.90–1.10 mm (0.0354–0.0433 in)
  - Limit: 1.6 mm (0.06 in)
  - Exhaust: 0.90–1.10 mm (0.0354–0.0433 in)
  - Limit: 1.6 mm (0.06 in)
- **Valve margin thickness D**
  - Intake: 0.60–0.80 mm (0.0236–0.0315 in)
<table>
<thead>
<tr>
<th>Specification</th>
<th>Minimum/Maximum</th>
<th>Unit (Inches/Seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve margin thickness D (exhaust)</td>
<td>0.60–0.80 mm</td>
<td>(0.0236–0.0315 in)</td>
</tr>
<tr>
<td>Valve stem diameter (intake)</td>
<td>3.975–3.990 mm</td>
<td>(0.1565–0.1571 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>3.945 mm</td>
<td>(0.1553 in)</td>
</tr>
<tr>
<td>Valve stem diameter (exhaust)</td>
<td>3.960–3.975 mm</td>
<td>(0.1559–0.1565 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>3.930 mm</td>
<td>(0.1547 in)</td>
</tr>
<tr>
<td>Valve guide inside diameter (intake)</td>
<td>4.000–4.012 mm</td>
<td>(0.1575–0.1580 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>4.050 mm</td>
<td>(0.1594 in)</td>
</tr>
<tr>
<td>Valve guide inside diameter (exhaust)</td>
<td>4.000–4.012 mm</td>
<td>(0.1575–0.1580 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>4.050 mm</td>
<td>(0.1594 in)</td>
</tr>
<tr>
<td>Valve-stem-to-valve-guide clearance (intake)</td>
<td>0.010–0.037 mm</td>
<td>(0.0004–0.0015 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.080 mm</td>
<td>(0.0032 in)</td>
</tr>
<tr>
<td>Valve-stem-to-valve-guide clearance (exhaust)</td>
<td>0.025–0.052 mm</td>
<td>(0.0010–0.0020 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.100 mm</td>
<td>(0.0039 in)</td>
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<tr>
<td>Valve stem runout</td>
<td>0.040 mm</td>
<td>(0.0016 in)</td>
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<tr>
<td>Cylinder head valve seat width (intake)</td>
<td>0.90–1.10 mm</td>
<td>(0.0354–0.0433 in)</td>
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<tr>
<td>Limit</td>
<td>1.6 mm</td>
<td>(0.06 in)</td>
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<tr>
<td>Cylinder head valve seat width (exhaust)</td>
<td>0.90–1.10 mm</td>
<td>(0.0354–0.0433 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>1.6 mm</td>
<td>(0.06 in)</td>
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<tr>
<td>Valve spring</td>
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<tr>
<td>Free length (intake)</td>
<td>35.59 mm</td>
<td>(1.40 in)</td>
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<tr>
<td>Limit</td>
<td>33.81 mm</td>
<td>(1.33 in)</td>
</tr>
<tr>
<td>Free length (exhaust)</td>
<td>35.59 mm</td>
<td>(1.40 in)</td>
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<tr>
<td>Limit</td>
<td>33.81 mm</td>
<td>(1.33 in)</td>
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<tr>
<td>Installed length (intake)</td>
<td>30.39 mm</td>
<td>(1.20 in)</td>
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<tr>
<td>Installed length (exhaust)</td>
<td>30.39 mm</td>
<td>(1.20 in)</td>
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<tr>
<td>Spring rate K1 (intake)</td>
<td>18.84 N/mm</td>
<td>(107.60 lb/in)</td>
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<tr>
<td>Spring rate K2 (intake)</td>
<td>24.52 N/mm</td>
<td>(140.01 lb/in)</td>
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<tr>
<td>Spring rate K1 (exhaust)</td>
<td>18.84 N/mm</td>
<td>(107.60 lb/in)</td>
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<tr>
<td>Spring rate K2 (exhaust)</td>
<td>24.52 N/mm</td>
<td>(140.01 lb/in)</td>
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<tr>
<td>Installed compression spring force (intake)</td>
<td>91.2–104.9 N</td>
<td>(20.50–23.59 lbf)</td>
</tr>
<tr>
<td>Installed compression spring force (exhaust)</td>
<td>91.2–104.9 N</td>
<td>(20.50–23.59 lbf)</td>
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<tr>
<td>Spring tilt (intake)</td>
<td>2.5°/1.6 mm</td>
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<td>Spring tilt (exhaust)</td>
<td>2.5°/1.6 mm</td>
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Winding direction (intake): Clockwise
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<tr>
<td><strong>Winding direction (exhaust)</strong></td>
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<tr>
<td><strong>Valve lifter</strong></td>
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<tr>
<td>Valve lifter outside diameter (intake)</td>
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<td>Limit</td>
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<tr>
<td>Valve lifter outside diameter (exhaust)</td>
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<td>Limit</td>
</tr>
<tr>
<td><strong>Cylinder</strong></td>
</tr>
<tr>
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<td>Out of round limit</td>
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<tr>
<td><strong>Piston</strong></td>
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<tr>
<td>Piston-to-cylinder clearance</td>
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<tr>
<td>Limit</td>
</tr>
<tr>
<td>Diameter D</td>
</tr>
<tr>
<td>Height H</td>
</tr>
<tr>
<td>Offset</td>
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<td>Offset direction</td>
</tr>
<tr>
<td>Piston pin bore inside diameter</td>
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<td>Limit</td>
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<tr>
<td>Piston pin outside diameter</td>
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<tr>
<td>Limit</td>
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<tr>
<td>Piston-pin-to-piston-pin-bore clearance</td>
</tr>
<tr>
<td><strong>Piston ring</strong></td>
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<td>Dimensions (B × T)</td>
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<td>Limit</td>
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<tr>
<td>Ring type</td>
</tr>
</tbody>
</table>
### Dimensions (B × T)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (B × T)</td>
<td>0.80 × 2.50 mm (0.03 × 0.10 in)</td>
</tr>
</tbody>
</table>

### End gap (installed)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>End gap (installed)</td>
<td>0.40–0.50 mm (0.0157–0.0197 in)</td>
</tr>
</tbody>
</table>

### Ring side clearance

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ring side clearance</td>
<td>0.020–0.055 mm (0.0008–0.0022 in)</td>
</tr>
</tbody>
</table>

### Oil ring

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (B × T)</td>
<td>1.50 × 2.00 mm (0.06 × 0.08 in)</td>
</tr>
</tbody>
</table>

### End gap (installed)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>End gap (installed)</td>
<td>0.10–0.35 mm (0.0039–0.0138 in)</td>
</tr>
</tbody>
</table>

### Ring side clearance

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ring side clearance</td>
<td>0.040–0.160 mm (0.0016–0.0063 in)</td>
</tr>
</tbody>
</table>

### Connecting rod

- **Oil clearance (using plastigauge®)**: 0.026–0.050 mm (0.0010–0.0020 in)
- **Small end inside diameter**: 15.005–15.018 mm (0.5907–0.5913 in)

### Crankshaft

- **Width A**: 50.00–50.60 mm (1.969–1.992 in)
- **Width B**: 118.55–118.60 mm (4.67–4.67 in)
- **Runout limit C**: 0.030 mm (0.0012 in)
- **Big end side clearance D**: 0.160–0.262 mm (0.0063–0.0103 in)
- **Big end radial clearance E**: 0.026–0.050 mm (0.0010–0.0020 in)

### Journal oil clearance (using plastigauge®)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal oil clearance</td>
<td>0.040–0.082 mm (0.0016–0.0032 in)</td>
</tr>
</tbody>
</table>

### Bearing color code


### Crankshaft journal diameter

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crankshaft journal diameter</td>
<td>55.032–55.074 mm (2.1666–2.1683 in)</td>
</tr>
</tbody>
</table>

### Balancer

- **Balancer drive method**: Piston
- **Balancer drive method**: Piston
- **Clutch type**: Wet, multiple-disc automatic
- **Clutch release method**: Automatic
- **Friction plate thickness**: 2.75–3.05 mm (0.108–0.120 in)
- **Wear limit**: 2.65 mm (0.1043 in)
- **Plate quantity**: 5 pcs
- **Clutch plate 1 thickness**: 1.30–1.50 mm (0.051–0.059 in)
### ENGINE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Plate quantity</th>
<th>4 pcs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warpage limit</td>
<td>0.10 mm (0.0039 in)</td>
</tr>
<tr>
<td>Clutch plate 2 thickness</td>
<td>1.80–2.00 mm (0.071–0.079 in)</td>
</tr>
<tr>
<td>Plate quantity</td>
<td>2 pcs</td>
</tr>
<tr>
<td>Warpage limit</td>
<td>0.20 mm (0.0079 in)</td>
</tr>
<tr>
<td>Clutch spring free length</td>
<td>25.80 mm (1.02 in)</td>
</tr>
<tr>
<td>Minimum length</td>
<td>20.40 mm (0.80 in)</td>
</tr>
<tr>
<td>Spring quantity</td>
<td>6 pcs</td>
</tr>
<tr>
<td>Clutch spring plate height</td>
<td>4.70 mm (0.19 in)</td>
</tr>
<tr>
<td>Minimum height</td>
<td>4.40 mm (0.17 in)</td>
</tr>
<tr>
<td>Spring quantity</td>
<td>1 pc</td>
</tr>
<tr>
<td>Clutch damper spring height</td>
<td>3.50 mm (0.14 in)</td>
</tr>
<tr>
<td>Minimum height</td>
<td>3.10 mm (0.12 in)</td>
</tr>
<tr>
<td>Spring quantity</td>
<td>6 pcs</td>
</tr>
</tbody>
</table>

### V-belt
- V-belt width: 32.0 mm (1.26 in)
- Limit: 30.5 mm (1.20 in)

### Transmission
- Transmission type: V-belt automatic
- Primary reduction system: Spur gear/helical gear
- Primary reduction ratio: 52/32 × 36/22 (2.659)
- Secondary reduction system: Chain drive
- Secondary reduction ratio: 41/25 × 40/29 (2.262)
- Operation: Centrifugal automatic type
- Main axle runout limit: 0.08 mm (0.0032 in)
- Drive axle runout limit: 0.08 mm (0.0032 in)

### Air filter
- Air filter element: Oil-coated paper element

### Fuel pump
- Pump type: Electrical
- Model/manufacturer: 4B5/AISAN
- Maximum consumption amperage: 1.9 A
- Output pressure: 246.0–254.0 kPa (35.7–36.8 psi) (2.46–2.54 kgf/cm²)

### Fuel injector
- Model/quantity: 1100-87J80, 1100-87J90/2
- Manufacturer: AISAN

### Throttle body
- Type/quantity: ACW31-3/1
- Manufacturer: MIKUNI
- ID mark: 4B54 10

### Throttle position sensor
- Resistance: 4.0–6.0 kΩ

### Fuel injection sensor
- Crankshaft position sensor resistance: 189–231 Ω at 20 °C (68 °F)
### ENGINE SPECIFICATIONS

| Intake air pressure sensor output voltage | 3.15–4.15 V |
| Intake air temperature sensor resistance | 2.21–2.69 kΩ at 20 °C (68 °F) |
| Coolant temperature sensor resistance | 2.32–2.59 kΩ at 20 °C (68 °F) |
| Coolant temperature sensor resistance | 310–326 Ω at 80 °C (176 °F) |

### Idling condition

| Engine idling speed | 1100–1300 r/min |
| Intake vacuum | 33.0 kPa (9.7 inHg) (248 mmHg) |
| Water temperature | 85.0–100.0 °C (185.00–212.00 °F) |
| Oil temperature | 70.0 °C (158.00 °F) |
| Throttle cable free play | 3.0–5.0 mm (0.12–0.20 in) |
# CHASSIS SPECIFICATIONS

### Chassis

<table>
<thead>
<tr>
<th>Frame type</th>
<th>Diamond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caster angle</td>
<td>25.00°</td>
</tr>
<tr>
<td>Trail</td>
<td>92.0 mm (3.62 in)</td>
</tr>
</tbody>
</table>

### Front wheel

<table>
<thead>
<tr>
<th>Wheel type</th>
<th>Cast wheel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rim size</td>
<td>15M/C × MT3.50</td>
</tr>
<tr>
<td>Rim material</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Wheel travel</td>
<td>120.0 mm (4.72 in)</td>
</tr>
<tr>
<td>Radial wheel runout limit</td>
<td>1.0 mm (0.04 in)</td>
</tr>
<tr>
<td>Lateral wheel runout limit</td>
<td>0.5 mm (0.02 in)</td>
</tr>
<tr>
<td>Wheel axle bending limit</td>
<td>0.25 mm (0.01 in)</td>
</tr>
</tbody>
</table>

### Rear wheel

<table>
<thead>
<tr>
<th>Wheel type</th>
<th>Cast wheel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rim size</td>
<td>15M/C × MT5.00</td>
</tr>
<tr>
<td>Rim material</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Wheel travel</td>
<td>116.0 mm (4.57 in)</td>
</tr>
<tr>
<td>Radial wheel runout limit</td>
<td>1.0 mm (0.04 in)</td>
</tr>
<tr>
<td>Lateral wheel runout limit</td>
<td>0.5 mm (0.02 in)</td>
</tr>
<tr>
<td>Wheel axle bending limit</td>
<td>0.25 mm (0.01 in)</td>
</tr>
</tbody>
</table>

### Front tire

<table>
<thead>
<tr>
<th>Type</th>
<th>Tubeless</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>120/70R15 M/C 56H</td>
</tr>
<tr>
<td>Manufacturer/model</td>
<td>DUNLOP/GPR-100F</td>
</tr>
<tr>
<td>Wear limit (front)</td>
<td>1.0 mm (0.04 in)</td>
</tr>
</tbody>
</table>

### Rear tire

<table>
<thead>
<tr>
<th>Type</th>
<th>Tubeless</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>160/60R15 M/C 67H</td>
</tr>
<tr>
<td>Manufacturer/model</td>
<td>DUNLOP/GPR-100L</td>
</tr>
<tr>
<td>Wear limit (rear)</td>
<td>1.0 mm (0.04 in)</td>
</tr>
</tbody>
</table>

### Tire air pressure (measured on cold tires)

<table>
<thead>
<tr>
<th>Loading condition</th>
<th>0–90 kg (0–198 lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td>225 kPa (33 psi) (2.25 kgf/cm²)</td>
</tr>
<tr>
<td>Rear</td>
<td>250 kPa (36 psi) (2.50 kgf/cm²)</td>
</tr>
<tr>
<td>Loading condition</td>
<td>90–193 kg (198–425 lb)</td>
</tr>
<tr>
<td>Front</td>
<td>225 kPa (33 psi) (2.25 kgf/cm²)</td>
</tr>
<tr>
<td>Rear</td>
<td>280 kPa (41 psi) (2.80 kgf/cm²)</td>
</tr>
</tbody>
</table>

### Front brake

<table>
<thead>
<tr>
<th>Type</th>
<th>Dual disc brake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation</td>
<td>Right hand operation</td>
</tr>
<tr>
<td>Disc outside diameter × thickness</td>
<td>267.0 × 4.0 mm (10.51 × 0.16 in)</td>
</tr>
<tr>
<td>Specification</td>
<td>Value</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>Brake disc thickness limit</td>
<td>3.5 mm (0.14 in)</td>
</tr>
<tr>
<td>Brake disc deflection limit</td>
<td>0.15 mm (0.0059 in)</td>
</tr>
<tr>
<td>Brake pad lining thickness (inner)</td>
<td>4.0 mm (0.16 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.5 mm (0.02 in)</td>
</tr>
<tr>
<td>Brake pad lining thickness (outer)</td>
<td>4.0 mm (0.16 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.5 mm (0.02 in)</td>
</tr>
<tr>
<td>Master cylinder inside diameter</td>
<td>15.00 mm (0.59 in)</td>
</tr>
<tr>
<td>Caliper cylinder inside diameter</td>
<td>27.00 mm (1.06 in)</td>
</tr>
<tr>
<td>Caliper cylinder inside diameter</td>
<td>30.23 mm (1.19 in)</td>
</tr>
<tr>
<td>Recommended fluid</td>
<td>DOT 4</td>
</tr>
</tbody>
</table>

**Rear brake**

| Type                          | Single disc brake          |
| Operation                     | Left hand operation        |
| Disc outside diameter × thickness | 267.0 × 5.0 mm (10.51 × 0.20 in) |
| Brake disc thickness limit     | 4.5 mm (0.18 in)           |
| Brake disc deflection limit    | 0.15 mm (0.0059 in)        |
| Brake pad lining thickness (inner) | 8.0 mm (0.31 in)           |
| Limit                         | 0.8 mm (0.03 in)           |
| Brake pad lining thickness (outer) | 8.0 mm (0.31 in)           |
| Limit                         | 0.8 mm (0.03 in)           |
| Master cylinder inside diameter | 14.0 mm (0.55 in)          |
| Caliper cylinder inside diameter | 38.10 mm (1.50 in)         |
| Recommended fluid             | DOT 4                      |

**Steering**

| Steering bearing type          | Angular bearing            |
| Center to lock angle (left)    | 38.5°                      |
| Center to lock angle (right)   | 38.5°                      |

**Front suspension**

| Type                          | Telescopic fork            |
| Spring/shock absorber type    | Coil spring/oil damper     |
| Front fork travel             | 120.0 mm (4.72 in)         |
| Fork spring free length       | 303.9 mm (11.96 in)        |
| Limit                         | 297.8 mm (11.72 in)        |
| Collar length                 | 195.0 mm (7.68 in)         |
| Installed length              | 284.9 mm (11.22 in)        |
| Spring rate K1                | 8.14 N/mm (46.48 lb/in)    |
| Spring stroke K1              | 0.0–120.0 mm (0.00–4.72 in) |
| Inner tube outer diameter     | 43.0 mm (1.69 in)          |
| Inner tube bending limit       | 0.2 mm (0.01 in)           |
| Optional spring available     | No                         |
| Recommended oil               | Yamaha fork oil 10WT       |
| Quantity                      | 517.0 cm³ (17.48 US oz)    |
| Level                         | 87.0 mm (3.43 in)          |

**Rear suspension**

<p>| Type                          | Swingarm                   |
| Spring/shock absorber type    | Coil spring/gas-oil damper |
| Rear shock absorber assembly travel | 43.3 mm (1.70 in)         |
| Spring free length            | 191.2 mm (7.53 in)         |</p>
<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installed length</td>
<td>180.0 mm (7.09 in)</td>
</tr>
<tr>
<td>Spring rate K1</td>
<td>225.60 N/mm (1288.18 lb/in) (23.00 kgf/mm)</td>
</tr>
<tr>
<td>Spring rate K2</td>
<td>294.00 N/mm (1678.74 lb/in) (29.98 kgf/mm)</td>
</tr>
<tr>
<td>Spring stroke K1</td>
<td>0.0–28.8 mm (0.00–1.13 in)</td>
</tr>
<tr>
<td>Spring stroke K2</td>
<td>28.8–43.0 mm (1.13–1.69 in)</td>
</tr>
<tr>
<td>Optional spring available</td>
<td>No</td>
</tr>
<tr>
<td>Enclosed gas/air pressure (STD)</td>
<td>4900 kPa (696.9 psi) (49.0 kgf/cm²)</td>
</tr>
</tbody>
</table>

**Swingarm**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swingarm end free play limit (radial)</td>
<td>1.0 mm (0.04 in)</td>
</tr>
<tr>
<td>Swingarm end free play limit (axial)</td>
<td>1.0 mm (0.04 in)</td>
</tr>
</tbody>
</table>
## ELECTRICAL SPECIFICATIONS

### Voltage
- **System voltage**: 12 V

### Ignition system
- **Ignition system**: Transistorized coil ignition (digital)
- **Advancer type**: Digital
- **Ignition timing (B.T.D.C.)**: 10.0°/1200 r/min

### Engine control unit
- **Model/manufacturer**: TBDF81/DENSO

### Ignition coil
- **Model/manufacturer**: JO313/DENSO
- **Minimum ignition spark gap**: 6.0 mm (0.24 in)
- **Primary coil resistance**: 1.87 – 2.53 Ω
- **Secondary coil resistance**: 12.00 – 18.00 kΩ

### Spark plug cap
- **Material**: Resin
- **Resistance**: 10.0 kΩ

### AC magneto
- **Model/manufacturer**: F004T39871/MITSUBISHI
- **Standard output**: 14.0 V, 27.0 A 5000 r/min
- **Standard output**: 14.0 V, 378 W 5000 r/min
- **Stator coil resistance**: 0.225 – 0.275 Ω at 20 °C (68 °F)

### Rectifier/regulator
- **Regulator type**: Semi conductor-short circuit
- **Model/manufacturer**: SH678-11/SHINDENGEN
- **Regulated voltage (DC)**: 14.1 – 14.9 V
- **Rectifier capacity (DC)**: 22.0 A
- **Withstand voltage**: 200.0 V

### Battery
- **Model**: YTZ10S
- **Voltage, capacity**: 12 V, 8.6 Ah
- **Manufacturer**: GS YUASA
- **Ten hour rate amperage**: 0.86 A

### Headlight
- **Bulb type**: Halogen bulb

### Bulb voltage, wattage \(\times\) quantity
- **Headlight**: 12 V, 60 W/55.0 W \(\times\) 1
- **Headlight**: 12 V, 55.0 W \(\times\) 1
- **Tail/brake light**: 12 V, 5.0 W/21.0 W \(\times\) 1
- **Front turn signal/position light**: 12 V, 21.0 W/5.0 W \(\times\) 2
- **Rear turn signal light**: 12 V, 21.0 W \(\times\) 2
- **License plate light**: 12 V, 5.0 W \(\times\) 1
<table>
<thead>
<tr>
<th><strong>ELECTRICAL SPECIFICATIONS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meter lighting</strong></td>
</tr>
<tr>
<td><strong>Indicator light</strong></td>
</tr>
<tr>
<td>Turn signal indicator light</td>
</tr>
<tr>
<td>High beam indicator light</td>
</tr>
<tr>
<td>Engine trouble warning light</td>
</tr>
<tr>
<td><strong>Electric starting system</strong></td>
</tr>
<tr>
<td>System type</td>
</tr>
<tr>
<td><strong>Starter motor</strong></td>
</tr>
<tr>
<td>Model/manufacturer</td>
</tr>
<tr>
<td>Power output</td>
</tr>
<tr>
<td>Armature coil resistance</td>
</tr>
<tr>
<td>Brush overall length</td>
</tr>
<tr>
<td>Limit</td>
</tr>
<tr>
<td>Mica undercut (depth)</td>
</tr>
<tr>
<td><strong>Starter relay</strong></td>
</tr>
<tr>
<td>Model/manufacturer</td>
</tr>
<tr>
<td>Amperage</td>
</tr>
<tr>
<td>Coil resistance</td>
</tr>
<tr>
<td><strong>Horn</strong></td>
</tr>
<tr>
<td>Horn type</td>
</tr>
<tr>
<td>Quantity</td>
</tr>
<tr>
<td>Model/manufacturer</td>
</tr>
<tr>
<td>Maximum amperage</td>
</tr>
<tr>
<td>Coil resistance</td>
</tr>
<tr>
<td>Performance</td>
</tr>
<tr>
<td><strong>Turn signal relay</strong></td>
</tr>
<tr>
<td>Relay type</td>
</tr>
<tr>
<td>Model/manufacturer</td>
</tr>
<tr>
<td>Built-in, self-canceling device</td>
</tr>
<tr>
<td>Turn signal blinking frequency</td>
</tr>
<tr>
<td><strong>Fuel sender unit</strong></td>
</tr>
<tr>
<td>Model/manufacturer</td>
</tr>
<tr>
<td>Sender unit resistance (full)</td>
</tr>
<tr>
<td>Sender unit resistance (empty)</td>
</tr>
<tr>
<td><strong>Starting circuit cut-off relay</strong></td>
</tr>
<tr>
<td>Model/manufacturer</td>
</tr>
<tr>
<td><strong>Headlight relay</strong></td>
</tr>
<tr>
<td>Model/manufacturer</td>
</tr>
<tr>
<td><strong>Fan motor relay</strong></td>
</tr>
<tr>
<td>Model/manufacturer</td>
</tr>
</tbody>
</table>
### Fuel injection system relay

| Model/manufacturer | 5JJ/MATSUSHITA |

### Fuses

<table>
<thead>
<tr>
<th>Fuse Type</th>
<th>Amperage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main fuse</td>
<td>30.0 A</td>
</tr>
<tr>
<td>Headlight fuse</td>
<td>20.0 A</td>
</tr>
<tr>
<td>Taillight fuse</td>
<td>10.0 A</td>
</tr>
<tr>
<td>Signaling system fuse</td>
<td>15.0 A</td>
</tr>
<tr>
<td>Ignition fuse</td>
<td>10.0 A</td>
</tr>
<tr>
<td>Radiator fan fuse</td>
<td>15.0 A</td>
</tr>
<tr>
<td>Fuel injection system fuse</td>
<td>10.0 A</td>
</tr>
<tr>
<td>Backup fuse</td>
<td>10.0 A</td>
</tr>
<tr>
<td>Spare fuse</td>
<td>30.0 A</td>
</tr>
<tr>
<td>Spare fuse</td>
<td>20.0 A</td>
</tr>
<tr>
<td>Spare fuse</td>
<td>15.0 A</td>
</tr>
<tr>
<td>Spare fuse</td>
<td>10.0 A</td>
</tr>
</tbody>
</table>
GENERAL TIGHTENING TORQUE SPECIFICATIONS

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening torque specifications for special components or assemblies are provided for each chapter of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross pattern and progressive stages until the specified tightening torque is reached. Unless otherwise specified, tightening torque specifications require clean, dry threads. Components should be at room temperature.

A. Distance between flats
B. Outside thread diameter

<table>
<thead>
<tr>
<th>A (nut)</th>
<th>B (bolt)</th>
<th>General tightening torques</th>
<th>Nm</th>
<th>m·kg</th>
<th>ft·lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 mm</td>
<td>6 mm</td>
<td></td>
<td>6</td>
<td>0.6</td>
<td>4.3</td>
</tr>
<tr>
<td>12 mm</td>
<td>8 mm</td>
<td></td>
<td>15</td>
<td>1.5</td>
<td>11</td>
</tr>
<tr>
<td>14 mm</td>
<td>10 mm</td>
<td></td>
<td>30</td>
<td>3.0</td>
<td>22</td>
</tr>
<tr>
<td>17 mm</td>
<td>12 mm</td>
<td></td>
<td>55</td>
<td>5.5</td>
<td>40</td>
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<tr>
<td>19 mm</td>
<td>14 mm</td>
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<td>85</td>
<td>8.5</td>
<td>61</td>
</tr>
<tr>
<td>22 mm</td>
<td>16 mm</td>
<td></td>
<td>130</td>
<td>13.0</td>
<td>94</td>
</tr>
</tbody>
</table>
## ENGINE TIGHTENING TORQUES

<table>
<thead>
<tr>
<th>Item</th>
<th>Thread size</th>
<th>Q’ty</th>
<th>Tightening torque</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camshaft cap</td>
<td>M6</td>
<td>12</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Engine oil check bolt</td>
<td>M8</td>
<td>1</td>
<td>20 Nm (2.0 m-kg, 14 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Exhaust pipe stud bolt</td>
<td>M8</td>
<td>4</td>
<td>15 Nm (1.5 m-kg, 11 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Cylinder head nut</td>
<td>M9</td>
<td>4</td>
<td>35 Nm (3.5 m-kg, 25 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Cylinder head nut</td>
<td>M9</td>
<td>2</td>
<td>46 Nm (4.6 m-kg, 33 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Cylinder head bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Cylinder bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
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<tr>
<td>Spark plug</td>
<td>M10</td>
<td>2</td>
<td>13 Nm (1.3 m-kg, 9.4 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Cylinder head cover bolt</td>
<td>M6</td>
<td>10</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Timing chain tensioner rod accessing plug</td>
<td>M20</td>
<td>1</td>
<td>12 Nm (1.2 m-kg, 8.7 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Cylinder head stud bolt</td>
<td>M9</td>
<td>6</td>
<td>13 Nm (1.3 m-kg, 9.4 ft-lb)</td>
<td>See TIP.</td>
</tr>
<tr>
<td>Connecting rod nut (1st)</td>
<td>M7</td>
<td>4</td>
<td>16 Nm (1.6 m-kg, 11 ft-lb)</td>
<td>See TIP.</td>
</tr>
<tr>
<td>Connecting rod nut (final)</td>
<td>M7</td>
<td>4</td>
<td>Specified angle 90°</td>
<td></td>
</tr>
<tr>
<td>Balancer connecting rod nut</td>
<td>M9</td>
<td>2</td>
<td>60 Nm (6.0 m-kg, 43 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Balancer cylinder bolt</td>
<td>M10</td>
<td>4</td>
<td>58 Nm (5.8 m-kg, 42 ft-lb)</td>
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</tr>
<tr>
<td>Generator rotor nut (1st)</td>
<td>M18</td>
<td>1</td>
<td>65 Nm (6.5 m-kg, 47 ft-lb)</td>
<td>See TIP.</td>
</tr>
<tr>
<td>Generator rotor nut (final)</td>
<td>M18</td>
<td>1</td>
<td>Specified angle 120°</td>
<td>See TIP.</td>
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<tr>
<td>Timing chain tensioner bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
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</tr>
<tr>
<td>Timing chain guide (intake side) bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Water pump housing cover bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
<td></td>
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<tr>
<td>Water pump assembly bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
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<tr>
<td>Water pump inlet and outlet pipes bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
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<tr>
<td>Thermostat cover bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Radiator guard bolt</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Radiator filler pipe bolt</td>
<td>M6</td>
<td>1</td>
<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Coolant pipe bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
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<tr>
<td>Oil pump assembly bolt</td>
<td>M6</td>
<td>3</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Oil strainer bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
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</tr>
<tr>
<td>Oil filter cartridge union bolt</td>
<td>M20</td>
<td>1</td>
<td>63 Nm (6.3 m-kg, 45 ft-lb)</td>
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<tr>
<td>Oil filter cartridge</td>
<td>M20</td>
<td>1</td>
<td>17 Nm (1.7 m-kg, 12 ft-lb)</td>
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</tr>
<tr>
<td>Oil delivery pipe bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
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<tr>
<td>Intake manifold bolt</td>
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<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
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<tr>
<td>Air filter case bolt</td>
<td>M6</td>
<td>2</td>
<td>9 Nm (0.9 m-kg, 6.5 ft-lb)</td>
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<tr>
<td>Fuel injector bolt</td>
<td>M6</td>
<td>2</td>
<td>12 Nm (1.2 m-kg, 8.7 ft-lb)</td>
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</tr>
<tr>
<td>Exhaust pipe nut</td>
<td>M8</td>
<td>3</td>
<td>20 Nm (2.0 m-kg, 14 ft-lb)</td>
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</tr>
<tr>
<td>Item</td>
<td>Thread size</td>
<td>Q’ty</td>
<td>Tightening torque</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-------------</td>
<td>------</td>
<td>-------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Muffler nut</td>
<td>M10</td>
<td>1</td>
<td>31 Nm (3.1 m·kg, 22 ft·lb)</td>
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<tr>
<td>Muffler end protector bolt</td>
<td>M6</td>
<td>3</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Exhaust pipe protector bolt</td>
<td>M6</td>
<td>1</td>
<td>8 Nm (0.8 m·kg, 5.8 ft·lb)</td>
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<tr>
<td>Muffler end protector cover bolt</td>
<td>M6</td>
<td>5</td>
<td>8 Nm (0.8 m·kg, 5.8 ft·lb)</td>
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<tr>
<td>Muffler protector (side) bolt</td>
<td>M6</td>
<td>2</td>
<td>8 Nm (0.8 m·kg, 5.8 ft·lb)</td>
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<tr>
<td>Muffler protector (upper) bolt</td>
<td>M6</td>
<td>2</td>
<td>8 Nm (0.8 m·kg, 5.8 ft·lb)</td>
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<tr>
<td>Crankcase bolt</td>
<td>M6</td>
<td>5</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Crankcase bolt</td>
<td>M6</td>
<td>8</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Crankcase bolt</td>
<td>M8</td>
<td>8</td>
<td>24 Nm (2.4 m·kg, 17 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Engine oil pressure check point plug</td>
<td>M20</td>
<td>1</td>
<td>12 Nm (1.2 m·kg, 8.7 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Engine oil passage bolt</td>
<td>M8</td>
<td>1</td>
<td>20 Nm (2.0 m·kg, 14 ft·lb)</td>
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<tr>
<td>Engine oil drain bolt</td>
<td>M14</td>
<td>1</td>
<td>43 Nm (4.3 m·kg, 31 ft·lb)</td>
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<tr>
<td>Oil tank bolt</td>
<td>M6</td>
<td>7</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Stator coil base screw</td>
<td>M6</td>
<td>3</td>
<td>12 Nm (1.2 m·kg, 8.7 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Timing mark accessing plug</td>
<td>M16</td>
<td>1</td>
<td>8 Nm (0.8 m·kg, 5.8 ft·lb)</td>
<td></td>
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<tr>
<td>Generator cover bolt</td>
<td>M6</td>
<td>19</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Outer V-belt case bolt</td>
<td>M6</td>
<td>4</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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</tr>
<tr>
<td>Outer V-belt case bolt</td>
<td>M8</td>
<td>6</td>
<td>24 Nm (2.4 m·kg, 17 ft·lb)</td>
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<tr>
<td>Inner V-belt case plate bolt</td>
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<td>3</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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<tr>
<td>Inner V-belt case bolt</td>
<td>M8</td>
<td>2</td>
<td>24 Nm (2.4 m·kg, 17 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Crankshaft end access cover screw</td>
<td>M6</td>
<td>3</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>V-belt case air filter case screw</td>
<td>M6</td>
<td>3</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Generator cover protector screw</td>
<td>M6</td>
<td>1</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
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<tr>
<td>V-belt case air filter case cover screw</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Generator cover protector cover screw</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
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<tr>
<td>V-belt case air filter element (left) bolt</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Starter clutch bolt</td>
<td>M8</td>
<td>3</td>
<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Clutch boss nut</td>
<td>M48</td>
<td>1</td>
<td>130 Nm (13.0 m·kg, 94 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Clutch assembly nut</td>
<td>M16</td>
<td>1</td>
<td>65 Nm (6.5 m·kg, 47 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Primary sheave nut</td>
<td>M20</td>
<td>1</td>
<td>160 Nm (16.0 m·kg, 115 ft·lb)</td>
<td>Shell BT grease 3®</td>
</tr>
<tr>
<td>Secondary sheave spring seat nut</td>
<td>M36</td>
<td>1</td>
<td>90 Nm (9.0 m·kg, 65 ft·lb)</td>
<td></td>
</tr>
</tbody>
</table>
## TIGHTENING TORQUES

<table>
<thead>
<tr>
<th>Item</th>
<th>Thread size</th>
<th>Q’ty</th>
<th>Tightening torque</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary sheave nut</td>
<td>M18</td>
<td>1</td>
<td>90 Nm (9.0 m·kg, 65 ft·lb)</td>
<td>BEL-RAY assembly lube®</td>
</tr>
<tr>
<td>Crankshaft right end bearing re-</td>
<td>M6</td>
<td>1</td>
<td>11 Nm (1.1 m·kg, 8.0 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>tainer screw</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary shaft bearing retainer</td>
<td>M6</td>
<td>2</td>
<td>12 Nm (1.2 m·kg, 8.7 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>bolt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stator coil bolt</td>
<td>M6</td>
<td>3</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Crankshaft position sensor bolt</td>
<td>M5</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Starter motor bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Starter motor insulator nut</td>
<td>M6</td>
<td>1</td>
<td>11 Nm (1.1 m·kg, 8.0 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>O₂ sensor</td>
<td>M18</td>
<td>1</td>
<td>45 Nm (4.5 m·kg, 32 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Coolant temperature sensor</td>
<td>M12</td>
<td>1</td>
<td>18 Nm (1.8 m·kg, 13 ft·lb)</td>
<td></td>
</tr>
</tbody>
</table>

**TIP**

**Cylinder head stud bolt**

The tightening torque is for reference only. Install the cylinder head stud bolt so that it protrudes 151.1–151.3 mm (5.95–5.96 in) from the crankcase.

**TIP**

**Connecting rod nut**

Tighten the connecting rod nuts to 16 Nm (1.6 m·kg, 11 ft·lb), and then tighten them further to reach the specified angle 90°.

**TIP**

**Generator rotor nut**

Tighten the generator rotor nuts to 65 Nm (6.5 m·kg, 47 ft·lb), and then tighten them further to reach the specified angle 120°.
Cylinder head tightening sequence:
## CHASSIS TIGHTENING TORQUES

<table>
<thead>
<tr>
<th>Item</th>
<th>Thread size</th>
<th>Q’ty</th>
<th>Tightening torque</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine mounting bolt (front upper side)</td>
<td>M12</td>
<td>1</td>
<td>88 Nm (8.8 m·kg, 64 ft·lb)</td>
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</tr>
<tr>
<td>Engine mounting bolt (front right lower side)</td>
<td>M10</td>
<td>2</td>
<td>45 Nm (4.5 m·kg, 32 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Engine mounting bolt (front left lower side)</td>
<td>M10</td>
<td>2</td>
<td>45 Nm (4.5 m·kg, 32 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Engine mounting nut (rear side)</td>
<td>M12</td>
<td>1</td>
<td>105 Nm (10.5 m·kg, 75 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Rear frame bolt</td>
<td>M12</td>
<td>2</td>
<td>83 Nm (8.3 m·kg, 60 ft·lb)</td>
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</tr>
<tr>
<td>Front cowling stay bolt (front side)</td>
<td>M10</td>
<td>2</td>
<td>48 Nm (4.8 m·kg, 35 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Front cowling stay bolt (rear side)</td>
<td>M8</td>
<td>2</td>
<td>23 Nm (2.3 m·kg, 17 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Radiator bracket bolt</td>
<td>M8</td>
<td>4</td>
<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Footrest board bracket bolt</td>
<td>M8</td>
<td>2</td>
<td>23 Nm (2.3 m·kg, 17 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Footrest board cover bolt</td>
<td>M6</td>
<td>8</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Radiator filler pipe bracket bolt</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Main switch/immobilizer unit bolt</td>
<td>M8</td>
<td>2</td>
<td>23 Nm (2.3 m·kg, 17 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Fuel tank bracket bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Frame cross member bolt</td>
<td>M6</td>
<td>3</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Muffler bracket nut</td>
<td>M10</td>
<td>1</td>
<td>32 Nm (3.2 m·kg, 23 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Tail bracket bolt</td>
<td>M8</td>
<td>2</td>
<td>16 Nm (1.6 m·kg, 11 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Taillight assembly bolt</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Seat hinge assembly bolt</td>
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<td>16 Nm (1.6 m·kg, 11 ft·lb)</td>
<td></td>
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<tr>
<td>Seat hinge damper ball joint</td>
<td>M8</td>
<td>2</td>
<td>16 Nm (1.6 m·kg, 11 ft·lb)</td>
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</tr>
<tr>
<td>Fuel tank bolt</td>
<td>M6</td>
<td>4</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Fuel pump bolt</td>
<td>M6</td>
<td>6</td>
<td>4 Nm (0.4 m·kg, 2.9 ft·lb)</td>
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<tr>
<td>Canister bracket nut</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Canister bolt</td>
<td>M6</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Storage box bolt</td>
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<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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</tr>
<tr>
<td>Seat lock bolt</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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</tr>
<tr>
<td>Seat hinge housing</td>
<td>M6</td>
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<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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<tr>
<td>Fuel tank cover bolt</td>
<td>M6</td>
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<tr>
<td>Grab bar bolt</td>
<td>M8</td>
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<td>16 Nm (1.6 m·kg, 11 ft·lb)</td>
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<tr>
<td>Seat nut</td>
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<td>4</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Front cowling assembly bolt</td>
<td>M6</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Storage compartment bracket bolt</td>
<td>M8</td>
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<td>23 Nm (2.3 m·kg, 17 ft·lb)</td>
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<tr>
<td>Battery holder bolt</td>
<td>M6</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Windshield bolt</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Rearview mirror nut</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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## TIGHTENING TORQUES

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<th>Tightening torque</th>
<th>Remarks</th>
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<td>Pivot shaft</td>
<td>M22</td>
<td>1</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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</tr>
<tr>
<td>Pivot shaft nut</td>
<td>M22</td>
<td>1</td>
<td>100 Nm (10.0 m·kg, 72 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Swingarm bolt</td>
<td>M10</td>
<td>3</td>
<td>40 Nm (4.0 m·kg, 29 ft·lb)</td>
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</tr>
<tr>
<td>Swingarm damper nut</td>
<td>M6</td>
<td>1</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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</tr>
<tr>
<td>Rear shock absorber assembly rear nut</td>
<td>M12</td>
<td>1</td>
<td>53 Nm (5.3 m·kg, 38 ft·lb)</td>
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<tr>
<td>Rear shock absorber assembly front bolt</td>
<td>M16</td>
<td>1</td>
<td>68 Nm (6.8 m·kg, 49 ft·lb)</td>
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</tr>
<tr>
<td>Upper bracket pinch bolt</td>
<td>M8</td>
<td>2</td>
<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Lower bracket pinch bolt</td>
<td>M8</td>
<td>4</td>
<td>26 Nm (2.6 m·kg, 19 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Lower bracket cover bolt</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
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<tr>
<td>Horn bracket nut</td>
<td>M8</td>
<td>1</td>
<td>16 Nm (1.6 m·kg, 11 ft·lb)</td>
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</tr>
<tr>
<td>Front fork cap bolt</td>
<td>M40</td>
<td>2</td>
<td>23 Nm (2.3 m·kg, 17 ft·lb)</td>
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<tr>
<td>Damper rod bolt</td>
<td>M10</td>
<td>2</td>
<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
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<tr>
<td>Steering stem nut</td>
<td>M28</td>
<td>1</td>
<td>115 Nm (11.5 m·kg, 85 ft·lb)</td>
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</tr>
<tr>
<td>Lower ring nut (initial tightening torque)</td>
<td>M30</td>
<td>1</td>
<td>52 Nm (5.2 m·kg, 37 ft·lb)</td>
<td>See TIP.</td>
</tr>
<tr>
<td>Lower ring nut (final tightening torque)</td>
<td>M30</td>
<td>1</td>
<td>14 Nm (1.4 m·kg, 10 ft·lb)</td>
<td>See TIP.</td>
</tr>
<tr>
<td>Handlebar nut</td>
<td>M10</td>
<td>2</td>
<td>40 Nm (4.0 m·kg, 29 ft·lb)</td>
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</tr>
<tr>
<td>Brake hose union bolt</td>
<td>M10</td>
<td>4</td>
<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Brake master cylinder holder bolt</td>
<td>M6</td>
<td>4</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Brake lever pivot nut</td>
<td>M6</td>
<td>2</td>
<td>6 Nm (0.6 m·kg, 4.3 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Grip end</td>
<td>M16</td>
<td>2</td>
<td>26 Nm (2.6 m·kg, 19 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Front fender bolt</td>
<td>M6</td>
<td>6</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Front wheel axle</td>
<td>M18</td>
<td>1</td>
<td>72 Nm (7.2 m·kg, 52 ft·lb)</td>
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</tr>
<tr>
<td>Front wheel axle pinch bolt</td>
<td>M8</td>
<td>1</td>
<td>20 Nm (2.0 m·kg, 14 ft·lb)</td>
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</tr>
<tr>
<td>Rear wheel axle nut</td>
<td>M14</td>
<td>1</td>
<td>105 Nm (10.5 m·kg, 75 ft·lb)</td>
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</tr>
<tr>
<td>Rear wheel axle bolt</td>
<td>M8</td>
<td>1</td>
<td>17 Nm (1.7 m·kg, 12 ft·lb)</td>
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</tr>
<tr>
<td>Front brake caliper bolt</td>
<td>M10</td>
<td>4</td>
<td>40 Nm (4.0 m·kg, 29 ft·lb)</td>
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<tr>
<td>Front reflector nut</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Front brake caliper bleed screw</td>
<td>M8</td>
<td>2</td>
<td>5 Nm (0.5 m·kg, 3.6 ft·lb)</td>
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<tr>
<td>Rear brake caliper bolt</td>
<td>M10</td>
<td>2</td>
<td>40 Nm (4.0 m·kg, 29 ft·lb)</td>
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<tr>
<td>Rear brake caliper retaining bolt</td>
<td>M10</td>
<td>2</td>
<td>31 Nm (3.1 m·kg, 22 ft·lb)</td>
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<tr>
<td>Rear brake caliper rear brake lock cable holder bolt</td>
<td>M8</td>
<td>1</td>
<td>22 Nm (2.2 m·kg, 16 ft·lb)</td>
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</tr>
<tr>
<td>Rear brake caliper bleed screw</td>
<td>M7</td>
<td>2</td>
<td>6 Nm (0.6 m·kg, 4.3 ft·lb)</td>
<td></td>
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<tr>
<td>Front brake disc bolt</td>
<td>M6</td>
<td>12</td>
<td>18 Nm (1.8 m·kg, 13 ft·lb)</td>
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</tr>
<tr>
<td>Wheel ring bolt</td>
<td>M6</td>
<td>3</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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</tbody>
</table>
### TIGHTENING TORQUES

<table>
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<tr>
<th>Item</th>
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<th>Tightening torque</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear brake disc bolt</td>
<td>M6</td>
<td>6</td>
<td>18 Nm (1.8 m·kg, 13 ft·lb)</td>
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<tr>
<td>Rear wheel drive hub bolt</td>
<td>M10</td>
<td>4</td>
<td>69 Nm (6.9 m·kg, 50 ft·lb)</td>
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<tr>
<td>Front brake hose joint bolt</td>
<td>M6</td>
<td>1</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td>-</td>
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<tr>
<td>Front brake hose holder bolt</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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</tr>
<tr>
<td>Rear brake hose holder bolt</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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</tr>
<tr>
<td>Rear brake lock cable holder bolt</td>
<td>M6</td>
<td>1</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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</tr>
<tr>
<td>Centerstand bracket nut</td>
<td>M10</td>
<td>4</td>
<td>55 Nm (5.5 m·kg, 40 ft·lb)</td>
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<tr>
<td>Centerstand nut</td>
<td>M10</td>
<td>2</td>
<td>55 Nm (5.5 m·kg, 40 ft·lb)</td>
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<tr>
<td>Sidestand nut</td>
<td>M10</td>
<td>1</td>
<td>39 Nm (3.9 m·kg, 28 ft·lb)</td>
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<tr>
<td>Passenger footrest bolt</td>
<td>M8</td>
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<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
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<tr>
<td>ECU (engine control unit) bolt</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Rectifier/regulator bolt</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Transmission chain drive case cover screw</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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</tr>
<tr>
<td>Transmission chain drive holder assembly</td>
<td>M10</td>
<td>3</td>
<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
<td>-</td>
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<tr>
<td>Chain drive oil drain bolt</td>
<td>M12</td>
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<td>20 Nm (2.0 m·kg, 14 ft·lb)</td>
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<tr>
<td>Outer chain drive case</td>
<td>M6</td>
<td>18</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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</tr>
</tbody>
</table>

**TIP**

1. First, tighten the lower ring nut to approximately 52 Nm (5.2 m·kg, 37 ft·lb) with a torque wrench, then loosen the lower ring nut completely.
2. Retighten the lower ring nut to 14 Nm (1.4 m·kg, 10 ft·lb) with a torque wrench.
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<thead>
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<th>Lubricant</th>
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</thead>
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<tr>
<td>O-rings</td>
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<tr>
<td>Bearings</td>
<td></td>
</tr>
<tr>
<td>Cylinder head nut seats and washers</td>
<td></td>
</tr>
<tr>
<td>Camshaft cap bolt seats</td>
<td></td>
</tr>
<tr>
<td>Big end bearings and crank pins</td>
<td></td>
</tr>
<tr>
<td>Connecting rod big end contact surfaces (to crank)</td>
<td></td>
</tr>
<tr>
<td>Balancer big end bearings and crank pin</td>
<td></td>
</tr>
<tr>
<td>Balancer connecting rod big end contact surface (to crank)</td>
<td></td>
</tr>
<tr>
<td>Pistons, ring grooves, and piston rings</td>
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<tr>
<td>Cylinder inner surface</td>
<td></td>
</tr>
<tr>
<td>Piston pins</td>
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<tr>
<td>Connecting rod bolt threads and nut seats</td>
<td></td>
</tr>
<tr>
<td>Balancer connecting rod bolt threads and nut seats</td>
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<tr>
<td>Crankshaft journal bearings and crankshaft journals</td>
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<tr>
<td>Balancer piston surface</td>
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<tr>
<td>Balancer cylinder inner surface</td>
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<td>Balancer piston pin</td>
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<tr>
<td>Camshaft cam lobes and camshaft journals</td>
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<tr>
<td>Valves and valve stems</td>
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<tr>
<td>Valve stem seals</td>
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<td>Valve pads</td>
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<td>Valve lifters</td>
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<tr>
<td>Impeller shaft</td>
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<tr>
<td>Oil pump rotors (inner and outer)</td>
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<tr>
<td>Oil pump driven gear shaft</td>
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<td>Oil filter cartridge union bolt threads and washer</td>
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<td>Oil pump gaskets</td>
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<td>Fuel injector gaskets and O-ring</td>
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<tr>
<td>Exhaust pipe gaskets</td>
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<td>Starter clutch idle gear inner surface</td>
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<td>Starter clutch idle gear shaft</td>
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<tr>
<td>Starter clutch and starter clutch gear</td>
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<tr>
<td>Lubrication point</td>
<td>Lubricant</td>
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<tr>
<td>1st pinion gear spline and main axle spline</td>
<td><img src="image2.png" alt="Image" /></td>
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<tr>
<td>1st wheel gear spline and drive axle spline</td>
<td><img src="image3.png" alt="Image" /></td>
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<tr>
<td>Crankshaft right end spacer and O-rings</td>
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<tr>
<td>Crankshaft right end threads</td>
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<td>Primary sheave nut seats</td>
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<td>Secondary shaft right end threads</td>
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<td>Cylinder head cover inner gaskets mating surface</td>
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<td>Timing chain guide (upper side) mating surface</td>
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<td>Inner V-belt case seal mating surface</td>
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<tr>
<td>Crankshaft position sensor/stator assembly lead grommet</td>
<td>Yamaha bond No.1215 (Three bond No.1215®)</td>
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<td>Lubrication point</td>
<td>Lubricant</td>
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<td>Steering bearing races (inner and outer)</td>
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<td>Transmission chain drive taper roller bearing</td>
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<td>Transmission chain drive case bearings</td>
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<td>Rear shock absorber assembly spacer and collar</td>
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<td>Seat hinge metal-to-metal moving parts</td>
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<td>Seat lock cable</td>
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<td>Passenger footrest pivoting point</td>
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<td>Centerstand pivoting point and metal-to-metal moving parts</td>
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<tr>
<td>Sidestand pivoting point and metal-to-metal moving parts</td>
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<tr>
<td>Front wheel oil seal lip</td>
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<tr>
<td>Rear wheel oil seal lip</td>
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</tbody>
</table>
1. Oil delivery pipe
2. Oil pump
3. Oil cooler
4. Oil filter cartridge
5. Oil pipe
6. Oil strainer
1. Secondary shaft
2. Drive axle
3. Clutch
4. Crankshaft
1. Radiator cap
2. Radiator filler hose
3. Radiator inlet hose
4. Coolant reservoir
5. Coolant pipe
6. Thermostat outlet hose
7. Oil cooler outlet hose
8. Thermostat
9. Oil cooler
10. Coolant hose
11. Water pump inlet pipe
12. Water pump outlet pipe
13. Oil cooler inlet hose
14. Radiator outlet hose
15. Fast idle plunger outlet coolant hose
16. Radiator
17. Cooling system air bleed hose
18. Coolant reservoir hose
19. Water pump
20. Fast idle plunger
1. Thermostat outlet hose
2. Cooling system air bleed hose
3. Radiator cap
4. Radiator filler pipe
5. Radiator filler hose
6. Coolant reservoir hose
7. Radiator
8. Radiator inlet hose
9. Coolant reservoir
10. Coolant reservoir breather hose
11. Oil cooler outlet hose
12. Coolant pipe
1. Rear brake hose
2. Left handlebar switch lead
3. Right handlebar switch lead
4. Front brake hose
5. Throttle cable (decelerator cable)
6. Throttle cable (accelerator cable)
7. Rear brake lock cable
8. Front brake light switch connectors
   A. Fasten the rear brake hose with the holder.
   B. Fasten the front brake pipe with the holder.
   C. Fasten the left and right handlebar switch leads with the holder.
   D. Fasten the front brake hose with the holder.
   E. Fasten the rear brake lock cable with the holder.
   F. Fasten the throttle cables with the holder.
   G. Route the right handlebar switch lead behind the handlebar, and then route it through the opening in the handlebar toward the front of the vehicle.
   H. Route the throttle cables behind the rear brake hose.
   I. Route the left handlebar switch lead behind the handlebar, and then route it through the opening in the handlebar toward the front of the vehicle.
   J. Route the rear brake hose in front of the handlebar, and then route it through the opening in the handlebar toward the rear of the vehicle.
   K. Route the left handlebar switch lead behind the front brake pipe.
   L. Route the rear brake lock cable behind the handlebar and throttle cables.
   M. Route the right handlebar switch lead along the handlebar in the area shown in the illustration.
   N. Fasten the right handlebar switch lead with the plastic band, making sure to point the end of the band inward.
   O. Route the throttle cables behind the handlebar and in front of the rear brake lock cable.
   P. Install the front brake light switch connectors so that the leads are routed inward.
1. Front brake pipe
2. Wire harness (to horn)
3. Front brake hose (to left front brake caliper)
4. Front brake hose (to right front brake caliper)
5. Horn
6. Speed sensor lead
7. Speed sensor
   A. Fasten the wire harness (to horn) and front brake pipe with plastic locking ties, making sure to position each tie 0–5 mm (0–0.20 in) from the bends in the pipe.
   B. Route the wire harness (to horn) along the front brake pipe, making sure that there is no slack in the lead.
   C. Pass the speed sensor lead through the hole in the lower bracket cover.
   D. 20–30 mm (0.8–1.2 in)
   E. Fasten the speed sensor lead and front brake hose (to left front brake caliper) with a plastic locking tie, making sure to align the tie with the white paint mark on the lead.
   F. Make sure that the horn coupler is completely seated on the horn terminals.
   G. Pass the speed sensor lead between the front brake pipe and the wire harness (to horn).
   H. Point the end of the plastic locking tie inward, angled rearward, and then cut off the excess end of the tie to 5–10 mm (0.20–0.39 in).
   I. 86–96 mm (3.4–3.8 in)
   J. Fasten the grommet on the speed sensor lead with the holder.
   K. Route the speed sensor lead to the inside of the front brake hose (to left front brake caliper).
   L. Pass the speed sensor lead through the upper and lower portions of the guide.
1. Left handlebar switch lead
2. Right handlebar switch lead
3. Rectifier/regulator
4. Throttle cable (accelerator cable)
5. Throttle cable (decelerator cable)
6. Rear brake hose
7. Fuel tank overflow hose
8. Spark plug lead #1
9. Spark plug lead #2
10. Speed sensor lead
11. Starter motor lead
12. Positive battery lead
13. Wire harness (to starter relay)
14. Generator lead
15. Wire harness
16. Wire harness (to sidestand switch)
17. Wire harness (to ignition coil)
18. Front brake pipe
19. Crankshaft position sensor coupler
20. Stator coil coupler
21. Speed sensor coupler
22. Horn
23. Lean angle sensor
24. Starting circuit cut-off relay
25. Radiator fan motor relay
26. Fuel injection system relay
27. Wire harness (to meter assembly)
28. Wire harness (to right handlebar switch)
29. Wire harness (to left handlebar switch)
30. Wire harness (to relays)
31. Wire harness (to headlight relay)
32. Lean angle sensor lead
33. Negative battery lead
34. Wire harness (to speed sensor)
A. Fasten the speed sensor lead at the white paint mark with the plastic locking tie.
B. Pass the throttle cables and rear brake hose through the guide, making sure to route the cables to the outside of the hose.
C. Route the throttle cables to the inside of the rear brake hose.
D. To starter motor and engine
E. Route the generator lead and starter motor lead below the engine mounting bolt.
F. Route the fuel tank overflow hose and sidestand switch lead to the inside of the radiator outlet hose.
G. Route the sidestand switch lead to the front of the footrest board bracket.
H. Install the ignition coil connectors so that the leads are routed outward.
I. Route the wire harness (to left headlight) to the outside of the starter motor lead.
J. To left headlight unit
K. Cut off the excess end of the plastic locking tie to 5–10 mm (0.20–0.39 in).
L. Point the end of the plastic band inward.
M. Route the starter motor lead to the outside of the other leads.
N. Face the catch of the holder outward.
O. Outward
P. Route the starter motor lead and generator lead to the outside of the wire harness.
Q. To meter assembly
R. Route the wire harness (to starter relay) behind the starter relay.
S. Pass the left and right handlebar switch leads through the opening in the front cowling stay as shown in the illustration.
T. Fasten the speed sensor lead with the plastic band, making sure to position the band next to the speed sensor coupler.
U. Route the speed sensor lead behind the front brake pipe.
V. Fasten the fuse box lead to the front cowling stay with the plastic band.
W. Route the positive battery lead above the battery holder bolt.
X. Face the catch of the holder upward.
Y. Face the catch of the holder forward.
Z. Point the end of the plastic band forward.
AA. Point the end of the plastic band upward.
AB. Fasten the wire harness by sliding the plastic holder on the harness onto the stud on the front cowling stay.
1. Positive battery lead
2. Fuse box
3. Negative battery lead
4. Cooling system air bleed hose
5. Wire harness
6. Turn signal relay
7. Radiator filler hose
8. Radiator fan motor coupler
9. Coolant reservoir hose
10. Coolant reservoir breather hose
11. Fuel tank breather hose
12. Wire harness (to fuel pump)
13. Wire harness (to intake air temperature sensor)
14. Wire harness (to fuel injector)
15. Fuel injector couplers
16. Seat lock cable
17. Main switch coupler
18. Main switch
19. Rear brake lock cable
20. ECU (engine control unit)
21. Grip warmer coupler
22. Headlight relay
23. Left handlebar switch coupler
24. Right handlebar switch coupler
25. Air filter case bracket
26. Damper
27. Wire harness (to main switch)
28. Wire harness (to headlight relay)
29. Front cowling stay
30. Wire harness (to fuse box)
31. Wire harness (to ECU)
32. Rubber cover
33. Radiator filler pipe bracket
34. Footrest board bracket
A. To right headlight unit
B. Route the wire harness to the inside of the front cowling stay.
C. Route the wire harness and coolant reservoir hose to the outside of the relay guard.
D. Fasten the coolant reservoir hose and wire harness to the radiator filler hose with the plastic band, making sure to position the band 0–100 mm (0–3.9 in) from where the turn signal relay lead branches off from the harness.
E. Route the radiator fan motor lead over the radiator bracket.
F. Route the wire harness to the outside of the cooling system air bleed hose.
G. To throttle position sensor
H. Route the fuel tank breather hose to the outside of the wire harness.
I. Route the wire harness (to coolant temperature sensor) under the fuel tank bracket.
J. Route the wire harnesses (to fuel pump, intake air pressure sensor, and throttle position sensor) to the front of the fuel tank bracket.
K. Connect the main switch coupler and fuel injector couplers, and then install the rubber cover around the couplers, making sure to face the opening of the cover upward.
L. Fasten the main switch lead with the holder, making sure that the plastic locking tie is positioned to the inside of the holder. Face the catch of the holder forward.
M. Pass the seat lock cable between the air filter case bracket and the damper.
N. Fasten the seat lock cable to the air filter case bracket with the plastic band, making sure to align the band with the cutouts in the bracket.
O. Face the catch of the holder outward.
P. To wire harness
Q. Point the end of the plastic band forward.
R. Face the catch of the holder upward.
S. Do not fasten the wire harness (to ECU) with the holder.
T. Be sure to fasten the rubber cover by passing the holder through the hole in the cover.
U. Point the end of the plastic band outward, angled downward, as shown in the illustration.
V. Fasten the wire harnesses (to fuel injector and main switch) with the plastic band, making sure to install the band around the protective sleeves of the leads, not the leads themselves. Point the end of the plastic band outward, angled downward, as shown in the illustration.
W. Point the end of the plastic band inward.
X. Do not pinch the cooling system air bleed hose when installing the plastic band.
Y. Position the buckle of the plastic band under the leads, with the end pointing inward.
Z. Point the end of the plastic band inward.
AA. Do not fasten the wire harness (to turn signal relay) with the plastic band.
AB. Do not pinch the coolant reservoir hose when installing the plastic band.
1. Intake air temperature sensor coupler
2. Cylinder head breather hose
3. Fast idle plunger intake hose
4. Throttle position sensor coupler
5. Intake air pressure sensor coupler
6. Fuel tank breather hose
7. Fuel pump coupler
8. Fuel hose
9. Fuel tank overflow hose
10. Frame cross member
11. Starter motor
12. O₂ sensor coupler
13. Storage box light sub-wire harness
14. License plate light lead
15. Storage box light switch lead
16. Wire harness
17. Seat lock cable
18. Rear brake lock cable
19. O₂ sensor lead
20. Tail/brake light assembly lead
21. Tail/brake light assembly
22. Wire harness (to intake air temperature sensor)
23. Fuel injector leads

A. Make sure that there is no slack in the fuel injector leads and wire harness (to intake air temperature sensor) to the left of the plastic band.
B. Route the wire harness (to fuel pump) under the fuel tank bracket, and then pass it through the hole in the storage box.
C. Route the wire harness (to fuel pump) to the outside of the fuel hose.
D. Pass the seat lock cable and fuel tank breather hose between the storage box and the fuel tank.
E. Fasten the seat lock cable and fuel tank breather hose with the holder, making sure to position the holder 0–70 mm (0–2.8 in) from the seat lock cable holder affixed to the frame.
F. Fasten the seat lock cable with the holder, making sure to position the white protector on the cable to the front of the holder.
G. Route the rear brake lock cable to the inside of the outer V-belt case bolt.
H. Position the plastic locking tie to the front of the holder on the rear cowl ing assembly, making sure that the tie contacts the holder.
I. Fasten the seat lock cable with the portion of the holder that has the smaller diameter.
J. Face the catch of the holder downward.
K. Point the end of the plastic locking tie outward, and then cut off the excess end of the tie to 0–5 mm (0–0.20 in).
L. To storage box light switch
M. Install the rubber cover over the license plate light connector and leads, making sure to cover the sections of the leads that are not covered by the protective sleeves. Then, fasten the rubber cover with the plastic band so that the band is positioned around the center of the connector.
N. Place the rubber cover in the opening in the rear cover bracket.
O. Push the storage box light switch coupler as far into the rubber cover as possible.
1. Rear brake hose
2. Rear brake pipe
3. Rear brake lock cable
4. Ribs (bottom of storage box)
   A. Install the rear brake hose holder to the front cowling stay, making sure to fit the projection on the holder into the hole in the stay.
   B. Face the catch of the holder upward.
   C. Pass the rear brake lock cable through the guide.
   D. Install the rear brake hose holder to the left passenger footrest, making sure to fit the projection on the holder into the hole in the footrest.
   E. Point the open ends of the holder inward.
   F. Install the rear brake hose onto the rear brake caliper, making sure that the pipe section on the end of the hose contacts the rib on the caliper.
   G. Route the rear brake lock cable under the frame cross member and fuel tank bracket.
   H. Route the rear brake lock cable to the left of the ribs on the bottom of the storage box.
   I. Be sure to fit the projection on the outer section of the rear brake lock cable holder into the hole in the inner section.
1. Fast idle plunger intake hose
2. Cylinder head breather hose
3. Intake air pressure sensor hose
4. Fuel hose
5. Fast idle plunger inlet coolant hose
6. Fast idle plunger outlet coolant hose
7. Fuel injector #2
8. Fuel injector #1
9. Coolant temperature sensor
10. Intake air pressure sensor coupler
A. Face the white paint mark on the hose upward.
B. Position the hose clamp 1–4 mm (0.04–0.16 in) from the end of the hose, making sure to point the ends of the clamp to the left.
C. Install the hose onto the hose fitting of the air filter case, making sure that the hose contacts the case.
D. 0–3 mm (0–0.12 in)
E. Face the pink paint mark on the hose rearward.
F. Position the hose clamp 1–4 mm (0.04–0.16 in) from the end of the hose, making sure to point the ends of the clamp rearward.
G. Install the hose up to the bend in the hose fitting.
H. Install the hose onto the hose fitting of the cylinder head, making sure that the hose contacts the head.
I. Position the hose clamp 1–4 mm (0.04–0.16 in) from the end of the hose, making sure to point the ends of the clamp downward.
J. Face the white paint mark on the hose to the left.
K. Face the yellow paint mark on the hose forward.
L. Position the hose clamp 1–4 mm (0.04–0.16 in) from the end of the hose, making sure to point the ends of the clamp downward, angled forward, so that they do not contact the spark plug wires or radiator.
M. Face the white paint mark on the hose forward.
N. Position the hose clamp 1–4 mm (0.04–0.16 in) from the end of the hose, making sure to point the ends of the clamp upward.
O. Fasten the fast idle plunger intake hose and cylinder head breather hose with the holder, making sure to align the holder with the white paint mark on the fast idle plunger intake hose.
P. To cylinder head cover
Q. To fuel pump
CABLE ROUTING

Diagram showing cable routing with labeled components:

- A
- B
- C
- D
- E
- F
- G
- H
- I
- J
- K
- L
- M
- N
- O
- P
- Q
- R
- S
- T
- U
- V

Diagram and labels indicate various parts and their connections for cable routing.
1. Rollover valve
2. Fuel tank breather hose (fuel tank to rollover valve)
3. Fuel tank breather hose (rollover valve to canister)
4. Canister purge hose (throttle body #2 to 3-way joint)
5. Canister purge hose (throttle body #1 to 3-way joint)
6. Throttle body
7. Canister purge hose (3-way joint to canister)
8. Canister
9. Frame cross member
10. Fuel hose

A. Do not fit the protector of the fuel tank breather hose (rollover valve to canister) into the guide on the storage box.
B. Point the ends of each hose clamp rearward.
C. Pass the fuel tank breather hose (rollover valve to canister) through the guide on the fuel tank bracket, making sure that the hose is positioned to the inside of the guide.
D. Fit the grommet on the fuel tank breather hose (rollover valve to canister) into the cutout in the fuel tank bracket.
E. Fasten the grommets on the fuel tank breather hose (rollover valve to canister) and canister purge hose (3-way joint to canister) with the holder on the frame cross member.
F. Make sure that the canister purge hose (3-way joint to canister), canister purge hose (throttle body #1 to 3-way joint), and canister purge hose (throttle body #2 to 3-way joint) are completely seated on the 3-way joint.
G. Fasten the canister purge hose (throttle body #1 to 3-way joint) with the holder on the frame cross member, making sure to align the yellow paint mark on the hose with the holder.
H. Attach the holders to the frame cross member at the locations shown in the illustration.
I. Face the white paint mark on each hose upward. Position each hose clamp 1–4 mm (0.04–0.16 in) from the end of the respective pipe, making sure to point the ends of the clamp upward.
J. Fasten the canister purge hose (throttle body #2 to 3-way joint) with the holder on the frame cross member, making sure to align the white paint mark on the hose with the holder.
K. Do not install the hose clamp on the flange at the end of the hose fitting.
L. Install the hose up to the bend in the hose fitting on the canister.
M. Point the ends of each hose clamp inward.
N. Install the canister purge hose up to the bend in the hose fitting on the throttle body.
O. Face the yellow paint mark on each canister purge hose forward.
P. Fasten the fuel tank breather hose (rollover valve to canister) with the holder on the storage box.
Q. Install the fuel tank breather hose (rollover valve to canister) onto the pipe fitting, making sure that it contacts the rollover valve.
R. Pass the fuel tank breather hose (rollover valve to canister) through the cutout in the storage box.
S. Point the ends of the hose clamp rearward.
T. Route the fuel tank breather hose (rollover valve to canister) above and to the outside of the fuel hose.

U. Route the canister purge hose (3-way joint to canister) over the frame cross member.
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GENERAL MAINTENANCE AND LUBRICATION CHART

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ADJUSTING THE VALVE CLEARANCE
SYNCHRONIZING THE THROTTLE BODY
ADJUSTING THE ENGINE IDLING SPEED
ADJUSTING THE THROTTLE CABLE FREE PLAY
CHECKING THE SPARK PLUGS
MEASURING THE COMPRESSION PRESSURE
CHECKING THE ENGINE OIL LEVEL
CHANGING THE ENGINE OIL
MEASURING THE ENGINE OIL PRESSURE
REPLACING THE AIR FILTER ELEMENT
REPLACING THE V-BELT
CLEANING THE V-BELT CASE AIR FILTER ELEMENT
CHECKING THE THROTTLE BODY JOINTS
CHECKING THE FUEL LINE
CHECKING THE CYLINDER HEAD BREATHER HOSE
CHECKING THE EXHAUST SYSTEM
CHECKING THE CANISTER
CHECKING THE COOLANT LEVEL
CHECKING THE COOLING SYSTEM
CHANGING THE COOLANT

CHASSIS
ADJUSTING THE FRONT DISC BRAKE
ADJUSTING THE REAR DISC BRAKE
CHECKING THE BRAKE FLUID LEVEL
CHECKING THE FRONT BRAKE PADS
CHECKING THE REAR BRAKE PADS
CHECKING THE FRONT BRAKE HOSES
CHECKING THE REAR BRAKE HOSE
ADJUSTING THE REAR BRAKE LOCK CABLE
BLEEDING THE HYDRAULIC BRAKE SYSTEM
CHECKING THE CHAIN DRIVE OIL LEVEL
CHANGING THE CHAIN DRIVE OIL
CHECKING AND ADJUSTING THE STEERING HEAD
CHECKING THE FRONT FORK
CHECKING THE TIRES
CHECKING THE WHEELS
CHECKING AND LUBRICAING THE CABLES
LUBRICATING THE LEVERS
LUBRICATING THE SIDESTAND
LUBRICATING THE CENTERSTAND
LUBRICATING THE REAR SUSPENSION
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CHECKING THE FUSES ............................................... 3-30
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PERIODIC MAINTENANCE

INTRODUCTION
This chapter includes all information necessary to perform recommended checks and adjustments. If followed, these preventive maintenance procedures will ensure more reliable vehicle operation, a longer service life and reduce the need for costly overhaul work. This information applies to vehicles already in service as well as to new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

<table>
<thead>
<tr>
<th>No.</th>
<th>ITEM</th>
<th>ROUTINE</th>
<th>INITIAL</th>
<th>ODOMETER READINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>600 mi</td>
<td>4000 mi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1000 km)</td>
<td>(7000 km)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>or 1 month</td>
<td>or 6 months</td>
</tr>
<tr>
<td>1</td>
<td>* Fuel line</td>
<td>• Check fuel hoses for cracks or damage.</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>* Spark plugs</td>
<td>• Check condition.</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adjust gap and clean.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace every 12000 mi (19000 km) or 18 months.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>* Valve clearance</td>
<td>• Check and adjust valve clearance when engine is cold.</td>
<td></td>
<td>Every 26600 mi (42000 km)</td>
</tr>
<tr>
<td>4</td>
<td>* Crankcase breather system</td>
<td>• Check breather hose for cracks or damage.</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>* Fuel injection</td>
<td>• Check and adjust engine idle speed and synchronization.</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>* Evaporative emission control system</td>
<td>• Check control system for damage.</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace if necessary.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Since these items require special tools, data and technical skills, have a Yamaha dealer perform the service.

GENERAL MAINTENANCE AND LUBRICATION CHART

<table>
<thead>
<tr>
<th>No.</th>
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<th>ODOMETER READINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>600 mi (1000 km) or 1 month</td>
<td>4000 mi (7000 km) or 6 months</td>
</tr>
<tr>
<td>1</td>
<td>Air filter element</td>
<td>• Replace.</td>
<td></td>
<td>Every 12000 mi (19000 km)</td>
</tr>
<tr>
<td>2</td>
<td>* V-belt case air filter elements</td>
<td>• Clean.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>* Front brake</td>
<td>• Check operation, fluid level, and for fluid leakage.</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace brake pads if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>* Rear brake</td>
<td>• Check operation, fluid level, and for fluid leakage.</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace brake pads if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>* Brake hoses</td>
<td>• Check for cracks or damage.</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Every 4 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Rear brake lock</td>
<td>• Check operation.</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adjust.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>* Wheels</td>
<td>• Check runout and for damage.</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace if necessary.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### PERIODIC MAINTENANCE

<table>
<thead>
<tr>
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</tr>
</thead>
</table>
| 8   | * Tires | • Check tread depth and for damage.  
• Replace if necessary.  
• Check air pressure.  
• Correct if necessary. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 9   | * Wheel bearings | • Check bearings for smooth operation.  
• Replace if necessary. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 10  | * Steering bearings | • Check bearing assemblies for looseness.  
• Moderately repack with lithium-soap-based grease.  
Every 12000 mi (19000 km) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 11  | * Chassis fasteners | • Check all chassis fitting and fasteners.  
• Correct if necessary. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 12  | Front brake lever pivot shaft | • Apply silicone grease lightly. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 13  | Rear brake lever pivot shaft | • Apply silicone grease lightly. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 14  | Centerstand and sidestand pivots | • Check operation.  
• Apply lithium-soap-based grease lightly. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 15  | * Sidestand switch | • Check operation and replace if necessary. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 16  | * Front fork | • Check operation and for oil leakage.  
• Replace if necessary. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 17  | * Shock absorber assembly | • Check operation and for oil leakage.  
• Replace if necessary. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 18  | Engine oil | • Change.  
When the oil change indicator flashes | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 19  | Engine oil filter cartridge | • Replace.  
At 12500 mi (20000 km) and thereafter every 12500 mi (20000 km) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 20  | * Cooling system | • Check coolant level and vehicle for coolant leakage.  
• Change.  
Every 3 years | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 21  | Chain drive oil | • Check vehicle for oil leakage.  
• Change. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 22  | * V-belt | • Replace.  
When the V-belt replacement indicator flashes | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 23  | * Front and rear brake switches | • Check operation. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 24  | * Control cables | • Apply Yamaha chain and cable lube or engine oil SAE 10W-30 thoroughly. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 25  | * Throttle grip housing and cable | • Check operation and free play.  
• Adjust the throttle cable free play if necessary.  
• Lubricate the throttle grip housing and cable. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 26  | * Lights, signals and switches | • Check operation.  
• Adjust headlight beam. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

* Since these items require special tools, data and technical skills, have a Yamaha dealer perform the service.

**TIP**

From 24000 mi (37000 km) or 36 months, repeat the maintenance intervals starting from 8000 mi (13000 km) or 12 months.
TIP

- The air filter and V-belt filter need more frequent service if you are riding in unusually wet or dusty areas.

- Hydraulic brake service
  - After disassembling the brake master cylinders and calipers, always change the fluid. Regularly check the brake fluid levels and fill the reservoirs as required.
  - Every two years replace the internal components of the brake master cylinders and calipers, and change the brake fluid.
  - Replace the brake hoses every four years and if cracked or damaged.
ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

TIP

- Valve clearance adjustment should be made on a cold engine, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.

1. Remove:
   - Storage compartment
     Refer to “GENERAL CHASSIS” on page 4-1.
2. Remove:
   - Radiator bracket
     Refer to “RADIATOR” on page 6-1.
3. Remove:
   - Air filter case
   - Throttle body
   - Intake manifolds
     Refer to “THROTTLE BODY” on page 7-5.
4. Remove:
   - Spark plugs
   - Cylinder head cover
   - Cylinder head cover gasket
     Refer to “CAMSHAFTS” on page 5-6.
5. Remove:
   - Timing mark accessing plug “1”
   - Crankshaft end access cover “2”
6. Measure:
   - Valve clearance
     Out of specification → Adjust.

<table>
<thead>
<tr>
<th>Valve clearance (cold)</th>
<th>Intake</th>
<th>0.15–0.20 mm (0.0059–0.0079 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exhaust</td>
<td>0.25–0.30 mm (0.0098–0.0118 in)</td>
</tr>
</tbody>
</table>

a. Turn the crankshaft clockwise.

b. When piston #1 is at TDC on the compression stroke, align the “I” mark “a” on the generator rotor with the mark “b” on the generator cover.

TIP

- TDC on the compression stroke can be found when the cylinder #1 camshaft lobes are turned away from each other.
- In order to be sure that the piston is at TDC, the alignment hole “c” on the intake camshaft sprocket and the alignment hole “d” on the exhaust camshaft sprocket must align with the cylinder head mating surface as shown in the illustration.
c. Measure the valve clearance with a thickness gauge “1”.

TIP
- If the valve clearance is incorrect, record the measured reading.
- Measure the valve clearance in the following sequence.

Valve clearance measuring sequence

Cylinder #1 → #2

A. Front

d. To measure the valve clearances of the other cylinders, starting with cylinder #1 at TDC, turn the crankshaft clockwise as specified in the following table.

A. Degrees that the crankshaft is turned clockwise
B. Cylinder
C. Combustion cycle

<table>
<thead>
<tr>
<th>Cylinder #2</th>
<th>360°</th>
</tr>
</thead>
</table>

7. Remove:
- Camshafts

TIP
- Refer to “CAMSHAFTS” on page 5-6.
- When removing the timing chain and camshafts, fasten the timing chain with a wire to retrieve it if it falls into the crankcase.

8. Adjust:
- Valve clearance

TIP
- Cover the timing chain opening with a rag to prevent the valve pad from falling into the crankcase.
- Make a note of the position of each valve lifter “1” and valve pad “2” so that they can be installed in the correct place.

Valve lapper
90890-04101
Valve lapping tool
YM-A8998
b. Calculate the difference between the specified valve clearance and the measured valve clearance.

Example:
Specified valve clearance = 0.15–0.22 mm (0.0059–0.0087 in)
Measured valve clearance = 0.25 mm (0.0098 in)

0.25 mm (0.0098 in) - 0.22 mm (0.0087 in) = 0.03 mm (0.001 in)

c. Check the thickness of the current valve pad.

TIP

The thickness "a" of each valve pad is marked in hundredths of millimeters on the side that touches the valve lifter.

Example:
If the valve pad is marked “155”, the pad thickness is 1.55 mm (0.061 in).

d. Calculate the sum of the values obtained in steps (b) and (c) to determine the required valve pad thickness and the valve pad number.

Example:
1.55 mm (0.061 in) + 0.03 mm (0.001 in) = 1.58 mm (0.062 in)

The valve pad number is 158.

e. Round off the valve pad number according to the following table, and then select the suitable valve pad.

<table>
<thead>
<tr>
<th>Last digit</th>
<th>Rounded value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 1, 2</td>
<td>0</td>
</tr>
</tbody>
</table>

f. Install the new valve pad “1” and the valve lifter “2”.

TIP

- Lubricate the valve pad with molybdenum disulfide grease.
- Lubricate the valve lifter with engine oil.
- The valve lifter must turn smoothly when rotated by hand.
- Install the valve lifter and the valve pad in the correct place.

g. Install the exhaust and intake camshafts, timing chain and camshaft caps.

TIP

- Refer to “CAMSHAFTS” on page 5-6.
- Lubricate the camshaft lobes and camshaft journals.
- First, install the exhaust camshaft.
9. Install:
   • All removed parts

   **TIP**

   For installation, reverse the removal procedure.

10. Adjust:
   • Throttle cable free play

   Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-9.

**SYNCHRONIZING THE THROTTLE BODY**

**TIP**

Prior to synchronizing the throttle body, the valve clearance and the engine idling speed should be properly adjusted and the ignition timing should be checked.

1. Stand the vehicle on a level surface.

   **TIP**

   Place the vehicle on the centerstand.

2. Remove:
   • Bottom cowling

   Refer to “GENERAL CHASSIS” on page 4-1.

3. Remove:
   • Synchronizing pipe caps “1”

4. Install:
   • Vacuum gauge “1”
     (onto the synchronizing pipes)
   • Digital tachometer
     (onto the spark plug lead of cylinder #1)

5. Start the engine and let it warm up for several minutes.

6. Check:
   • Engine idling speed

   Out of specification → Adjust.

   Refer to “ADJUSTING THE ENGINE IDLING SPEED” on page 3-8.

7. Adjust:

   **Throttle body synchronization**

   a. Turn the cylinder #1 air screw “1” and cylinder #2 air screw “2” using the carburetor angle driver “3”.

   **TIP**

   • After each step, rev the engine two or three times, each time for less than a second, and check the synchronization again.

   • If an air screw was removed, turn the screw in fully, and then turn it out 3/4 turn. Then, synchronize the throttle body.
TIP
The difference in vacuum pressure between the two cylinders should not exceed 1.33 kPa (10 mmHg).

8. Measure:
   • Engine idling speed
     Out of specification → Adjust.
     Make sure that the vacuum pressure is within specification.
9. Stop the engine and remove the measuring equipment.
10. Adjust:
    • Throttle cable free play
      Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-9.

11. Install:
    • Synchronizing pipe caps
12. Install:
    • Bottom cowling
      Refer to “GENERAL CHASSIS” on page 4-1.

ADJUSTING THE ENGINE IDLING SPEED

TIP
Prior to adjusting the engine idling speed, the throttle body synchronization should be adjusted properly, the air filter element should be clean, and the engine should have adequate compression.

1. Start the engine and let it warm up for several minutes.
2. Remove:
   • Left side panel
   • Right center panel
      Refer to “GENERAL CHASSIS” on page 4-1.

3. Install:
   • Digital tachometer
     (onto the spark plug lead of cylinder #1)

4. Check:
   • Engine idling speed
     Out of specification → Adjust.

5. Adjust:
   • Engine idling speed

   Direction “a”
   Engine idling speed is increased.
   Direction “b”
   Engine idling speed is decreased.

6. Install:
   • Right center panel
   • Left side panel
      Refer to “GENERAL CHASSIS” on page 4-1.
7. Adjust:
   • Throttle cable free play
      Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-9.

Throttle cable free play
3.0–5.0 mm (0.12–0.20 in)
ADJUSTING THE THROTTLE CABLE FREE PLAY

TIP

Prior to adjusting the throttle cable free play, the engine idling speed and throttle body synchronization should be adjusted properly.

1. Check:
   - Throttle cable free play “a”
     Out of specification → Adjust.

2. Adjust:
   - Throttle cable free play

   ▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲^
Before installing the spark plug, clean the spark plug and gasket surface.

9. Connect:
   • Spark plug
10. Remove:
    • Bottom cowling
    Refer to “GENERAL CHASSIS” on page 4-1.

**MEASURING THE COMPRESSION PRESSURE**

The following procedure applies to all of the cylinders.

**TIP**
Insufficient compression pressure will result in a loss of performance.

1. Measure:
   • Valve clearance
     Out of specification → Adjust.
     Refer to “ADJUSTING THE VALVE CLEARANCE” on page 3-4.
2. Remove:
   • Bottom cowling
   Refer to “GENERAL CHASSIS” on page 4-1.
3. Start the engine, warm it up for several minutes, and then turn it off.
4. Disconnect:
   • Spark plug cap
5. Remove:
   • Spark plug

**NOTICE**

Before removing the spark plugs, use compressed air to blow away any dirt accumulated in the spark plug wells to prevent it from falling into the cylinders.

6. Install:
   • Compression gauge “1”

---

**Standard compression pressure (at sea level)**

- **1400 kPa/360 r/min (199.1 psi/360 r/min) (14.0 kgf/cm²/360 r/min)**
- **Minimum–maximum**
  - 1220–1570 kPa (173.5–223.3 psi)
  - (12.2–15.7 kgf/cm²)

---

a. Turn the main switch to “ON”.
b. With the throttle wide open, crank the engine until the reading on the compression gauge stabilizes.

c. If the compression pressure is above the maximum specification, check the cylinder head, valve surfaces and piston crown for carbon deposits.
   Carbon deposits → Eliminate.
d. If the compression pressure is below the minimum specification, pour a teaspoonful of engine oil into the spark plug bore and measure again.
   Refer to the following table.
8. Install:  
- Spark plug

| Spark plug | 13 Nm (1.3 m·kg, 9.4 ft·lb) |

9. Connect:  
- Spark plug cap
10. Install:  
- Bottom cowling
  Refer to “GENERAL CHASSIS” on page 4-1.

### CHECKING THE ENGINE OIL LEVEL

1. Stand the vehicle on a level surface.

   **TIP**
   - Place the vehicle on the centerstand.
   - Make sure the vehicle is upright.

2. Start the engine, warm it up for several minutes, and then turn it off.

3. Wait two minutes until the oil settles, and then check the oil level through the check window located at the bottom-left side of the crankcase.

4. Check:  
   - Engine oil level
     The engine oil level should be between the minimum level mark ”a” and maximum level mark ”b”.
     Below the minimum level mark → Add the recommended engine oil to the proper level.

### NOTICE

- Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives or use engine oils with a grade of CD “c” or higher and do not use oils labeled “ENERGY CONSERVING II” “d”.
- Do not allow foreign materials to enter the crankcase.

### TIP

Before checking the engine oil level, wait a few minutes until the oil has settled.

5. Start the engine, warm it up for several minutes, and then turn it off.

6. Check the engine oil level again.

**TIP**

Before checking the engine oil level, wait a few minutes until the oil has settled.
ENGINE

CHANGING THE ENGINE OIL

1. Start the engine, warm it up for several minutes, and then turn it off.
2. Place a container under the engine oil drain bolt.
3. Remove:
   • Engine oil filler cap “1”
   • Engine oil drain bolt “2” (along with the gasket)
4. Drain:
   • Engine oil (completely from the crankcase)
5. If the oil filter cartridge is also to be replaced, perform the following procedure.
   a. Remove the oil filter cartridge “1” with an oil filter wrench “2”.

b. Lubricate the O-ring “3” of the new oil filter cartridge with a thin coat of engine oil.

**NOTICE**

Make sure the O-ring “3” is positioned correctly in the groove of the oil filter cartridge.

c. Tighten the new oil filter cartridge to specification with an oil filter wrench.

<table>
<thead>
<tr>
<th>Oil filter cartridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 Nm (1.7 m·kg, 12 ft·lb)</td>
</tr>
</tbody>
</table>

6. Check:
   • Engine oil drain bolt gasket
     Damage → Replace.
7. Install:
   • Engine oil drain bolt
     (along with the gasket)

<table>
<thead>
<tr>
<th>Engine oil drain bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>43 Nm (4.3 m·kg, 31 ft·lb)</td>
</tr>
</tbody>
</table>

8. Fill:
   • Crankcase
     (with the specified amount of the recommended engine oil)

<table>
<thead>
<tr>
<th>Engine oil quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total amount</td>
</tr>
<tr>
<td>3.60 L (3.81 US qt) (3.17 Imp.qt)</td>
</tr>
<tr>
<td>Without oil filter cartridge replacement</td>
</tr>
<tr>
<td>2.80 L (2.96 US qt) (2.46 Imp.qt)</td>
</tr>
<tr>
<td>With oil filter cartridge replacement</td>
</tr>
<tr>
<td>2.90 L (3.07 US qt) (2.55 Imp.qt)</td>
</tr>
</tbody>
</table>

9. Install:
   • Engine oil filler cap
10. Start the engine, warm it up for several minutes, and then turn it off.

11. Check:
   • Engine
     (for engine oil leaks)

12. Check:
   • Engine oil level
     Refer to “CHECKING THE ENGINE OIL LEVEL” on page 3-11.

13. Check:
   • Engine oil pressure

   - a. Remove the bottom cowling. Refer to “GENERAL CHASSIS” on page 4-1.
   - b. Slightly loosen the oil check bolt “1”.
   - c. Start the engine and keep it idling until engine oil starts to seep from the oil check bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.
   - d. Check the engine oil passages, the oil filter cartridge and the oil pump for damage or leakage. Refer to “OIL PUMP” on page 5-62.
   - e. Start the engine after solving the problem(s) and check the engine oil pressure again.
   - f. Tighten the oil check bolt to specification.
   - g. Install the bottom cowling. Refer to “GENERAL CHASSIS” on page 4-1.

   ![Engine oil check bolt](image)

   **Engine oil check bolt**
   20 Nm (2.0 m·kg, 14 ft·lb)

---

2. Start the engine, warm it up for several minutes, and then turn it off.

---

**NOTICE**

When the engine is cold, the engine oil will have a higher viscosity, causing the engine oil pressure to increase. Therefore, be sure to measure the engine oil pressure after warming up the engine.

---

3. Remove:
   • Engine oil pressure check point plug “1”

---

**WARNING**

The engine, muffler and engine oil are extremely hot.

---

4. Install:
   • Oil pressure gauge “1”
   • Adapter

![Oil pressure gauge](image)

**Oil pressure gauge set**
90890-03120

**Oil pressure adapter B**
90890-03124

**Pressure gauge**
90890-03153

YU-03153

---

5. Measure:
   • Engine oil pressure
     (at the following conditions)

---

**MEASURING THE ENGINE OIL PRESSURE**

1. Check:
   • Engine oil level
     Below the minimum level mark → Add the recommended engine oil to the proper level.
ENGINE

Oil pressure (hot)
150.0 kPa/1200 r/min (21.8 psi/1200 r/min) (1.50 kgf/cm²/1200 r/min)
Oil temperature
70.0 °C (158.00 °F)

Out of specification → Adjust.

<table>
<thead>
<tr>
<th>Engine oil pressure</th>
<th>Possible causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below specification</td>
<td>• Faulty oil pump</td>
</tr>
<tr>
<td></td>
<td>• Clogged oil filter</td>
</tr>
<tr>
<td></td>
<td>• Leaking oil passage</td>
</tr>
<tr>
<td></td>
<td>• Broken or damaged oil seal</td>
</tr>
<tr>
<td>Above specification</td>
<td>• Leaking oil passage</td>
</tr>
<tr>
<td></td>
<td>• Faulty oil filter</td>
</tr>
<tr>
<td></td>
<td>• Oil viscosity too high</td>
</tr>
</tbody>
</table>

6. Install:
• Engine oil pressure check point plug

4. Install:
• Air filter case cover

**NOTICE**

Never operate the engine without the air filter element installed. Unfiltered air will cause rapid wear of engine parts and may damage the engine. Operating the engine without the air filter element will also affect throttle body synchronization, leading to poor engine performance and possible overheating.

**TIP**

When installing the air filter element into the air filter case cover, make sure that the sealing surfaces are aligned to prevent any air leaks.

5. Install:
• Front lower inner panel
  Refer to “GENERAL CHASSIS” on page 4-1.

**REPLACING THE AIR FILTER ELEMENT**

1. Remove:
• Front lower inner panel
  Refer to “GENERAL CHASSIS” on page 4-1.
2. Remove:
• Air filter case cover “1”

3. Check:
• Air filter element “1”
  Damage → Replace.

**TIP**

• Replace the air filter element every 40000 km of operation.
• The air filter needs more frequent service if you are riding in unusually wet or dusty areas.

**REPLACING THE V-BELT**

1. Remove:
• Right footrest board
  Refer to “GENERAL CHASSIS” on page 4-1.
• Outer V-belt case
  Refer to “V-BELT AUTOMATIC TRANSMISSION” on page 5-35.
2. Check:
• V-belt
  Cranks/damage/wear → Replace.
  Grease/oil → Clean the primary and secondary pulleys.
  Refer to “V-BELT AUTOMATIC TRANSMISSION” on page 5-35.

**TIP**

Replace the V-belt every 20000 km of operation.

3. Install:
• Outer V-belt case
  Refer to “V-BELT AUTOMATIC TRANSMISSION” on page 5-35.
• Right footrest board
  Refer to “GENERAL CHASSIS” on page 4-1.
CLEANING THE V-BELT CASE AIR FILTER ELEMENT

1. Remove:
   - Footrest boards
     Refer to “GENERAL CHASSIS” on page 4-1.

2. Remove:
   - V-belt case air filter element (left) “1”

3. Remove:
   - V-belt case air filter case cover “1”
   - V-belt case air filter case “2”
   - V-belt case air filter element (right) “3”

4. Clean:
   - V-belt case air filter elements
     Blow the compressed air to the outer surface of the V-belt case air filter element.

5. Check:
   - V-belt case air filter elements
     Damage → Replace.

   **NOTICE**
   Since the V-belt case air filter element is a dry type, do not let grease or water contact it.

6. Install:
   - V-belt case air filter element (right)
   - V-belt case air filter case
   - V-belt case air filter case cover

   **V-belt case air filter case screw**
   7 Nm (0.7 m·kg, 5.1 ft·lb)

   **V-belt case air filter case cover screw**
   7 Nm (0.7 m·kg, 5.1 ft·lb)

7. Install:
   - V-belt case air filter element (left)

   **V-belt case air filter element (left) bolt**
   7 Nm (0.7 m·kg, 5.1 ft·lb)

CHECKING THE THROTTLE BODY JOINTS

1. Remove:
   - Front lower inner panel
     Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
   - Throttle body joints “1”
     Cracks/damage → Replace the intake manifolds.

3. Install:
   - Front lower inner panel
     Refer to “GENERAL CHASSIS” on page 4-1.

EAS21030
**CHECKING THE FUEL LINE**
The following procedure applies to all of the fuel, vacuum and breather hoses.
1. Remove:
   - Footrest boards
     Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
   - Fuel hose “1”
   - Fuel tank breather hose “2”
     Cracks/damage → Replace.
     Loose connection → Connect properly.

ECA14940
**NOTICE**
Make sure the fuel tank breather hose is routed correctly.

3. Install:
   - Footrest boards
     Refer to “GENERAL CHASSIS” on page 4-1.

EAS21080
**CHECKING THE EXHAUST SYSTEM**
1. Remove:
   - Bottom cowling
     Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
   - Exhaust pipes “1”
   - Muffler “2”
     Cracks/damage → Replace.
   - Gaskets “3”
     Exhaust gas leaks → Replace.
3. Check:
   - Tightening torque
   - Exhaust pipe nuts “4”
   - Muffler nut “5”

Exhaust pipe nut
20 Nm (2.0 m·kg, 14 ft·lb)
Muffler nut
31 Nm (3.1 m·kg, 22 ft·lb)
4. Install:
   • Bottom cowling
     Refer to “GENERAL CHASSIS” on page 4-1.

   EAS2100
   CHECKING THE CANISTER
   1. Remove:
      • Storage box
        Refer to “GENERAL CHASSIS” on page 4-1.
      • Fuel tank
        Refer to “FUEL TANK” on page 7-1.
   2. Check:
      • Canister “1”
      • Canister purge hoses “2”
        Cracks/damage → Replace.

   EAS2110
   CHECKING THE COOLANT LEVEL
   1. Stand the vehicle on a level surface.
      TIP
      • Place the vehicle on the centerstand.
      • Make sure the vehicle is upright.
   2. Check:
      • Coolant level
        The coolant level should be between the maximum level mark “a” and minimum level mark “b”.

Below the minimum level mark → Add the recommended coolant to the proper level.

   NOTICE
   • Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.
   • Use only distilled water. However, if distilled water is not available, soft water may be used.

   3. Start the engine, warm it up for several minutes, and then turn it off.
   4. Check:
      • Coolant level
      TIP
      Before checking the coolant level, wait a few minutes until it settles.

   EAS21120
   CHECKING THE COOLING SYSTEM
   1. Remove:
      • Bottom cowling
      • Footrest boards
        Refer to “GENERAL CHASSIS” on page 4-1.
   2. Check:
      • Radiator “1”
      • Radiator inlet hose “2”
      • Radiator outlet hose “3”
      • Oil cooler inlet hose “4”
      • Oil cooler outlet hose “5”
      • Oil cooler “6”
      • Thermostat outlet hose “7”
      • Water pump “8”
      • Oil cooler hose “9”
      • Water pump inlet pipe “10”
      • Water pump outlet pipe “11”
        Cracks/damage → Replace.
        Refer to “RADIATOR” on page 6-1, “THERMOSTAT” on page 6-7 and “WATER PUMP” on page 6-9.
3. Install:
• Footrest boards
• Bottom cowling
Refer to “GENERAL CHASSIS” on page 4-1.

CHANGING THE COOLANT
1. Remove:
• Bottom cowling
Refer to “GENERAL CHASSIS” on page 4-1.
2. Disconnect:
• Coolant reservoir hose “1”

3. Drain:
• Coolant
  (from the coolant reservoir)
4. Remove:
• Radiator cap “1”

WARNING
A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may
be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:
Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, press down on the radiator cap and turn it counterclockwise to remove it.

5. Remove:
• Coolant drain bolt “1”
  (along with the gasket)

6. Drain:
• Coolant
  (from the engine and radiator)

7. Install:
• Coolant drain bolt
  (along with the gasket)

8. Connect:
• Coolant reservoir hose

9. Fill:
• Cooling system
  (with the specified amount of the recommended coolant)

Recommended antifreeze
High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines
Mixing ratio
  1:1 (antifreeze:water)
Radiator capacity (including all routes)
  1.48 L (1.56 US qt) (1.30 Imp.qt)
Coolant reservoir capacity (up to the maximum level mark)
  0.25 L (0.26 US qt) (0.22 Imp.qt)

Handling notes for coolant
Coolant is potentially harmful and should be handled with special care.

WARNING
• If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.
• If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.
• If coolant is swallowed, induce vomiting and get immediate medical attention.

NOTICE
• Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.
• Use only distilled water. However, if distilled water is not available, soft water may be used.
• If coolant comes into contact with painted surfaces, immediately wash them with water.
• Do not mix different types of antifreeze.

10. Install:
• Radiator cap

11. Fill:
• Coolant reservoir
  (with the recommended coolant to the maximum level mark “a”)
12. Install:
   • Coolant reservoir cap

13. Start the engine, warm it up for several minutes, and then stop it.

14. Check:
   • Coolant level
     Refer to “CHECKING THE COOLANT LEVEL” on page 3-17.

**TIP**
Before checking the coolant level, wait a few minutes until the coolant has settled.

15. Install:
   • Bottom cowling
     Refer to “GENERAL CHASSIS” on page 4-1.
ADJUSTING THE FRONT DISC BRAKE

1. Adjust:
   • Brake lever position
     (distance “a” from the throttle grip to the brake lever)

   a. While pushing the brake lever forward, turn the adjusting dial “1” until the brake lever is in the desired position.

   TIP
   Be sure to align the setting on the adjusting dial with the arrow mark “2” on the brake lever.

   Position #1
   Distance “a” is the largest.
   Position #5
   Distance “a” is the smallest.

WARNING
A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance.

NOTICE
After adjusting the brake lever position, make sure there is no brake drag.

ADJUSTING THE REAR DISC BRAKE

1. Adjust:
   • Brake lever position
     (distance “a” from the throttle grip to the brake lever)

   a. While pushing the brake lever forward, turn the adjusting dial “1” until the brake lever is in the desired position.

   TIP
   Be sure to align the setting on the adjusting dial with the arrow mark “2” on the brake lever.

   Position #1
   Distance “a” is the largest.
   Position #5
   Distance “a” is the smallest.

WARNING
A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance.

NOTICE
After adjusting the brake lever position, make sure there is no brake drag.

CHECKING THE BRAKE FLUID LEVEL

1. Stand the vehicle on a level surface.

   TIP
   • Place the vehicle on the centerstand.
   • Make sure the vehicle is upright.

2. Check:
   • Brake fluid level
     Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.

Recommended fluid
DOT 4
1. Operate the brake.
2. Check:
   - Front brake pad
     Wear indicator groove “a” has almost disappeared → Replace the brake pads as a set. Refer to “FRONT BRAKE” on page 4-18.

EAS21260

CHECKING THE REAR BRAKE PADS
The following procedure applies to all of the brake pads.
1. Operate the brake.
2. Check:
   - Rear brake pad
     Wear indicators “1” almost touch the brake disc → Replace the brake pads as a set. Refer to “REAR BRAKE” on page 4-30.

EAS21280

CHECKING THE FRONT BRAKE HOSES
The following procedure applies to all of the brake hoses and brake hose clamps.
1. Check:
   - Brake hoses
     Cracks/damage/wear → Replace.
2. Check:
   • Brake hose holders
     Loose → Tighten the holder bolt.

3. Hold the vehicle upright and apply the brake several times.

4. Check:
   • Brake hoses
     Brake fluid leakage → Replace the damaged hose.
     Refer to “FRONT BRAKE” on page 4-18.

CHECKING THE REAR BRAKE HOSE
1. Check:
   • Brake hose
     Cracks/damage/wear → Replace.

2. Check:
   • Brake hose holder
     Loose connection → Tighten the holder bolt.

3. Hold the vehicle upright and apply the front brake several times.

4. Check:
   • Brake hose
     Brake fluid leakage → Replace the damaged hose.
     Refer to “REAR BRAKE” on page 4-30.

ADJUSTING THE REAR BRAKE LOCK CABLE

Do not apply the rear brake lock lever when riding.

TIP

Place the vehicle on the centerstand.
Before adjusting the rear brake lock lever, check the rear brake fluid level.

1. Measure:
   • Rear brake lock cable length “a”
     Out of specification → Adjust.

BLEEDING THE HYDRAULIC BRAKE SYSTEM

WARNING

Bleed the hydraulic brake system whenever:

• the system is disassembled.
• a brake hose is loosened, disconnected or replaced.
• the brake fluid level is very low.
• brake operation is faulty.

TIP

Be careful not to spill any brake fluid or allow the brake master cylinder reservoir to overflow.
When bleeding the hydraulic brake system, make sure there is always enough brake fluid before applying the brake. Ignoring this pre-
caution could allow air to enter the hydraulic brake system, considerably lengthening the bleeding procedure.

- If bleeding is difficult, it may be necessary to let the brake fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the hose have disappeared.

1. **Bleed:**
   - **Hydraulic brake system**

```
1  Fill the brake master cylinder reservoir to the proper level with the recommended brake fluid.
2  Install the brake master cylinder reservoir diaphragm.
3  Connect a clear plastic hose “1” tightly to the bleed screw “2”.
4  Place the other end of the hose into a container.
5  Slowly apply the brake several times.
6  Fully pull the brake lever and hold it in position.
7  Loosen the bleed screw.
8  Tighten the bleed screw and then release the braking lever.
```

i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.

j. Tighten the bleed screw to specification.

k. Fill the brake master cylinder reservoir to the proper level with the recommended brake fluid.

Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.

**WARNING**

After bleeding the hydraulic brake system, check the brake operation.

```
CHECKING THE CHAIN DRIVE OIL LEVEL
1. Stand the vehicle on a level surface.

**TIP**

- Place the vehicle on the centerstand.
- Make sure that the vehicle is upright.

2. Remove:
   - Transmission chain drive case cover “1”
   - Chain drive oil filler cap “2”
```

A. Front brake caliper
B. Rear brake caliper

EWA13110

Front brake caliper bleed screw
5 Nm (0.5 m·kg, 3.6 ft·lb)
Rear brake caliper bleed screw
6 Nm (0.6 m·kg, 4.3 ft·lb)
3. Check:
   • Chain drive oil level
     Wipe the dipstick clean, insert it into the oil fill-
     er hole (without screw it in), and then remove
     it to check the oil level.
     The chain drive oil level should be between
     the minimum level mark “a” and maximum
     level mark “b”.
     Below the minimum level mark → Add the
     recommended chain drive oil to the proper
     level.

4. Install:
   • Chain drive oil filler cap
   • Transmission chain drive case cover

5. Drain:
   • Chain drive oil
     (completely from the chain drive case)

6. Check:
   • Drain bolt gasket
     Damage → Replace.

7. Install:
   • Chain drive oil drain bolt
     (along with the gasket)

8. Check:
   • Chain drive oil level
     Refer to “CHECKING THE CHAIN DRIVE
     OIL LEVEL” on page 3-24.

9. Install:
   • Chain drive oil filler cap
2. Check:
   • Steering head
     Grasp the bottom of the front fork legs and gently rock the front fork.
     Binding/looseness → Adjust the steering head.

3. Remove:
   • Upper bracket
     Refer to "STEERING HEAD" on page 4-58.

4. Adjust:
   • Steering head

a. Remove the lock washer “1”, the upper ring nut “2”, and the rubber washer “3”.

b. Loosen the lower ring nut “4” and then tighten it to specification with a steering nut wrench “5”.

```markdown
Steering nut wrench
90890-01403
Spanner wrench
YU-33975

Lower ring nut (initial tightening torque)
52 Nm (5.2 m·kg, 37 ft·lb)

TIP
Set a torque wrench at a right angle to the steering nut wrench.
```

c. Loosen the lower ring nut completely, then tighten it to specification.

d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.

Refer to "STEERING HEAD" on page 4-58.

e. Install the rubber washer “3”.

f. Install the upper ring nut “2”.

g. Finger tighten the upper ring nut “2”, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

h. Install the lock washer “1”.

```markdown
WARNING
Do not overtighten the lower ring nut.
```

```
Lower ring nut (final tightening torque)
14 Nm (1.4 m·kg, 10 ft·lb)
```

d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.

Refer to "STEERING HEAD" on page 4-58.

e. Install the rubber washer “3”.

f. Install the upper ring nut “2”.

g. Finger tighten the upper ring nut “2”, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

h. Install the lock washer “1”.

TIP
Make sure the lock washer tabs “a” sit correctly in the ring nut slots “b”.
```

c. Loosen the lower ring nut completely, then tighten it to specification.

d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.

Refer to "STEERING HEAD" on page 4-58.

e. Install the rubber washer “3”.

f. Install the upper ring nut “2”.

g. Finger tighten the upper ring nut “2”, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

h. Install the lock washer “1”.

TIP
Make sure the lock washer tabs “a” sit correctly in the ring nut slots “b”.
```

c. Loosen the lower ring nut completely, then tighten it to specification.

d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.

Refer to "STEERING HEAD" on page 4-58.

e. Install the rubber washer “3”.

f. Install the upper ring nut “2”.

g. Finger tighten the upper ring nut “2”, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

h. Install the lock washer “1”.

TIP
Make sure the lock washer tabs “a” sit correctly in the ring nut slots “b”.

```

```markdown
Lower ring nut (initial tightening torque)
52 Nm (5.2 m·kg, 37 ft·lb)

TIP
Set a torque wrench at a right angle to the steering nut wrench.
```

c. Loosen the lower ring nut completely, then tighten it to specification.

d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.

Refer to "STEERING HEAD" on page 4-58.

e. Install the rubber washer “3”.

f. Install the upper ring nut “2”.

g. Finger tighten the upper ring nut “2”, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

h. Install the lock washer “1”.

TIP
Make sure the lock washer tabs “a” sit correctly in the ring nut slots “b”.
```

c. Loosen the lower ring nut completely, then tighten it to specification.

d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.

Refer to "STEERING HEAD" on page 4-58.

e. Install the rubber washer “3”.

f. Install the upper ring nut “2”.

g. Finger tighten the upper ring nut “2”, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

h. Install the lock washer “1”.

TIP
Make sure the lock washer tabs “a” sit correctly in the ring nut slots “b”.

```

```markdown
Lower ring nut (final tightening torque)
14 Nm (1.4 m·kg, 10 ft·lb)
```

d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.

Refer to "STEERING HEAD" on page 4-58.

e. Install the rubber washer “3”.

f. Install the upper ring nut “2”.

g. Finger tighten the upper ring nut “2”, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

h. Install the lock washer “1”.

TIP
Make sure the lock washer tabs “a” sit correctly in the ring nut slots “b”.

```

```markdown
Lower ring nut (initial tightening torque)
52 Nm (5.2 m·kg, 37 ft·lb)

TIP
Set a torque wrench at a right angle to the steering nut wrench.
```

c. Loosen the lower ring nut completely, then tighten it to specification.

d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.

Refer to "STEERING HEAD" on page 4-58.

e. Install the rubber washer “3”.

f. Install the upper ring nut “2”.

g. Finger tighten the upper ring nut “2”, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

h. Install the lock washer “1”.

TIP
Make sure the lock washer tabs “a” sit correctly in the ring nut slots “b”.

```

```markdown
Lower ring nut (final tightening torque)
14 Nm (1.4 m·kg, 10 ft·lb)
```

d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.

Refer to "STEERING HEAD" on page 4-58.

e. Install the rubber washer “3”.

f. Install the upper ring nut “2”.

g. Finger tighten the upper ring nut “2”, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

h. Install the lock washer “1”.

TIP
Make sure the lock washer tabs “a” sit correctly in the ring nut slots “b”.

```

```markdown
Lower ring nut (initial tightening torque)
52 Nm (5.2 m·kg, 37 ft·lb)

TIP
Set a torque wrench at a right angle to the steering nut wrench.
```

c. Loosen the lower ring nut completely, then tighten it to specification.
d. Hold the spring gauge at a 90° angle from the handlebar, pull the spring gauge, and then record the measurement when the handlebar starts to run.

Steering head tension
1.97–4.90 N (200–500 gf) (7.06–17.65 oz)

e. Repeat the above procedure on the opposite handlebar.

f. If the steering head tension is out of specification (both handlebar ends should be within specification), remove the upper bracket and loosen or tighten the lower ring nut.

g. Reinstall the upper bracket and measure the steering head tension again as described above.

h. Repeat the above procedure until the steering head tension is within specification.

i. Grasp the bottom of the front fork legs and gently rock the front fork. Binding/looseness → Adjust the steering head.

2. Check:
   • Inner tube
     Damage/scratches → Replace.
   • Oil seal
     Oil leakage → Replace.

3. Hold the vehicle upright and apply the front brake.

4. Check:
   • Front fork operation
     Push down hard on the handlebar several times and check if the front fork rebounds smoothly.
     Rough movement → Repair.
     Refer to “FRONT FORK” on page 4-49.

EAS21650
CHECKING THE TIRES
The following procedure applies to both of the tires.

1. Check:
   • Tire pressure
     Out of specification → Regulate.

WARNING
The tire pressure should only be checked and regulated when the tire temperature equals the ambient air temperature.

The tire pressure and the suspension must be adjusted according to the total weight (including cargo, rider, passenger and accessories) and the anticipated riding speed.

Operation of an overloaded vehicle could cause tire damage, an accident or an injury.
NEVER OVERLOAD THE VEHICLE.

Tire air pressure (measured on cold tires)

<table>
<thead>
<tr>
<th>Loading condition</th>
<th>Front</th>
<th>Rear</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–90 kg (0–198 lb)</td>
<td>225 kPa (33 psi) (2.25 kgf/cm²)</td>
<td>250 kPa (36 psi) (2.50 kgf/cm²)</td>
</tr>
<tr>
<td>90–193 kg (198–425 lb)</td>
<td>225 kPa (33 psi) (2.25 kgf/cm²)</td>
<td>280 kPa (41 psi) (2.80 kgf/cm²)</td>
</tr>
</tbody>
</table>

* Total weight of rider, passenger, cargo and accessories

**WARNING**
It is dangerous to ride with a worn-out tire. When the tire tread reaches the wear limit, replace the tire immediately.

2. Check:
- Tire surfaces
  - Damage/wear → Replace the tire.

1. Tire tread depth
2. Side wall
3. Wear indicator

**WARNING**
Do not use a tubeless tire on a wheel designed only for tube tires to avoid tire failure and personal injury from sudden deflation.
- When using a tube tire, be sure to install the correct tube.

Always replace a new tube tire and a new tube as a set.
- To avoid pinching the tube, make sure the wheel rim band and tube are centered in the wheel groove.
- Patching a punctured tube is not recommended. If it is absolutely necessary to do so, use great care and replace the tube as soon as possible with a good quality replacement.

**WARNING**
After extensive tests, the tires listed below have been approved by Yamaha Motor Co., Ltd. for this model. The front and rear tires should always be by the same manufacturer and of the same design. No guarantee concerning handling characteristics can be given if a tire combination other than one approved by Yamaha is used on this vehicle.

<table>
<thead>
<tr>
<th>Tire</th>
<th>Size</th>
<th>Manufacturer/model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td>120/70R15 M/C 56H</td>
<td>DUNLOP/GPR-100F</td>
</tr>
<tr>
<td>Rear</td>
<td>160/60R15 M/C 67H</td>
<td>DUNLOP/GPR-100L</td>
</tr>
</tbody>
</table>

**WARNING**

- Total weight of rider, passenger, cargo and accessories

- Tire tread depth
- Side wall
- Wear indicator

<table>
<thead>
<tr>
<th>Wear limit (front)</th>
<th>1.0 mm (0.04 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wear limit (rear)</td>
<td>1.0 mm (0.04 in)</td>
</tr>
</tbody>
</table>
**WARNING**

New tires have a relatively low grip on the road surface until they have been slightly worn. Therefore, approximately 100 km should be traveled at normal speed before any high-speed riding is done.

**TIP**

For tires with a direction of rotation mark “1”:
- Install the tire with the mark pointing in the direction of wheel rotation.
- Align the mark “2” with the valve installation point.

---

**CHECKING THE WHEELS**

The following procedure applies to both of the wheels.

1. Check:
   - Wheel Damage/out-of-round → Replace.

---

**WARNING**

Never attempt to make any repairs to the wheel.

**TIP**

After a tire or wheel has been changed or replaced, always balance the wheel.

---

**CHECKING AND LUBRICATING THE CABLES**

The following procedure applies to all of the inner and outer cables.

**WARNING**

A damaged outer cable may cause the cable to corrode and interfere with its movement. Replace damaged outer cable and inner cables as soon as possible.

---

1. Check:
   - Outer cable Damage → Replace.
2. Check:
   - Cable operation Rough movement → Lubricate.

---

**LUBRICATING THE LEVERS**

Lubricate the pivoting point and metal-to-metal moving parts of the levers.

---

**LUBRICATING THE SIDESTAND**

Lubricate the pivoting point and metal-to-metal moving parts of the sidestand.

---

**LUBRICATING THE CENTERSTAND**

Lubricate the pivoting point and metal-to-metal moving parts of the centerstand.

---

**LUBRICATING THE REAR SUSPENSION**

Lubricate the pivoting point and metal-to-metal moving parts of the rear suspension.

---

**Recommended lubricant**

- Engine oil or a suitable cable lubricant
- Silicone grease
- Lithium-soap-based grease

---
ELECTRICAL SYSTEM

CHECKING AND CHARGING THE BATTERY
Refer to "ELECTRICAL COMPONENTS" on page 8-57.

CHECKING THE FUSES
Refer to "ELECTRICAL COMPONENTS" on page 8-57.

REPLACING THE HEADLIGHT BULBS
The following procedure applies to both of the headlight bulbs.
1. Remove:
   • Front cowling
     Refer to "GENERAL CHASSIS" on page 4-1.
2. Disconnect:
   • Headlight coupler “1”
3. Remove:
   • Headlight bulb holder “2”
4. Detach:
   • Headlight bulb holder “1”
5. Remove:
   • Headlight bulb “2”

WARNING
Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

6. Install:
   • Headlight bulb New
     Secure the new headlight bulb with the headlight bulb holder.

NOTICE
Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

7. Install:
   • Headlight bulb holder cover
8. Connect:
   • Headlight coupler
9. Install:
   • Front cowling
     Refer to "GENERAL CHASSIS" on page 4-1.

ADJUSTING THE HEADLIGHT BEAMS
1. Adjust:
   • Headlight beam (vertically)

Direction “a”
Headlight beam is raised.
Direction “b”
Headlight beam is lowered.

2. Adjust:
   • Headlight beam (horizontally)

Direction “a”
Headlight beam is raised.
Direction “b”
Headlight beam is lowered.
Direction “a”
Headlight beam moves to the right.
Direction “b”
Headlight beam moves to the left.

Right headlight

Direction “a”
Headlight beam moves to the left.
Direction “b”
Headlight beam moves to the right.
CHASSIS

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  DISASSEMBLING THE FRONT WHEEL ........................................................................ 4-11
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  ASSEMBLING THE TRANSMISSION CHAIN DRIVE ASSEMBLY ....4-69
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Removing the battery and windshield

**Order** | **Job/Parts to remove** | **Q'ty** | **Remarks**
--- | --- | --- | ---
1 | Rear view mirror | 2 | 
2 | Front upper outer panel | 1 | 
3 | Front upper inner panel | 1 | 
4 | Battery cover | 1 | 
5 | Battery holder | 1 | 
6 | Negative battery lead | 1 | Disconnect. 
7 | Positive battery lead | 1 | Disconnect. 
8 | Battery | 1 | 
9 | Windshield | 1 | 
10 | Windshield bracket upper cover | 1 | For installation, reverse the removal procedure.

7 Nm (0.7 m·kg, 5.1 ft·lb)
Removing the bottom cowl

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Footrest board mat</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Footrest board cover</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Side panel</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Left side cowlng</td>
<td>1</td>
<td>Unhook.</td>
</tr>
<tr>
<td>5</td>
<td>Bottom panel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Right side cowlng</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Wire harness (to ignition coil)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bottom cowlng</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
Removing the footrest boards

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Front lower outer panel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Front lower inner panel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Center panel</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fuel tank overflow hose</td>
<td>1</td>
<td>Unhook.</td>
</tr>
<tr>
<td>5</td>
<td>Rear brake pipe</td>
<td>1</td>
<td>Unhook.</td>
</tr>
<tr>
<td>6</td>
<td>Left footrest board</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fuel tank breather hose</td>
<td>1</td>
<td>Unhook.</td>
</tr>
<tr>
<td>8</td>
<td>Right footrest board</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
Removing the front cowling assembly

![Diagram of front cowling assembly](image)

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upper handlebar cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Windshield bracket lower cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Meter ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Meter assembly cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Meter assembly coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Meter assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Storage compartment</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Headlight sub-wire harness coupler</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>9</td>
<td>Front cowling assembly</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

Note: 7 Nm (0.7 m·kg, 5.1 ft·lb)
Removing the rear cowling assembly

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Grab bar</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>O₂ sensor lead</td>
<td>1</td>
<td>Unhook.</td>
</tr>
<tr>
<td>5</td>
<td>Taillight assembly coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Rear cowling assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fuel tank cover</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
Removing the storage box

![Diagram of motorcycle chassis with labels and torque values]

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coupler rubber cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Storage box light switch coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Seat hinge assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>License plate light connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Mudguard</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Fuel pump access cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fuel pump coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>Fuel hose connector cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Fuel hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>10</td>
<td>Fuel tank overflow hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Storage box inner mat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Seat lock</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Seat hinge housing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Storage box light sub-wire harness coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>15</td>
<td>Storage box</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

Torque values:
- 7 Nm (0.7 m·kg, 5.1 ft·lb)
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 16 Nm (1.6 m·kg, 11 ft·lb)
REMOVING THE FUEL HOSE

1. Remove:
   • Fuel hose connector cover “1”
2. Disconnect:
   • Fuel hose “2”

NOTICE

• Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.
• Although the fuel has been removed from the fuel tank, be careful when removing the fuel hose, since there may be fuel remaining in it.
• Do not disconnect the fuel hose from the fuel hose connector. Disconnect the connector from the fuel pump.

TIP

Before removing the hose, place a few rags in the area under where it will be removed.

INSTALLING THE FUEL HOSE

1. Install:
   • Fuel hose
   • Fuel hose connector cover

NOTICE

When installing the fuel hose, make sure that it is securely connected, and that the fuel hose connector cover is in the correct position, otherwise the fuel hose will not be properly installed.

TIP

• Wipe up any fuel remaining in the recess “a” in the fuel pump with a dry rag “1”.
• After installing the fuel hose connector cover, make sure that it is installed securely.
Removing the front wheel and brake discs

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Front brake hose holder bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Front brake caliper</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Front reflector</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Front reflector bracket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Front wheel axle pinch bolt</td>
<td>1</td>
<td>Loosen.</td>
</tr>
<tr>
<td>6</td>
<td>Front wheel axle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Front wheel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Speed sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Wheel ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Front brake disc</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

**TIP**

Place the vehicle on a suitable stand so that the front wheel is elevated.
Removing the front wheel and brake discs

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Front fender</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>
Disassembling the front wheel

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Wheel bearing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.
REMOVING THE FRONT WHEEL

1. Stand the vehicle on a level surface.

WARNING
Securely support the vehicle so that there is no danger of it falling over.

2. Remove:
   • Front brake calipers

TIP
Do not apply the brake lever when removing the brake calipers.

3. Elevate:
   • Front wheel

TIP
Place the vehicle on a suitable stand so that the front wheel is elevated.

DISASSEMBLING THE FRONT WHEEL

1. Remove:
   • Oil seal
   • Wheel bearings

   a. Clean the surface of the front wheel hub.
   b. Remove the oil seal “1” with a flat-head screwdriver.

TIP
To prevent damaging the wheel, place a rag “2” between the screwdriver and the wheel surface.

c. Remove the wheel bearings “3” with a general bearing puller.

CHECKING THE FRONT WHEEL

1. Check:
   • Wheel axle
     Roll the wheel axle on a flat surface.
     Bends → Replace.

WARNING
Do not attempt to straighten a bent wheel axle.

2. Check:
   • Tire
   • Front wheel
     Damage/wear → Replace.
     Refer to “CHECKING THE TIRES” on page 3-27 and “CHECKING THE WHEELS” on page 3-29.

3. Measure:
   • Radial wheel runout “1”
   • Lateral wheel runout “2”
     Over the specified limits → Replace.

Radial wheel runout limit
1.0 mm (0.04 in)

Lateral wheel runout limit
0.5 mm (0.02 in)
4. Check:
• Wheel bearings
  Front wheel turns roughly or is loose → Replace the wheel bearings.
• Oil seal
  Damage/wear → Replace.

ASSEMBLING THE FRONT WHEEL
1. Install:
• Wheel bearings
  New
• Oil seal
  New

a. Install the new wheel bearings and oil seal in the reverse order of disassembly.

NOTICE
Do not apply pressure to the wheel bearing inner race “1” or balls “2”. Pressure should only be applied to the outer race “3”.

TIP
Use a socket “4” that matches the diameter of the wheel bearing outer race and oil seal.

ADJUSTING THE FRONT WHEEL STATIC BALANCE
TIP
• After replacing the tire, wheel or both, the front wheel static balance should be adjusted.
• Adjust the front wheel static balance with the brake disc installed.

1. Remove:
• Balancing weight(s)
2. Find:
• Front wheel’s heavy spot

TIP
Place the front wheel on a suitable balancing stand.

a. Spin the front wheel.
b. When the front wheel stops, put an “X1” mark at the bottom of the wheel.
c. Turn the front wheel 90° so that the “X1” mark is positioned as shown.
d. Release the front wheel.
e. When the wheel stops, put an “X2” mark at the bottom of the wheel.
f. Repeat steps (c) through (e) several times until all the marks come to rest at the same spot.
g. The spot where all the marks come to rest is the front wheel’s heavy spot “X”.

3. Adjust:
   • Front wheel static balance

   a. Install a balancing weight “1” onto the rim exactly opposite the heavy spot “X”.

   **TIP**  
   Start with the lightest weight.

b. Turn the front wheel 90° so that the heavy spot is positioned as shown.

c. If the heavy spot does not stay in that position, install a heavier weight.
d. Repeat steps (b) and (c) until the front wheel is balanced.

4. Check:
   • Front wheel static balance

   **TIP**  
   Tighten the brake disc bolts in stages and in a crisscross pattern.

2. Check:
   • Front brake discs

   Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-23.

3. Lubricate:
   • Oil seal lips
   • Speed sensor

   **Recommended lubricant**  
   Lithium-soap-based grease

4. Install:
   • Speed sensor
**TIP**
Be sure to fit the two projections on the speed sensor in between the projections on the wheel hub.

5. Install:
- Front wheel

**TIP**
Make sure the slot “a” in the speed sensor fits over the stopper “b” on the outer tube.

6. Tighten:
- Front wheel axle
- Front wheel axle pinch bolt

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Front wheel axle</strong></td>
<td><strong>72 Nm (7.2 m·kg, 52 ft·lb)</strong></td>
</tr>
<tr>
<td><strong>Front wheel axle pinch bolt</strong></td>
<td><strong>20 Nm (2.0 m·kg, 14 ft·lb)</strong></td>
</tr>
</tbody>
</table>

**NOTICE**
Before tightening the wheel axle, push down hard on the handlebar several times and check if the front fork rebounds smoothly.

7. Install:
- Front brake calipers

**WARNING**
Make sure the brake cable is routed properly.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Front brake caliper bolt</strong></td>
<td><strong>40 Nm (4.0 m·kg, 29 ft·lb)</strong></td>
</tr>
</tbody>
</table>
Removing the rear wheel and brake disc

**Order** | **Job/Parts to remove** | **Q'ty** | **Remarks** |
---|---|---|---|
1 | Rear brake caliper | 1 | |
2 | Transmission chain drive case cover | 1 | |
3 | Rear wheel axle pinch bolt | 1 | Loosen. |
4 | Rear wheel axle nut | 1 | |
5 | Rear wheel axle | 1 | |
6 | Collar | 1 | |
7 | Rear wheel | 1 | |
8 | Rear brake disc | 1 | |
9 | Spacer | 1 | For installation, reverse the removal procedure. |

**TIP**
Place the vehicle on the centerstand so that the rear wheel is elevated.
Disassembling the rear wheel

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rear wheel drive hub</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Wheel bearing</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.

- 69 Nm (6.9 m·kg, 50 ft·lb)
REAR WHEEL

REMOVING THE REAR WHEEL (DISC)
1. Stand the vehicle on a level surface.

WARNING
Securely support the vehicle so that there is no danger of it falling over.

TIP
Place the vehicle on the centerstand so that the rear wheel is elevated.

2. Remove:
   • Rear brake caliper

TIP
Do not apply the brake lever when removing the brake caliper.

CHECKING THE REAR WHEEL
1. Check:
   • Wheel axle
     Refer to “CHECKING THE FRONT WHEEL” on page 4-11.

2. Check:
   • Tire
   • Rear wheel
     Damage/wear → Replace.
     Refer to “CHECKING THE TIRES” on page 3-27 and “CHECKING THE WHEELS” on page 3-29.

3. Measure:
   • Radial wheel runout
   • Lateral wheel runout
     Refer to “CHECKING THE FRONT WHEEL” on page 4-11.

Radial wheel runout limit
1.0 mm (0.04 in)
Lateral wheel runout limit
0.5 mm (0.02 in)

CHECKING THE REAR WHEEL DRIVE HUB
1. Check:
   • Rear wheel drive hub “1”
     Cracks/damage → Replace.

ADJUSTING THE REAR WHEEL STATIC BALANCE

TIP
• After replacing the tire, wheel or both, the rear wheel static balance should be adjusted.
• Adjust the rear wheel static balance with the brake disc and rear wheel drive hub installed.

1. Adjust:
   • Rear wheel static balance
     Refer to “ADJUSTING THE FRONT WHEEL STATIC BALANCE” on page 4-12.

INSTALLING THE REAR WHEEL (DISC)
1. Install:
   • Rear wheel drive hub
   • Rear brake disc

<table>
<thead>
<tr>
<th>Rear wheel drive hub bolt</th>
<th>LOCTITE®</th>
</tr>
</thead>
<tbody>
<tr>
<td>69 Nm (6.9 m·kg, 50 ft·lb)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rear brake disc bolt</th>
<th>LOCTITE®</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 Nm (1.8 m·kg, 13 ft·lb)</td>
<td></td>
</tr>
</tbody>
</table>

TIP
Tighten the brake disc bolts in stages and in a crisscross pattern.

2. Check:
   • Rear brake disc
     Refer to “CHECKING THE REAR BRAKE DISC” on page 4-36.
Removing the front brake pads

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Front brake hose holder bolt</td>
<td>1</td>
<td>The following procedure applies to both of the front brake calipers.</td>
</tr>
<tr>
<td>2</td>
<td>Front brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Front brake caliper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake pad clip</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake pad pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake pad spring</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>7</td>
<td>Front brake pad</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
Removing the front brake master cylinder

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Upper handlebar cover</td>
<td></td>
<td>Refer to &quot;GENERAL CHASSIS&quot; on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Brake fluid</td>
<td></td>
<td>Drain. Refer to &quot;BLEEDING THE HYDRAULIC BRAKE SYSTEM&quot; on page 3-23.</td>
</tr>
<tr>
<td>1</td>
<td>Brake master cylinder reservoir cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake master cylinder reservoir diaphragm holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake master cylinder reservoir diaphragm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Front brake lever</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Front brake light switch connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Brake hose union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Front brake hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Brake hose gasket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Front brake master cylinder holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Front brake master cylinder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Front brake light switch</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

**Torque Specifications**

- Brake master cylinder reservoir cap: 10 Nm (1.0 m·kg, 7.2 ft·lb)
- Brake master cylinder reservoir diaphragm holder: 6 Nm (0.6 m·kg, 4.3 ft·lb)
- Front brake lever: 10 Nm (1.0 m·kg, 7.2 ft·lb)
- Front brake hose union bolt: 30 Nm (3.0 m·kg, 22 ft·lb)
Disassembling the front brake master cylinder

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brake master cylinder kit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake master cylinder body</td>
<td>1</td>
<td>For assembly, reverse the disassembly pro-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cedure.</td>
</tr>
</tbody>
</table>
Removing the front brake calipers

The following procedure applies to both of the front brake calipers.

1. Front brake hose holder bolt 1
2. Brake hose union bolt 1
3. Brake hose gasket 2
4. Front brake hose 1
5. Front brake caliper bolt 2
6. Front brake caliper 1

For installation, reverse the removal procedure.

Order | Job/Parts to remove | Q'ty | Remarks
--- | --- | --- | ---
1 | Front brake hose holder bolt | 1 |
2 | Brake hose union bolt | 1 |
3 | Brake hose gasket | 2 |
4 | Front brake hose | 1 |
5 | Front brake caliper bolt | 2 |
6 | Front brake caliper | 1 |

Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.

7 Nm (0.7 m · kg, 5.1 ft · lb)
30 Nm (3.0 m · kg, 22 ft · lb)
40 Nm (4.0 m · kg, 29 ft · lb)
Disassembling the front brake calipers

The following procedure applies to both of the front brake calipers.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brake pad clip</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake pad pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake pad spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Front brake pad</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake caliper piston</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake caliper piston dust seal</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Brake caliper piston seal</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bleed screw</td>
<td>1</td>
<td>For assembly, reverse the disassembly proce-</td>
</tr>
</tbody>
</table>

5 Nm (0.5 m · kg, 3.6 ft · lb)
INTRODUCTION

**WARNING**

Disc brake components rarely require disassembly. Therefore, always follow these preventive measures:

- Never disassemble brake components unless absolutely necessary.
- If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.
- Never use solvents on internal brake components.
- Use only clean or new brake fluid for cleaning brake components.
- Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any split brake fluid immediately.
- Avoid brake fluid coming into contact with the eyes as it can cause serious injury.

**FIRST AID FOR BRAKE FLUID GETTING INTO THE EYES:**
- Flush with water for 15 minutes and get immediate medical attention.

CHECKING THE FRONT BRAKE DISCS

The following procedure applies to both brake discs.

1. Remove:
   - Front wheel
   Refer to “FRONT WHEEL” on page 4-8.

2. Check:
   - Brake disc
   Damage/galling → Replace.

3. Measure:
   - Brake disc deflection
   Out of specification → Correct the brake disc deflection or replace the brake disc.

**Brake disc deflection limit 0.15 mm (0.0059 in)**

4. Measure:
   - Brake disc thickness
   Measure the brake disc thickness at a few different locations.
   Out of specification → Replace.

**Brake disc thickness limit 3.5 mm (0.14 in)**

5. Adjust:
   - Brake disc deflection

**Brake disc deflection limit 0.15 mm (0.0059 in)**

- a. Place the vehicle on a suitable stand so that the front wheel is elevated.
- b. Before measuring the front brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.
- c. Remove the brake caliper.
- d. Hold the dial gauge at a right angle against the brake disc surface.

TIP

Tighten the brake disc bolts in stages and in a crisscross pattern.
d. Measure the brake disc deflection.
e. If out of specification, repeat the adjustment steps until the brake disc deflection is within specification.
f. If the brake disc deflection cannot be brought within specification, replace the brake disc.

6. Install:
   • Front wheel
     Refer to “FRONT WHEEL” on page 4-8.

REPLACING THE FRONT BRAKE PADS
The following procedure applies to both brake calipers.

TIP
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

1. Measure:
   • Brake pad wear limit “a”
     Out of specification → Replace the brake pads as a set.

   **Brake pad lining thickness (inner)**
   - 4.0 mm (0.16 in)
   - Limit
     - 0.5 mm (0.02 in)

   **Brake pad lining thickness (outer)**
   - 4.0 mm (0.16 in)
   - Limit
     - 0.5 mm (0.02 in)

2. Install:
   • Front brake pads
   • Brake pad spring

   **TIP**
   Always install new brake pads and a new brake pad spring as a set.

   **TIP**
   a. Connect a clear plastic hose “1” tightly to the bleed screw “2”. Put the other end of the hose into an open container.
   b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.
   c. Tighten the bleed screw.

   **Front brake caliper bleed screw**
   - 5 Nm (0.5 m·kg, 3.6 ft·lb)

   d. Install new brake pads and a new brake pad spring.

   **TIP**
   The arrow mark “a” on the brake pad spring must point in the direction of disc rotation.
e. Install the brake pad pin and brake pad clips.

3. Install:
• Front brake caliper

| Front brake caliper bolt | 40 Nm (4.0 m·kg, 29 ft·lb) |

4. Check:
• Brake fluid level
  Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.
  Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.

5. Check:
• Brake lever operation
  Soft or spongy feeling → Bleed the brake system.
  Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

EAS22360
DISASSEMBLING THE FRONT BRAKE CALIPERS
The following procedure applies to both of the brake calipers.
1. Remove:
• Brake caliper pistons “1”
• Brake caliper piston dust seals “2”
• Brake caliper piston seals “3”

a. Blow compressed air into the brake hose joint opening “a” to force out the pistons from the brake caliper.

**WARNING**
- Cover the brake caliper pistons with a rag. Be careful not to get injured when the pistons are expelled from the brake caliper.
- Never try to pry out the brake caliper pistons.
- Do not loosen the bolts “4”.

---

**TIP**
Put the end of the brake hose into a container and pump out the brake fluid carefully.
b. Remove the brake caliper piston dust seals and piston seals.

---

**CHECKING THE FRONT BRAKE CALIPERS**

<table>
<thead>
<tr>
<th>Recommended brake component replacement schedule</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake pads</td>
<td>If necessary</td>
</tr>
<tr>
<td>Piston seals</td>
<td>Every two years</td>
</tr>
<tr>
<td>Piston dust seals</td>
<td>Every two years</td>
</tr>
<tr>
<td>Brake hoses</td>
<td>Every four years</td>
</tr>
<tr>
<td>Brake fluid</td>
<td>Every two years and whenever the brake is disassembled</td>
</tr>
</tbody>
</table>

1. Check:
   - Brake caliper pistons “1”
     Rust/scratches/wear → Replace the brake caliper pistons.
   - Brake caliper cylinders “2”
     Scratches/wear → Replace the brake caliper assembly.
   - Brake caliper body “3”
     Cracks/damage → Replace the brake caliper assembly.
   - Brake fluid delivery passages (brake caliper body)
     Obstruction → Blow out with compressed air.

---

**WARNING**
Whenever a brake caliper is disassembled, replace the brake caliper piston dust seals and piston seals.

---

**ASSEMBLING THE FRONT BRAKE CALIPERS**

**WARNING**
Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.

- Never use solvents on internal brake components as they will cause the brake caliper piston dust seals and piston seals to swell and distort.
- Whenever a brake caliper is disassembled, replace the brake caliper piston dust seals and piston seals.

**Recommended fluid**
DOT 4

**INSTALLING THE FRONT BRAKE CALIPERS**
The following procedure applies to both of the brake calipers.

1. Install:
   - Front brake caliper “1”
     (temporarily)
   - Brake hose gaskets **New**
   - Front brake hose “2”
   - Brake hose union bolt “3”

**Brake hose union bolt**
30 Nm (3.0 m·kg, 22 ft·lb)

---

**WARNING**
Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-35.
When installing the brake hose onto the brake caliper “1”, make sure the brake pipe “a” touches the projection “b” on the brake caliper.

2. Remove:
   • Front brake caliper

3. Install:
   • Brake pads
   • Brake pad spring
   • Brake pad pin
   • Brake pad clips
   • Front brake caliper
   • Front brake hose holder bolt

Front brake caliper bolt
40 Nm (4.0 m·kg, 29 ft·lb)
Front brake hose holder bolt
7 Nm (0.7 m·kg, 5.1 ft·lb)

Refer to “REPLACING THE FRONT BRAKE PADS” on page 4-24.

4. Fill:
   • Brake master cylinder reservoir
     (with the specified amount of the recommended brake fluid)

Recommended fluid
DOT 4

WARNING
• Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
• Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.

When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

NOTICE
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any split brake fluid immediately.

5. Bleed:
   • Brake system
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

6. Check:
   • Brake fluid level
     Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.

7. Check:
   • Brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

REMOVING THE FRONT BRAKE MASTER CYLINDER

TIP
Before removing the front brake master cylinder, drain the brake fluid from the entire brake system.

1. Remove:
   • Brake hose union bolt “1”
   • Brake hose gaskets “2”
   • Front brake hose “3”

TIP
To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.
CHECKING THE FRONT BRAKE MASTER CYLINDER
1. Check:
   - Brake master cylinder
     Damage/scratches/wear → Replace.
   - Brake fluid delivery passages
     (brake master cylinder body)
     Obstruction → Blow out with compressed air.
2. Check:
   - Brake master cylinder kit
     Damage/scratches/wear → Replace.
3. Check:
   - Brake master cylinder reservoir
     Cracks/damage → Replace.
   - Brake master cylinder reservoir diaphragm
     Damage/wear → Replace.
4. Check:
   - Brake hose
     Cracks/damage/wear → Replace.

ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

WARNING
Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
Never use solvents on internal brake components.

Recommended fluid
DOT 4

INSTALLING THE FRONT BRAKE MASTER CYLINDER
1. Install:
   - Brake master cylinder “1”
   - Brake master cylinder holder “2”

   Brake master cylinder holder bolt
   10 Nm (1.0 m·kg, 7.2 ft·lb)

WARNING
Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-35.

TIP
- Install the brake master cylinder holder with the “UP” mark “a” facing up.
- Align the end of the brake master cylinder holder with the punch mark “b” on the handlebar.
- First, tighten the upper bolt, then the lower bolt.

NOTICE
When installing the brake hose onto the brake master cylinder, make sure the brake pipe touches the projection “a” as shown.

Turn the handlebar to the left and right to make sure the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.
3. Fill:
   • Brake master cylinder reservoir
     (with the specified amount of the recommended brake fluid)

   **WARNING**
   • Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
   • Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
   • When refilling, be careful that water does not enter the brake master cylinder reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

   **NOTICE**
   Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

4. Bleed:
   • Brake system
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

5. Check:
   • Brake fluid level
     Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.

6. Check:
   • Brake lever operation
     Soft or spongy feeling → Bleed the brake system.
Removing the rear brake pads

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rear brake caliper retaining bolt (rear)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rear brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear brake caliper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rear brake pad</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake pad support</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Rear brake caliper bracket</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

- 31 Nm (3.1 m·kg, 22 ft·lb)
- 40 Nm (4.0 m·kg, 29 ft·lb)
Removing the rear brake master cylinder

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Upper handlebar cover</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Brake fluid</td>
<td></td>
<td>Drain. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.</td>
</tr>
<tr>
<td>1</td>
<td>Brake master cylinder reservoir cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake master cylinder reservoir diaphragm holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake master cylinder reservoir diaphragm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rear brake lever</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear brake light switch connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Brake hose union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rear brake hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Brake hose gasket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Rear brake master cylinder holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Rear brake master cylinder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Rear brake light switch</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
Disassembling the rear brake master cylinder

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brake master cylinder kit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake master cylinder body</td>
<td>1</td>
<td>For assembly, reverse the disassembly proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>
Removing the rear brake caliper

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Brake fluid</td>
<td></td>
<td>Drain. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.</td>
</tr>
<tr>
<td>1</td>
<td>Rear brake lock cable adjusting nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rear brake lock cable</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear brake lock cable holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake hose union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Brake hose gasket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Rear brake hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Rear brake caliper retaining bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Rear brake caliper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Rear brake pad</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Brake pad support</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Rear brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
Removing the rear brake caliper

- **30 Nm (3.0 m · kg, 22 ft · lb)**
- **31 Nm (3.1 m · kg, 22 ft · lb)**
- **22 Nm (2.2 m · kg, 16 ft · lb)**
- **40 Nm (4.0 m · kg, 29 ft · lb)**

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Rear brake caliper bracket</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>
### Disassembling the rear brake caliper

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brake caliper piston</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake caliper piston dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake caliper piston seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bleed screw</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake caliper body</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.

\[ \times 6 \text{ Nm (0.6 m} \cdot \text{kg, 4.3 ft} \cdot \text{lb)} \]
INTRODUCTION

WARNING

Disc brake components rarely require disassembly. Therefore, always follow these preventive measures:

- Never disassemble brake components unless absolutely necessary.
- If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.
- Never use solvents on internal brake components.
- Use only clean or new brake fluid for cleaning brake components.
- Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any split brake fluid immediately.
- Avoid brake fluid coming into contact with the eyes as it can cause serious injury.
- FIRST AID FOR BRAKE FLUID GETTING INTO THE EYES:
  - Flush with water for 15 minutes and get immediate medical attention.

CHECKING THE REAR BRAKE DISC

1. Remove:
   - Rear wheel
     Refer to “REAR WHEEL” on page 4-15.
2. Check:
   - Brake disc
     Damage/galling → Replace.
3. Measure:
   - Brake disc deflection
     Out of specification → Correct the brake disc deflection or replace the brake disc.
     Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-23.

   Brake disc deflection limit
   0.15 mm (0.0059 in)

4. Measure:
   - Brake disc thickness
     Measure the brake disc thickness at a few different locations.
     Out of specification → Replace.
     Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-23.

5. Adjust:
   - Brake disc deflection
     Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-23.

   Rear brake disc bolt
   18 Nm (1.8 m·kg, 13 ft·lb)
   LOCTITE®

6. Install:
   - Rear wheel
     Refer to “REAR WHEEL” on page 4-15.

REPLACING THE REAR BRAKE PADS

TIP

When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

1. Remove:
   - Rear brake caliper retaining bolt (rear) “1”
   - Rear brake caliper bolts “2”
   - Rear brake caliper “3”

2. Remove:
   - Rear brake pads “1”
   - Brake pad supports “2”
3. Measure:
- Brake pad wear limit “a”
  Out of specification → Replace the brake pads as a set.

<table>
<thead>
<tr>
<th>Brake pad lining thickness (inner)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0 mm (0.31 in)</td>
</tr>
<tr>
<td>Limit</td>
</tr>
<tr>
<td>0.8 mm (0.03 in)</td>
</tr>
</tbody>
</table>

4. Install:
- Brake pad supports “1” New
- Rear brake pads “2” New
- Rear brake caliper bracket “3”
  (to brake caliper)

**TIP**
Always install new brake pads and a new brake pad supports as a set.

a. Connect a clear plastic hose “1” tightly to the bleed screw “2”. Put the other end of the hose into an open container.

b. Loosen the bleed screw, and then turn the brake caliper piston “3” clockwise until section “a” of the brake caliper piston is level with the surface of the brake caliper body.

**TIP**
Align the recesses “b” in the brake caliper piston with the brake caliper body as shown in the illustration.
c. Tighten the bleed screw.

**Rear brake caliper bleed screw**
6 Nm (0.6 m·kg, 4.3 ft·lb)

d. Install new brake pads, new pad supports, and the rear brake caliper.

**TIP**
Align the projection “c” on the piston side of the brake pad with the lower recess in the brake caliper piston.

---

---

5. Lubricate:
- Rear brake caliper retaining bolt

**Recommended lubricant**
Silicone grease

---

---

**NOTICE**
- Do not allow grease to contact the brake pads.
- Remove any excess grease.

6. Install:
- Rear brake caliper retaining bolt (rear)

**Rear brake caliper retaining bolt (rear)**
31 Nm (3.1 m·kg, 22 ft·lb)

7. Install:
- Rear brake caliper bolts

**Rear brake caliper bolt**
40 Nm (4.0 m·kg, 29 ft·lb)

8. Check:
- Brake fluid level
  Below the minimum level mark “a” → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.

---

---

9. Check:
- Brake lever operation
  Soft or spongy feeling → Bleed the brake system.
  Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

---

---

**REMOVING THE REAR BRAKE CALIPER**

**TIP**
Before disassembling the brake caliper, drain the brake fluid from the entire brake system.

---

---

1. Remove:
- Rear brake lock cable adjusting nut “1”
- Rear brake lock cable “2”
- Pin “3”
- Spring “4”
- Brake hose union bolt “5”
- Brake hose gaskets “6”
- Rear brake hose “7”

**TIP**
Put the end of the brake hose into a container and pump out the brake fluid carefully.
EAS22530

DISASSEMBLING THE REAR BRAKE CALIPER

1. Remove:
   • Brake caliper piston “1”
   • Brake caliper piston dust seal “2”
   • Brake caliper piston seal “3”

   a. Operate the rear brake lock lever “4” continuously in the direction shown by the arrow until the brake caliper piston comes out.

   b. Remove the brake caliper piston dust seal and piston seal.

EAS22640

CHECKING THE REAR BRAKE CALIPER

<table>
<thead>
<tr>
<th>Recommended brake component replacement schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake pads</td>
</tr>
<tr>
<td>Piston seal</td>
</tr>
<tr>
<td>Piston dust seal</td>
</tr>
</tbody>
</table>

1. Check:
   • Brake caliper piston “1”
     Rust/scratches/wear → Replace the brake caliper piston.
   • Brake caliper cylinder “2”
     Scratches/wear → Replace the brake caliper assembly.
   • Brake caliper body “3”
     Cracks/damage → Replace the brake caliper assembly.
   • Brake fluid delivery passages
     (brake caliper body)
     Obstruction → Blow out with compressed air.

   WARNING
   EWA4B51009
   Whenever a brake caliper is disassembled, replace the brake caliper piston dust seal and piston seal.

   Recommended brake component replacement schedule

   Brake hose  Every four years
   Brake fluid Every two years and whenever the brake is disassembled

2. Check:
   • Brake caliper bracket “1”
     Cracks/damage → Replace.
ASSEMBLING THE REAR BRAKE CALIPER

**WARNING**

- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- Never use solvents on internal brake components as they will cause the brake caliper piston dust seal and piston seal to swell and distort.
- Whenever a brake caliper is disassembled, replace the brake caliper piston dust seal and piston seal.

**Recommended fluid**

DOT 4

---

1. Install:
   - Brake caliper piston “1”
     Turn the brake caliper piston clockwise until section “a” of the brake caliper piston is level with the surface of the brake caliper body.

**TIP**

Align the recesses “b” in the brake caliper piston with the brake caliper body as shown in the illustration.

INSTALLING THE REAR BRAKE CALIPER

1. Install:
   - Rear brake caliper bracket

---

**WARNING**

Proper brake hose routing is essential to ensure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-35.

**NOTICE**

When installing the brake hose onto the brake caliper “1”, make sure the brake pipe “a” touches the projection “b” on the brake caliper.

---

**Recommended fluid**

DOT 4

---

1. Install:
   - Rear brake caliper “1” (temporarily)
   - Brake hose gaskets New
   - Rear brake hose “2”
   - Brake hose union bolt “3”

**WARNING**

- Rear brake caliper retaining bolt (front)
  31 Nm (3.1 m·kg, 22 ft·lb)
- Brake hose union bolt
  30 Nm (3.0 m·kg, 22 ft·lb)

---

2. Remove:
   - Rear brake caliper retaining bolt (rear)
   - Rear brake caliper
   - Rear brake caliper bracket

3. Install:
   - Brake pad supports
   - Rear brake pads
   - Rear brake caliper bracket
   - Rear brake caliper
   - Rear brake caliper retaining bolt (rear)
     Refer to “REPLACING THE REAR BRAKE PADS” on page 4-36.

---

**Recommended fluid**

DOT 4

---

2. Remove:
   - Rear brake caliper retaining bolt (rear)
   - Rear brake caliper
   - Rear brake caliper bracket

3. Install:
   - Brake pad supports
   - Rear brake pads
   - Rear brake caliper bracket
   - Rear brake caliper
   - Rear brake caliper retaining bolt (rear)
     Refer to “REPLACING THE REAR BRAKE PADS” on page 4-36.

---

**Recommended fluid**

DOT 4
4. Fill:
   • Brake master cylinder reservoir
     (with the specified amount of the recommended brake fluid)

   **Recommended fluid**
   DOT 4

**WARNING**

- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
- When refilling, be careful that water does not enter the brake master cylinder reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

**NOTICE**

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

5. Bleed:
   • Brake system
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

6. Check:
   • Brake fluid level
     Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.

7. Check:
   • Brake lever operation
     Soft or spongy feeling → Bleed the brake system.

8. Install:
   • Rear brake lock cable holder
   • Spring
   • Pin
   • Rear brake lock cable
   • Rear brake lock cable adjusting nut

   **Rear brake lock cable holder bolt**
   22 Nm (2.2 m·kg, 16 ft·lb)

9. Check:
   • Rear brake lock cable length
     Refer to “ADJUSTING THE REAR BRAKE LOCK CABLE” on page 3-23.

---

**REMOVING THE REAR BRAKE MASTER CYLINDER**

**TIP**

Before removing the rear brake master cylinder, drain the brake fluid from the entire brake system.

1. Remove:
   • Brake hose union bolt “1”
   • Brake hose gaskets “2”
   • Rear brake hose “3”

**TIP**

To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

---

**CHECKING THE REAR BRAKE MASTER CYLINDER**

1. Check:
   • Brake master cylinder
     Damage/scratches/wear → Replace.
   • Brake fluid delivery passages
     (brake master cylinder body)
     Obstruction → Blow out with compressed air.
2. Check:
   • Brake master cylinder kit
     Damage/scratches/wear → Replace.

3. Check:
   • Brake master cylinder reservoir
   • Brake master cylinder reservoir diaphragm
     Cracks/damage → Replace.

4. Check:
   • Brake hose
     Cracks/damage/wear → Replace.

EAS22730
ASSEMBLING THE REAR BRAKE MASTER CYLINDER

**WARNING**

- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- Never use solvents on internal brake components.

Recommended fluid
DOT 4

EAS22700
INSTALLING THE REAR BRAKE MASTER CYLINDER

1. Install:
   • Brake master cylinder “1”
   • Brake master cylinder holder “2”

**WARNING**

Proper brake hose routing is essential to ensure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-35.

**NOTICE**

When installing the brake hose onto the brake master cylinder, make sure the brake pipe touches the projection “a” as shown.

**TIP**

Turn the handlebar to the left and to the right to make sure that the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.

2. Install:
   • Brake hose gaskets “1” New

ECA14160

**TIP**

- Install the brake master cylinder holder with the “UP” mark “a” facing up.
- Align the end of the brake master cylinder holder with the punch mark “b” on the handlebar.
- First, tighten the upper bolt, then the lower bolt.

Recommended fluid
DOT 4

EWA13530

**WARNING**

- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
When refilling, be careful that water does not enter the brake master cylinder reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

**NOTICE**

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

4. **Bleed:**
   - Brake system
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

5. **Check:**
   - Brake fluid level
     Below the minimum level mark “a” → Add the recommended brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.

6. **Check:**
   - Brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.
Removing the handlebar

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Front cowling assembly</td>
<td></td>
<td>Refer to &quot;GENERAL CHASSIS&quot; on page 4-1.</td>
</tr>
<tr>
<td>1</td>
<td>Plastic clamp</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Grip end</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Front brake light switch connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Right handlebar switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Throttle cable</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Throttle grip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Front brake master cylinder holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Front brake master cylinder assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Rear brake light switch connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>10</td>
<td>Rear brake lock lever/holder</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Rear brake lock cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>12</td>
<td>Left handlebar switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Rear brake master cylinder holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Rear brake master cylinder assembly</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

26 Nm (2.6 m·kg, 19 ft·lb)

10 Nm (1.0 m·kg, 7.2 ft·lb)

40 Nm (4.0 m·kg, 29 ft·lb)
Removing the handlebar

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Handlebar grip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Lower handlebar cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Handlebar</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

T R. 10 Nm (1.0 m • kg, 7.2 ft • lb)

T R. 26 Nm (2.6 m • kg, 19 ft • lb)

T R. 10 Nm (1.0 m • kg, 7.2 ft • lb)

T R. 40 Nm (4.0 m • kg, 29 ft • lb)
REMOVING THE HANDLEBAR
1. Stand the vehicle on a level surface.

**WARNING**
Securely support the vehicle so that there is no danger of it falling over.

2. Remove:
   • Handlebar grip “1”

**TIP**
Blow compressed air between the left end of the handlebar and the handlebar grip, and gradually push the grip off the handlebar.

CHECKING THE HANDLEBAR
1. Check:
   • Handlebar
     Bends/cracks/damage → Replace.

**WARNING**
Do not attempt to straighten a bent handlebar as this may dangerously weaken it.

INSTALLING THE HANDLEBAR
1. Stand the vehicle on a level surface.

**WARNING**
Securely support the vehicle so that there is no danger of it falling over.

2. Install:
   • Handlebar

**TIP**
Route the right handlebar switch lead “1”, left handlebar switch lead “2”, and rear brake hose “3” through the opening “a” in the handlebar. Refer to “CABLE ROUTING” on page 2-35.

3. Install:
   • Lower handlebar cover

**TIP**
Route the throttle cables “1” and rear brake lock cable “2” through the lower handlebar cover.

4. Install:
   • Handlebar grip

Do not attempt to straighten a bent handlebar as this may dangerously weaken it.

5. Install:
   • Rear brake master cylinder assembly “1”
   • Rear brake master cylinder holder “2”

**TIP**
Install the rear brake master cylinder holder with the “UP” mark “a” facing up.

**WARNING**
Do not touch the handlebar grip until the rubber adhesive has fully dried.

**TIP**
First, tighten the upper bolt, then the lower bolt.
6. Connect:
   • Rear brake lock cable
     (to rear brake lock lever)

   **TIP**
   Lubricate the inside of the rear brake lock cable and rear brake lock lever with a thin coat of lithium-soap-based grease.

7. Install:
   • Left handlebar switch “1”
   • Rear brake lock lever
   • Rear brake lock lever holder

   **TIP**
   Align the projection “a” on the left handlebar switch with the hole “b” in the handlebar.

8. Install:
   • Front brake master cylinder assembly “1”
   • Front brake master cylinder holder “2”

   **TIP**
   - Install the front brake master cylinder holder with the “UP” mark “a” facing up.
   - Align the end of the brake master cylinder holder with the punch mark “b” on the handlebar.
   - First, tighten the upper bolt, then the lower bolt.

   **Brake master cylinder holder**
   10 Nm (1.0 m·kg, 7.2 ft·lb)

9. Install:
   • Throttle grip “1”
   • Throttle cables “2”

   **TIP**
   Lubricate the inside of the throttle grip with a thin coat of lithium-soap-based grease and install it onto the handlebar.

10. Install:
    • Right handlebar switch “1”

    **WARNING**
    Make sure the throttle grip operates smoothly.

    **TIP**
    Align the projection “a” on the right handlebar switch with the hole “b” in the handlebar.

11. Adjust:
    • Throttle cable free play

    Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-9.
12. Adjust:

- Rear brake lock cable length
  Refer to “ADJUSTING THE REAR BRAKE LOCK CABLE” on page 3-23.
Removing the front fork legs

The following procedure applies to both of the front fork legs.

Front cowling assembly
- Refer to "GENERAL CHASSIS" on page 4-1.

Front wheel/Front fender
- Refer to "FRONT WHEEL" on page 4-8.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>The following procedure applies to both of the front fork legs.</td>
</tr>
<tr>
<td>1</td>
<td>Lower bracket cover bolt</td>
<td>2</td>
<td>Loosen.</td>
</tr>
<tr>
<td>2</td>
<td>Upper bracket pinch bolt</td>
<td>1</td>
<td>Loosen.</td>
</tr>
<tr>
<td>3</td>
<td>Cap bolt</td>
<td>1</td>
<td>Loosen.</td>
</tr>
<tr>
<td>4</td>
<td>Lower bracket pinch bolt</td>
<td>2</td>
<td>Loosen.</td>
</tr>
<tr>
<td>5</td>
<td>Front fork leg</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
Disassembling the front fork legs

The following procedure applies to both of the front fork legs.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cap bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fork spring seat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fork spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oil seal clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Damper rod bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Copper washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Damper rod</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Rebound spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Inner tube</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Outer tube bushing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Inner tube bushing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

30 Nm (3.0 m·kg, 22 ft·lb)
## Disassembling the front fork legs

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>Oil flow stopper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Outer tube</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>

30 Nm (3.0 m·kg, 22 ft·lb)
**REMOVING THE FRONT FORK LEGS**

The following procedure applies to both of the front fork legs.

1. Stand the vehicle on a level surface.

**WARNING**

Securely support the vehicle so that there is no danger of it falling over.

**TIP**

Place the vehicle on a suitable stand so that the front wheel is elevated.

2. Remove:
   - Lower bracket cover bolts

**TIP**

Before removing the lower bracket cover bolts, support the front brake calipers so that there is no strain placed on the brake pipe or speed sensor lead.

3. Loosen:
   - Upper bracket pinch bolt “1”
   - Cap bolt “2”
   - Lower bracket pinch bolts “3”

**WARNING**

Before loosening the upper and lower bracket pinch bolts, support the front fork leg.

4. Remove:
   - Front fork leg

**DISASSEMBLING THE FRONT FORK LEGS**

The following procedure applies to both of the front fork legs.

1. Drain:
   - Fork oil

**TIP**

Stroke the inner tube several times while draining the fork oil.

2. Remove:
   - Dust seal “1”
   - Oil seal clip “2” (with a flat-head screwdriver)

**NOTICE**

Do not scratch the inner tube.

**TIP**

- Do not remove the fork leg protector from the outer tube.
- If the front fork leg protector must be removed, always install a new one.

3. Remove:
   - Damper rod bolt “1”
   - Copper washer

**TIP**

While holding the damper rod with the damper rod holder “2” and T-handle “3”, loosen the damper rod bolt.
4. Remove:
• Inner tube

⚠️ **NOTICE**
Excessive force will damage the oil seal and bushing. A damaged oil seal or bushing must be replaced.

Avoid bottoming the inner tube into the outer tube during the above procedure, as the oil flow stopper will be damaged.

---

2. Measure:
• Spring free length “a”
  Out of specification → Replace.

---

3. Check:
• Damper rod “1”
  Damage/wear → Replace.
  Obstruction → Blow out all of the oil passages with compressed air.
• Oil flow stopper “2”
  Damage → Replace.

⚠️ **NOTICE**
When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.
WARNING

Make sure the oil levels in both front fork legs are equal.
Uneven oil levels can result in poor handling and a loss of stability.

TIP

When assembling the front fork leg, be sure to replace the following parts:
- Inner tube bushing
- Outer tube bushing
- Oil seal
- Dust seal

Before assembling the front fork leg, make sure all of the components are clean.

1. Install:
   • Damper rod “1”
   • Rebound spring “2”

NOTICE

Allow the damper rod to slide slowly down the inner tube “3” until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.

2. Install:
   • Oil flow stopper “1”

3. Lubricate:
   • Inner tube’s outer surface “2”

4. Install:
   • Inner tube (into the outer tube)
   • Copper washer
   • Damper rod bolt

5. Tighten:
   • Damper rod bolt “1”

TIP

While holding the damper rod with the damper rod holder “2” and T-handle “3”, tighten the damper rod bolt.

6. Install:
   • Outer tube bushing “1” New
   • Washer “2”
     (with the fork seal driver weight “3” and fork seal driver attachment “4”)

Recommended oil
Yamaha fork oil 10WT

4. Install:
   • Inner tube (into the outer tube)
   • Copper washer
   • Damper rod bolt

5. Tighten:
   • Damper rod bolt “1”

TIP

While holding the damper rod with the damper rod holder “2” and T-handle “3”, tighten the damper rod bolt.

Recommended oil
Yamaha fork oil 10WT

TIP

While holding the damper rod with the damper rod holder “2” and T-handle “3”, tighten the damper rod bolt.

Recommended oil
Yamaha fork oil 10WT

TIP

While holding the damper rod with the damper rod holder “2” and T-handle “3”, tighten the damper rod bolt.

Recommended oil
Yamaha fork oil 10WT

TIP

While holding the damper rod with the damper rod holder “2” and T-handle “3”, tighten the damper rod bolt.

Recommended oil
Yamaha fork oil 10WT

TIP

While holding the damper rod with the damper rod holder “2” and T-handle “3”, tighten the damper rod bolt.

Recommended oil
Yamaha fork oil 10WT

TIP

While holding the damper rod with the damper rod holder “2” and T-handle “3”, tighten the damper rod bolt.

Recommended oil
Yamaha fork oil 10WT

TIP

While holding the damper rod with the damper rod holder “2” and T-handle “3”, tighten the damper rod bolt.

Recommended oil
Yamaha fork oil 10WT

TIP

While holding the damper rod with the damper rod holder “2” and T-handle “3”, tighten the damper rod bolt.

Recommended oil
Yamaha fork oil 10WT
7. Install:
   • Oil seal “1” New
     (with the fork seal driver weight “2” and fork seal driver attachment “3”)

   **NOTICE**
   Make sure the numbered side of the oil seal faces up.

   **TIP**
   • Before installing the oil seal, lubricate its lips with lithium-soap-based grease.
   • Lubricate the outer surface of the inner tube with fork oil.
   • Before installing the oil seal, cover the top of the front fork leg with a plastic bag to protect the oil seal during installation.

8. Install:
   • Oil seal clip “1” New

   **TIP**
   Adjust the oil seal clip so that it fits into the outer tube’s groove.

9. Install:
   • Dust seal “1” New
     (with the fork seal driver weight “2”)

10. Fill:
    • Front fork leg
      (with the specified amount of the recommended fork oil)

   **NOTICE**
   Be sure to use the recommended fork oil. Other oils may have an adverse effect on front fork performance.
   • When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.

**Recommended oil**
Yamaha fork oil 10WT
Quantity
517.0 cm³ (17.48 US oz) (18.23 Imp.oz)
11. After filling the front fork leg, slowly stroke the inner tube “1” up and down (at least ten times) to distribute the fork oil.

**TIP**
Be sure to stroke the inner tube slowly because the fork oil may spurt out.

12. Before measuring the fork oil level, wait ten minutes until the oil has settled and the air bubbles have dispersed.

**TIP**
Be sure to bleed the front fork leg of any residual air.

13. Measure:
   - Front fork leg oil level “a” (from the top of the inner tube, with the inner tube fully compressed and without the fork spring)
   - Out of specification → Correct.

<table>
<thead>
<tr>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>87.0 mm (3.43 in)</td>
</tr>
</tbody>
</table>

14. Install:
   - Fork spring
   - Fork spring seat
   - Spacer
   - Cap bolt
     (along with the O-ring New)

**TIP**
- Before installing the cap bolt, lubricate its O-ring with grease.

---

**INSTALLING THE FRONT FORK LEGS**

The following procedure applies to both of the front fork legs.

1. Install:
   - Front fork leg
     Temporarily tighten the upper and lower bracket pinch bolts.

**TIP**
- Make sure the inner tube end “a” is flush with the lower edge “b” of the upper bracket.

2. Tighten:
   - Lower bracket pinch bolts “1”
     Lower bracket pinch bolt
     26 Nm (2.6 m·kg, 19 ft·lb)
   - Cap bolt “2”
     Cap bolt
     23 Nm (2.3 m·kg, 17 ft·lb)
   - Upper bracket pinch bolt “3”
     Upper bracket pinch bolt
     30 Nm (3.0 m·kg, 22 ft·lb)
Removing the lower bracket

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Front cowling assembly</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Front wheel</td>
<td></td>
<td>Refer to “FRONT WHEEL” on page 4-8.</td>
</tr>
<tr>
<td></td>
<td>Front fork legs</td>
<td></td>
<td>Refer to “FRONT FORK” on page 4-49.</td>
</tr>
<tr>
<td></td>
<td>Handlebar</td>
<td></td>
<td>Refer to “HANDLEBAR” on page 4-44.</td>
</tr>
<tr>
<td>1</td>
<td>Steering stem nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Upper bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lock washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Upper ring nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rubber washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Lower ring nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Lower bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Upper bearing cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Upper bearing inner race</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Upper bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Lower bearing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
For installation, reverse the removal procedure.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Lower bearing inner race</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Lower bearing outer race</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Upper bearing outer race</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

1st 52 Nm (5.2 m·kg, 37 ft·lb)

final 14 Nm (1.4 m·kg, 10 ft·lb)
REMOVING THE LOWER BRACKET

1. Stand the vehicle on a level surface.

**WARNING**

Securely support the vehicle so that there is no danger of it falling over.

2. Remove:
   - Upper ring nut
   - Rubber washer
   - Lower ring nut “1”
   - Lower bracket

**TIP**

Remove the upper ring nut and lower ring nut with the steering nut wrench “2”.

**WARNING**

Securely support the lower bracket so that there is no danger of it falling.

3. Replace:
   - Bearings
   - Bearing races

**TIP**

- Remove the bearing races from the steering head pipe “1” with a long rod “2” and hammer.
- Remove the bearing race from the lower bracket “3” with a floor chisel “4” and hammer.
- Install a new rubber seal and new bearing races.

**NOTICE**

If the bearing race is not installed properly, the steering head pipe could be damaged.

**TIP**

- Always replace the bearings and bearing races as a set.
- Whenever the steering head is disassembled, replace the dust seal.

---

CHECKING THE STEERING HEAD

1. Wash:
   - Bearings
   - Bearing races

**Recommended cleaning solvent**

Kerosene

2. Check:
   - Bearings “1”
   - Bearing races “2”
   Damage/pitting → Replace.
4. Check:
   • Upper bracket
   • Lower bracket
   (along with the steering stem)
   Bends/cracks/damage → Replace.

INSTALLING THE STEERING HEAD
1. Lubricate:
   • Upper bearing
   • Lower bearing
   • Bearing races

   Recommended lubricant
   Lithium-soap-based grease

2. Install:
   • Lower ring nut “1”
   • Rubber washer “2”
   • Upper ring nut “3”
   • Lock washer “4”
   Refer to “CHECKING AND ADJUSTING THE STEERING HEAD” on page 3-25.

3. Install:
   • Upper bracket
   • Washer
   • Steering stem nut

   TIP
   Temporarily tighten the steering stem nut.

4. Install:
   • Front fork legs
   Refer to “FRONT FORK” on page 4-49.

   TIP
   Temporarily tighten the upper and lower bracket pinch bolts.

5. Tighten:
   • Steering stem nut

   Steering stem nut
   115 Nm (11.5 m·kg, 85 ft·lb)
Removing the rear shock absorber assembly

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rear shock absorber assembly front bolt</td>
<td>1</td>
<td>Ref to “ENGINE REMOVAL” on page 5-1.</td>
</tr>
<tr>
<td>2</td>
<td>Lock washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rear shock absorber assembly rear nut/bolt</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear shock absorber assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Bearing</td>
<td>2</td>
<td>For installation, reverse the removal proce-</td>
</tr>
</tbody>
</table>

53 Nm (5.3 m·kg, 38 ft·lb)

68 Nm (6.8 m·kg, 49 ft·lb)
HANDLING THE REAR SHOCK ABSORBER

**WARNING**

This rear shock absorber contains highly compressed nitrogen gas. Before handling the rear shock absorber, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the rear shock absorber.

- Do not tamper or attempt to open the rear shock absorber.
- Do not subject the rear shock absorber to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.
- Do not deform or damage the rear shock absorber in any way. Rear shock absorber damage will result in poor damping performance.

DISPOSING OF A REAR SHOCK ABSORBER

1. Gas pressure must be released before disposing of a rear shock absorber. To release the gas pressure, drill a 2–3-mm hole through the rear shock absorber at a point 10–14 mm from its end as shown.

**WARNING**

Wear eye protection to prevent eye damage from released gas or metal chips.

REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the vehicle on a level surface.

**WARNING**

Securely support the vehicle so that there is no danger of it falling over.

CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

1. Check:
   - Bearing
     - Damage/wear → Replace.
   - Spacer
     - Damage/wear → Replace.
   - Bolts
     - Bends/damage/wear → Replace.

INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Lubricate:
   - Spacer
   - Bearings
   - Rear shock absorber assembly front bolt

**Recommended lubricant**

Lithium-soap-based grease

2. Install:
   - Rear shock absorber assembly

**TIP**

- Make sure that the warning label “1” on the rear shock absorber assembly faces up.
- When installing the rear shock absorber assembly, lift up the swingarm.
• Lubricate the rear shock absorber assembly front bolt seats with lithium-soap-based grease.

3. Tighten:
• Rear shock absorber assembly rear nut

<table>
<thead>
<tr>
<th>Rear shock absorber assembly rear nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>53 Nm (5.3 m·kg, 38 ft·lb)</td>
</tr>
</tbody>
</table>

4. Tighten:
• Rear shock absorber assembly front bolt “1”

<table>
<thead>
<tr>
<th>Rear shock absorber assembly front bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>68 Nm (6.8 m·kg, 49 ft·lb)</td>
</tr>
</tbody>
</table>

**TIP**
Bend the lock washer “2” tab along a flat side of the bolt “1”.

<table>
<thead>
<tr>
<th>New</th>
<th>1</th>
</tr>
</thead>
</table>
Removing the swingarm and transmission chain drive assembly

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chain drive oil</td>
<td></td>
<td>Drain.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Refer to “CHECKING THE CHAIN DRIVE OIL LEVEL” on page 3-24.</td>
</tr>
<tr>
<td></td>
<td>Exhaust assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Refer to “ENGINE REMOVAL” on page 5-1.</td>
</tr>
<tr>
<td></td>
<td>Rear cowling assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Rear wheel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Refer to “REAR WHEEL” on page 4-15.</td>
</tr>
<tr>
<td></td>
<td>Rear shock absorber assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Refer to “REAR SHOCK ABSORBER ASSEMBLY” on page 4-62.</td>
</tr>
<tr>
<td>1</td>
<td>Rear brake hose/rear brake lock cable holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Pivot shaft end cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pivot shaft nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Swingarm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Pivot shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- 7 Nm (0.7 m·kg, 5.1 ft·lb)
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 30 Nm (3.0 m·kg, 22 ft·lb)
- 40 Nm (4.0 m·kg, 29 ft·lb)
- 100 Nm (10.0 m·kg, 72 ft·lb)
Removing the swingarm and transmission chain drive assembly

For installation, reverse the removal procedure.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Pivot shaft taper roller bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Left passenger footrest</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Transmission chain drive assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Transmission chain drive holder assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Bearing race</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
Disassembling the transmission chain drive assembly

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Outer chain drive case</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Secondary drive gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Secondary drive chain</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Secondary driven gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Chain drive case gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Middle shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Primary driven gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Primary drive chain</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Primary drive gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Inner chain drive case</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Oil seal</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Bearing</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

10 Nm (1.0 m·kg, 7.2 ft·lb)
Disassembling the transmission chain drive assembly

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Bearing retainer</td>
<td>1</td>
<td>For assembly, reverse the disassembly pro-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cedure.</td>
</tr>
</tbody>
</table>

* Apply chain drive oil.
SWINGARM AND TRANSMISSION CHAIN DRIVE

CHECKING THE SWINGARM
1. Check:
   • Swingarm “1”
     Damage/wear → Replace.

2. Check:
   • Pivot shaft
   • Collar
   • Bearing
     Damage/wear → Replace.

CHECKING THE CHAINS AND GEARS
1. Check:
   • Primary drive chain “1”
   • Secondary drive chain “2”
     Damage/stiffness → Replace the drive chain and its respective gears as a set.

2. Check:
   • Primary drive gear “3”
   • Primary driven gear “4”
   • Secondary drive gear “5”
   • Secondary driven gear “6”
     Damage/wear → Replace the respective gears and respective drive chain as a set.

ASSEMBLING THE TRANSMISSION CHAIN DRIVE ASSEMBLY
1. Install:
   • Outer chain drive case

| Chain drive case bolt | 10 Nm (1.0 m·kg, 7.2 ft·lb) |

TIP
First, tighten the chain drive case bolts that are numbered in the illustration in the order shown, and then tighten the unnumbered bolts in a crisscross pattern.

INSTALLING THE TRANSMISSION CHAIN DRIVE ASSEMBLY
1. Install:
   • Pivot shaft taper roller bearing

TIP
Fill the space in the crankcase with lithium-soap-based grease before installing the pivot shaft taper roller bearing.
2. Install:
   • Pivot shaft “1”
   • Washer “2”
   • Pivot shaft nut “3”

TIP

Install the parts to the swingarm “4” temporarily, making sure that the portion “a” of the pivot shaft does not protrude past the swingarm surface “b”.

3. Install:
   • Transmission chain drive assembly
   • Dowel pins
   • Swingarm
   • Swingarm bolts

4. Tighten:
   • Pivot shaft
   • Pivot shaft nut

   **Swingarm bolt**
   40 Nm (4.0 m·kg, 29 ft·lb)

   **Pivot shaft**
   7 Nm (0.7 m·kg, 5.1 ft·lb)
   **Pivot shaft nut**
   100 Nm (10.0 m·kg, 72 ft·lb)

5. Fill:
   • Transmission chain drive case
     Refer to “CHANGING THE CHAIN DRIVE OIL” on page 3-25.

6. Check:
   • Chain drive oil level
     Refer to “CHECKING THE CHAIN DRIVE OIL LEVEL” on page 3-24.

   a. With your fingers, screw in the pivot shaft until it touches the collar, and then tighten the pivot shaft to the specified torque.
   b. Tighten the pivot shaft nut to the specified torque.
## ENGINE

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### INSTALLING THE ENGINE
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  - Checking the Camshafts
  - Checking the Camshaft Sprockets
  - Checking the Timing Chain Guides
  - Checking the Timing Chain Tensioner
  - Installing the Camshafts

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  - Checking the Cylinder Head
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  - Checking the Valves and Valve Guides
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  - Checking the Cylinders and Pistons
  - Checking the Piston Rings
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Removing the exhaust assembly

- **O2 sensor coupler**: Disconnect.
- **O2 sensor**: 1
- **Exhaust assembly**: 1
- **Gasket**: 2

* For installation, reverse the removal procedure.

* Apply Shell BT grease 3®.

---

**Order** | **Job/Parts to remove** | **Q'ty** | **Remarks**
--- | --- | --- | ---
| Bottom cowl/Left center panel | | | Refer to "GENERAL CHASSIS" on page 4-1.
| 1 | O2 sensor coupler | 1 | Disconnect.
| 2 | O2 sensor | 1 | 
| 3 | Exhaust assembly | 1 | 
| 4 | Gasket | 2 | 

---

ENGIN E REMOVAL
Disconnecting the leads

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Front cowling/Storage box</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Engine oil</td>
<td></td>
<td>Drain. Refer to “CHANGING THE ENGINE OIL” on page 3-12.</td>
</tr>
<tr>
<td></td>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-18.</td>
</tr>
<tr>
<td></td>
<td>Chain drive oil</td>
<td></td>
<td>Drain. Refer to “CHANGING THE CHAIN DRIVE OIL” on page 3-25.</td>
</tr>
<tr>
<td></td>
<td>Fuel tank</td>
<td></td>
<td>Refer to “FUEL TANK” on page 7-1.</td>
</tr>
<tr>
<td></td>
<td>Intake manifolds</td>
<td></td>
<td>Refer to “THROTTLE BODY” on page 7-5.</td>
</tr>
<tr>
<td></td>
<td>Radiator bracket</td>
<td></td>
<td>Refer to “RADIATOR” on page 6-1.</td>
</tr>
<tr>
<td></td>
<td>Oil cooler</td>
<td></td>
<td>Refer to “OIL COOLER” on page 6-4.</td>
</tr>
<tr>
<td></td>
<td>Thermostat</td>
<td></td>
<td>Refer to “THERMOSTAT” on page 6-7.</td>
</tr>
<tr>
<td></td>
<td>Water pump assembly</td>
<td></td>
<td>Refer to “WATER PUMP” on page 6-9.</td>
</tr>
<tr>
<td></td>
<td>Rear wheel</td>
<td></td>
<td>Refer to “REAR WHEEL” on page 4-15.</td>
</tr>
<tr>
<td></td>
<td>Rear shock absorber assembly</td>
<td></td>
<td>Refer to “REAR SHOCK ABSORBER ASSEMBLY” on page 4-62.</td>
</tr>
</tbody>
</table>
Disconnecting the leads

![Diagram showing engine removal components and connection points with torque values.]

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Transmission chain drive holder assembly</td>
<td></td>
<td>Refer to “SWINGARM AND TRANSMISSION CHAIN DRIVE” on page 4-65.</td>
</tr>
<tr>
<td>1</td>
<td>Right passenger footrest</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>V-belt case air duct</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Spark plug cap</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Plastic clamp</td>
<td>7</td>
<td>Open.</td>
</tr>
<tr>
<td>5</td>
<td>Rear brake lock cable holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Crankshaft position sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Stator coil coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>Sidestand switch coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>9</td>
<td>Seat lock cable</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Wire harness</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

Torque values:
- 30 Nm (3.0 m·kg, 22 ft·lb)
- 7 Nm (0.7 m·kg, 5.1 ft·lb)
Removing the engine

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rear frame bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Engine mounting nut (rear side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Engine mounting bolt (rear side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear frame</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Engine mounting bolt (front left lower side)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Sidestand</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Engine mounting bolt (front right lower side)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Engine mounting nut (front upper side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Engine mounting bolt (front upper side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Engine</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
INSTALLING THE ENGINE

1. Install:
   - All removed parts

   **TIP**
   - Apply locking agent (LOCTITE®) to engine mounting bolts (front right lower side) “1”, engine mounting bolts (front left lower side) “2”, and rear frame bolts “3”.
   - For installation, reverse the removal procedure.
   - Do not fully tighten the bolts and nuts.

2. Tighten:
   - Engine mounting nut (front upper side) “4”
   - Engine mounting bolts (front right lower side) “1”
   - Engine mounting bolts (front left lower side) “2”
   - Engine mounting nut (rear side) “5”
   - Rear frame bolts “3”

   **Engine mounting nut (front upper side)** 88 Nm (8.8 m·kg, 64 ft·lb)
   **Engine mounting bolt (front right lower side)** 45 Nm (4.5 m·kg, 32 ft·lb)
   **LOCTITE®**
   **Engine mounting bolt (front left lower side)** 45 Nm (4.5 m·kg, 32 ft·lb)
   **LOCTITE®**
   **Engine mounting nut (rear side)** 105 Nm (10.5 m·kg, 75 ft·lb)
   **Rear frame bolt** 83 Nm (8.3 m·kg, 60 ft·lb)
   **LOCTITE®**
Removing the cylinder head cover

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Engine oil</td>
<td></td>
<td>Drain. Refer to “CHANGING THE ENGINE OIL” on page 3-12.</td>
</tr>
<tr>
<td></td>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-18.</td>
</tr>
<tr>
<td></td>
<td>Storage box</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Front wheel/Front fender</td>
<td></td>
<td>Refer to “FRONT WHEEL” on page 4-8.</td>
</tr>
<tr>
<td></td>
<td>Radiator</td>
<td></td>
<td>Refer to “RADIATOR” on page 6-1.</td>
</tr>
<tr>
<td></td>
<td>Fuel tank</td>
<td></td>
<td>Refer to “FUEL TANK” on page 7-1.</td>
</tr>
<tr>
<td></td>
<td>Intake manifolds</td>
<td></td>
<td>Refer to “THROTTLE BODY” on page 7-5.</td>
</tr>
<tr>
<td></td>
<td>1 Spark plug</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Cylinder head cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Cylinder head cover gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 Gasket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Timing chain guide (upper side)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the cylinder head cover

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Timing mark accessing plug</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>8</td>
<td>Crankshaft end access cover</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
# Removing the Camshafts

During removal, the dowel pins may still be connected to the camshaft caps.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Timing chain tensioner rod accessing plug</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Timing chain tensioner</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Timing chain tensioner gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Intake camshaft cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Exhaust camshaft cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dowel pin</td>
<td>4</td>
<td>TIP</td>
</tr>
<tr>
<td>7</td>
<td>Intake camshaft</td>
<td>1</td>
<td>During removal, the dowel pins may still be connected to the camshaft caps.</td>
</tr>
<tr>
<td>8</td>
<td>Exhaust camshaft</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

10 Nm (1.0 m·kg, 7.2 ft·lb)

12 Nm (1.2 m·kg, 8.7 ft·lb)
REMOVING THE CAMSHAFTS

1. Align:
   • “I” mark “a” on the generator rotor
     (with the stationary pointer “b” on the genera-
     tor cover)
   ▣传真传真传真传真传真传真传真传真传真传真传真传真传真传真传真传真传真
   a. Turn the crankshaft clockwise.

b. When piston #1 is at TDC on the compres-
   sion stroke, align the “I” mark “a” on the gen-
   erator rotor with the stationary pointer “b” on
   the generator cover.

TIP

• TDC on the compression stroke can be found
  when the cylinder #1 camshaft lobes are
  turned away from each other.
• In order to be sure that the piston is at TDC, the
  alignment hole “c” on the intake camshaft
  sprocket and the alignment hole “d” on the ex-
  haust camshaft sprocket must align with the
  cylinder head mating surface as shown in the
  illustration.

2. Remove:
   • Timing chain tensioner “1”
   • Timing chain tensioner gasket “2”

3. Remove:
   • Intake camshaft cap “1”
   • Exhaust camshaft cap “2”
   • Dowel pins

NOTICE
To prevent damage to the cylinder head,
camshafts or camshaft caps, loosen the
camshaft cap bolts in stages and in a criss-
cross pattern, working from the outside in.

4. Remove:
   • Intake camshaft “1”
   • Exhaust camshaft “2”

TIP
To prevent the timing chain from falling into
the crankcase, fasten with a wire “3”.

5-9
CHECKING THE CAMSHAFTS

1. Check:
   • Camshaft lobes
     Blue discoloration/pitting/scratches → Replace the camshaft.

2. Measure:
   • Camshaft lobe dimensions “a” and “b”
     Out of specification → Replace the camshaft.

<table>
<thead>
<tr>
<th>Camshaft lobe dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake A</td>
</tr>
<tr>
<td>33.252–33.352 mm (1.3091–1.3131 in)</td>
</tr>
<tr>
<td>Limit</td>
</tr>
<tr>
<td>33.152 mm (1.3052 in)</td>
</tr>
<tr>
<td>Intake B</td>
</tr>
<tr>
<td>24.956–25.056 mm (0.9825–0.9865 in)</td>
</tr>
<tr>
<td>Limit</td>
</tr>
<tr>
<td>24.856 mm (0.9786 in)</td>
</tr>
<tr>
<td>Exhaust A</td>
</tr>
<tr>
<td>33.252–33.352 mm (1.3091–1.3131 in)</td>
</tr>
<tr>
<td>Limit</td>
</tr>
<tr>
<td>33.152 mm (1.3052 in)</td>
</tr>
<tr>
<td>Exhaust B</td>
</tr>
<tr>
<td>24.956–25.056 mm (0.9825–0.9865 in)</td>
</tr>
<tr>
<td>Limit</td>
</tr>
<tr>
<td>24.856 mm (0.9786 in)</td>
</tr>
</tbody>
</table>

3. Measure:
   • Camshaft runout
     Out of specification → Replace.

<table>
<thead>
<tr>
<th>Camshaft runout limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.030 mm (0.0012 in)</td>
</tr>
</tbody>
</table>

4. Measure:
   • Camshaft-journal-to-camshaft-cap clearance
     Out of specification → Measure the camshaft journal diameter.

<table>
<thead>
<tr>
<th>Camshaft-journal-to-camshaft-cap clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.020–0.054 mm (0.0008–0.0021 in)</td>
</tr>
</tbody>
</table>

- a. Install the camshaft into the cylinder head (without the dowel pins and camshaft caps).
- b. Position a strip of Plastigauge® “1” onto the camshaft journal as shown.
c. Install the dowel pins and camshaft caps.

**TIP**
- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.
- Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance with the Plastigauge®.

d. Remove the camshaft caps and then measure the width of the Plastigauge® “1”.

5. Measure:
- Camshaft journal diameter “a”
  - Out of specification → Replace the camshaft.
  - Within specification → Replace the cylinder head and the camshaft caps as a set.

**CHECKING THE CAMSHAFT SPROCKETS**
The following procedure applies to both of the camshaft sprockets.

1. Check:
   - Camshaft sprocket
     - More than 1/4 tooth wear “a” → Replace the camshafts and the timing chain as a set.

**CHECKING THE TIMING CHAIN GUIDES**

1. Check:
   - Timing chain guide (intake side) “1”
   - Timing chain guide (exhaust side) “2”
   - Timing chain guide (upper side) “3”
     - Damage/wear → Replace the defective part(s).
CHECKING THE TIMING CHAIN TENSIONER
1. Check:
   • Timing chain tensioner
     Cracks/damage → Replace.

   a. Push the timing chain tensioner rod “1” into the timing chain tensioner housing by hand.

   TIP
   While pushing the timing chain tensioner rod “a”, turn it clockwise “b” with the timing chain tensioner body “2” until if stops.

   b. Lock the timing chain tensioner rod “1” by setting the circlip “3” to groove “4” while pushing the timing chain tensioner rod.

   c. Push the timing chain tensioner rod “c”.

   d. Make sure that the timing chain tensioner rod comes out “d” of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.

INSTALLING THE CAMSHAFTS
1. Install:
   • Exhaust camshaft “1”
   • Intake camshaft “2”

   a. Turn the crankshaft clockwise.

   b. When piston #1 is at TDC on the compression stroke, align the “I” mark “a” on the generator rotor with the stationary pointer “b” on the generator cover.

   c. Install the timing chain onto both camshaft sprockets, and then install the camshafts onto the cylinder head.

   TIP
   • When installing the timing chain, start with the exhaust camshaft and be sure to keep the timing chain as tight as possible on the exhaust side.
   • The camshafts should be installed onto the cylinder head so that the alignment hole “c” on the intake camshaft sprocket and the alignment...
hole “d” on the exhaust camshaft sprocket align with the cylinder head mating surface, as shown in the illustration.

**NOTICE**

Do not turn the crankshaft when installing the camshafts to avoid damage or improper valve timing.

2. Install:
   - Dowel pins
   - Exhaust camshaft cap “1”
   - Intake camshaft cap “2”

**TIP**

Make sure each camshaft cap is installed in its original place. Refer to the identification marks as follows:
“IN”: Intake
“EX”: Exhaust

3. Install:
   - Camshaft cap bolts

<table>
<thead>
<tr>
<th>Camshaft cap bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10 Nm (1.0 m·kg, 7.2 ft·lb)</strong></td>
</tr>
</tbody>
</table>

**TIP**

- Lubricate the camshaft cap bolt seats.
- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.

**NOTICE**

The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft caps, and camshafts will result.

4. Install:
   - Timing chain tensioner gasket **New**
   - Timing chain tensioner

a. Push the timing chain tensioner rod “1” into the timing chain tensioner housing by hand.

**TIP**

While pushing the timing chain tensioner rod “a”, turn it clockwise “b” with the timing chain tensioner body “2” until it stops.

b. Lock the timing chain tensioner rod “1” by setting the circlip “3” into groove “4” while pushing the timing chain tensioner rod.

c. Install the timing chain tensioner to the cylinder block.

<table>
<thead>
<tr>
<th>Timing chain tensioner bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10 Nm (1.0 m·kg, 7.2 ft·lb)</strong></td>
</tr>
</tbody>
</table>

**WARNING**

Always use a new gasket.

d. Release the timing chain tensioner rod by pushing up the timing chain guide “5” from the hole “6”.

---

**Camshafts**

5-13
**NOTICE**

Do not push up the timing chain. Push up “c” the timing chain guide “5”.

5. Turn:
- Crankshaft  
  (several turns clockwise)

6. Check:
- “I” mark “a”  
  Make sure that the “I” mark is aligned with the stationary pointer “b”.
- Camshaft sprocket alignment holes “c” and “d”.  
  Make sure that the camshaft sprocket alignment hole is aligned with the cylinder head mating surface.  
  Out of alignment → Correct.  
  Refer to the installation steps above.

7. Measure:
- Valve clearance  
  Out of specification → Adjust.  
  Refer to “ADJUSTING THE VALVE CLEARANCE” on page 3-4.

8. Install:
- Timing chain guide (upper side)  
- Gaskets [New](to the cylinder head cover)

**TIP**

- Apply Yamaha bond No.1215 “1” onto the mating surface of the cylinder head cover and timing chain guide (upper side).
- Apply Yamaha bond No.1215 “1” onto the mating surfaces of the cylinder head cover and gaskets.

---

**Yamaha bond No. 1215**
90890-85505  
(Three Bond No.1215®)

---

9. Install:
- Cylinder head cover gasket [New]
- Cylinder head cover

**TIP**

Tighten the cylinder head cover bolts in stages and in a crisscross pattern.
Removing the cylinder head

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camshafts</td>
<td>Refer to “CAMSHAFTS” on page 5-6.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exhaust assembly</td>
<td>Refer to “ENGINE REMOVAL” on page 5-1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermostat/Coolant temperature sensor</td>
<td>Refer to “THERMOSTAT” on page 6-7.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coolant pipe</td>
<td>Refer to “OIL COOLER” on page 6-4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake and exhaust camshafts</td>
<td>Refer to “CAMSHAFTS” on page 5-6.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Cylinder head</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>2</td>
<td>Cylinder head gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
REMOVING THE CYLINDER HEAD

1. Remove:
   • Cylinder head bolts
   • Cylinder head nuts

TIP
- Loosen the bolts and nuts in the proper sequence as shown.
- Loosen each nut 1/2 of a turn at a time. After all of the nuts are fully loosened, remove them.

CHECKING THE CYLINDER HEAD

1. Eliminate:
   • Combustion chamber carbon deposits (with a rounded scraper)

   TIP
   Do not use a sharp instrument to avoid damaging or scratching:
   • Spark plug bore threads
   • Valve seats

2. Check:
   • Cylinder head
     Damage/scratches → Replace.
   • Cylinder head water jacket
     Mineral deposits/rust → Eliminate.

3. Measure:
   • Cylinder head warpage
     Out of specification → Resurface the cylinder head.

INSTALLING THE CYLINDER HEAD

1. Install:
   • Dowel pins
   • Cylinder head gasket

2. Install:
   • Cylinder head

   TIP
   Pass the timing chain through the timing chain cavity.

3. Tighten:
   • Cylinder head nuts “1”
TIP

- Lubricate the cylinder head nuts and washers with engine oil.
- Tighten the cylinder head nuts and bolts in the proper tightening sequence as shown and torque them in two stages.
Removing the valves and valve springs

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cylinder head</td>
<td></td>
<td>Refer to “CYLINDER HEAD” on page 5-15.</td>
</tr>
<tr>
<td>1</td>
<td>Valve lifter</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Valve pad</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Valve cotter</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Valve retainer</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Valve spring</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Intake valve</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Exhaust valve</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Valve stem seal</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Valve spring seat</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Valve guide</td>
<td>8</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
REMOVING THE VALVES

The following procedure applies to all of the valves and related components.

**TIP**

Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.

1. **Remove:**
   - Valve lifter “1”
   - Valve pad “2”

**TIP**

Make a note of the position of each valve lifter and valve pad so that they can be reinstalled in their original place.

2. **Check:**
   - Valve sealing
     Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.
     Refer to “CHECKING THE VALVE SEATS” on page 5-21.

**TIP**

There should be no leakage at the valve seat “1”.

3. **Remove:**
   - Valve cotters “1”

4. **Remove:**
   - Upper spring seat “1”
   - Valve spring “2”
   - Valve “3”
   - Valve stem seal “4”
   - Lower spring seat “5”

**TIP**

Identify the position of each part very carefully so that it can be reinstalled in its original place.

CHECKING THE VALVES AND VALVE GUIDES

The following procedure applies to all of the valves and valve guides.

---

**Valve spring compressor**
- 90890-04019
- YM-04019

**Valve spring compressor attachment**
- 90890-04114

**Valve spring compressor adapter 19.5 mm**
- YM-04114
1. Measure:
   • Valve-stem-to-valve-guide clearance
     Out of specification → Replace the valve guide.

   • Valve-stem-to-valve-guide clearance =
     Valve guide inside diameter “a” -
     Valve stem diameter “b”

<table>
<thead>
<tr>
<th>Valve-stem-to-valve-guide clearance (intake)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.010–0.037 mm (0.0004–0.0015 in)</td>
</tr>
<tr>
<td>Limit</td>
</tr>
<tr>
<td>0.080 mm (0.0032 in)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Valve-stem-to-valve-guide clearance (exhaust)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.025–0.052 mm (0.0010–0.0020 in)</td>
</tr>
<tr>
<td>Limit</td>
</tr>
<tr>
<td>0.100 mm (0.0039 in)</td>
</tr>
</tbody>
</table>

2. Replace:
   • Valve guide

   **TIP**
   To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C (212 °F) in an oven.

   a. Remove the valve guide with the valve guide remover “1”.

   b. Install the new valve guide with the valve guide installer “2” and valve guide remover “1”.

   c. After installing the valve guide, bore the valve guide with the valve guide reamer “3” to obtain the proper valve-stem-to-valve-guide clearance.

   **TIP**
   After replacing the valve guide, reface the valve seat.
3. Eliminate:
   • Carbon deposits
     (from the valve face and valve seat)

4. Check:
   • Valve face
     Pitting/wear → Grind the valve face.
   • Valve stem end
     Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.

5. Measure:
   • Valve margin thickness “a”
     Out of specification → Replace the valve.

6. Measure:
   • Valve stem runout
     Out of specification → Replace the valve.

TIP
• When installing a new valve, always replace the valve guide.
• If the valve is removed or replaced, always replace the oil seal.
b. Install the valve into the cylinder head.
c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
d. Measure the valve seat width.

**TIP**
Where the valve seat and valve face contacted one another, the blueing will have been removed.

4. Lap:
   - Valve face
   - Valve seat

**TIP**
After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve face should be lapped.

- a. Apply a coarse lapping compound “a” to the valve face.

**NOTICE**
Do not let the lapping compound enter the gap between the valve stem and the valve guide.

- b. Apply molybdenum disulfide oil onto the valve stem.

- c. Install the valve into the cylinder head.
- d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

**TIP**
For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

- e. Apply a fine lapping compound to the valve face and repeat the above steps.
- f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
- g. Apply Mechanic’s blueing dye (Dykom) “b” onto the valve face.

- h. Install the valve into the cylinder head.
- i. Press the valve through the valve guide and onto the valve seat to make a clear impression.
j. Measure the valve seat width again. If the valve seat width is out of specification, reface and lap the valve seat.

CHECKING THE VALVE SPRINGS
The following procedure applies to all of the valve springs.

1. Measure:
   • Valve spring free length “a”
     Out of specification → Replace the valve spring.

2. Measure:
   • Compressed valve spring force “a”
     Out of specification → Replace the valve spring.

3. Measure:
   • Valve spring tilt “a”
     Out of specification → Replace the valve spring.

CHECKING THE VALVE LIFTERS
The following procedure applies to all of the valve lifters.

1. Check:
   • Valve lifter
     Damage/scratches → Replace the valve lifters and cylinder head.

INSTALLING THE VALVES
The following procedure applies to all of the valves and related components.
1. Deburr:
   • Valve stem end (with an oil stone)

2. Lubricate:
   • Valve stem “1”
   • Valve stem seal “2”
   (with the recommended lubricant)

3. Install:
   • Lower spring seat “1”
   • Valve stem seal “2”
   • Valve “3”
   • Valve spring “4”
   • Upper spring seat “5”
   (into the cylinder head)

   **TIP**
   • Make sure each valve is installed in its original place.
   • Install the valve springs with the larger pitch “a” facing up.

4. Install:
   • Valve cotters “1”

   **TIP**
   Install the valve cotters by compressing the valve spring with the valve spring compressor “2” and the valve spring compressor attachment “3”.

   **Recommended lubricant**
   Molybdenum disulfide oil

   **b. Smaller pitch**

   **Valve spring compressor**
   90890-04019
   YM-04019

   **Valve spring compressor attachment**
   90890-04114
   YM-04114

   **Valve spring compressor adapter 19.5 mm**
   YM-04114
5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

**NOTICE**

Hitting the valve tip with excessive force could damage the valve.

6. Lubricate:
   - Valve pad (with the recommended lubricant)

   **Recommended lubricant**
   Molybdenum disulfide oil

7. Lubricate:
   - Valve lifter (with the recommended lubricant)

   **Recommended lubricant**
   Engine oil

8. Install:
   - Valve pad
   - Valve lifter

**NOTICE**

After making sure that the valve pads are fully inserted, install the valve lifter taking care so that the pads do not fall.

**TIP**

- The valve lifter must move smoothly when rotated with a finger.
- Each valve lifter and valve pad must be reinstalled in its original position.
Removing the cylinder and pistons

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cylinder head</td>
<td></td>
<td>Refer to “CYLINDER HEAD” on page 5-15.</td>
</tr>
<tr>
<td>1</td>
<td>Timing chain guide (exhaust side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cylinder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cylinder gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Piston pin clip</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Piston pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Piston</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Piston ring set</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>2nd ring</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Oil ring</td>
<td>2</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>

10 Nm (1.0 m·kg, 7.2 ft·lb)
REMOVING THE PISTONS
The following procedure applies to all of the pistons.

1. Remove:
   - Piston pin clips “1”
   - Piston pin “2”
   - Piston “3”

TIP

Do not use a hammer to drive the piston pin out.

NOTICE

Before removing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.

For reference during installation, put an identification mark on each piston crown.

Before removing the piston pin, deburr the piston pin clip’s groove and the piston’s pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set “4”.

2. Remove:
   - Top ring
   - 2nd ring
   - Oil ring

TIP

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.

CHECKING THE CYLINDERS AND PISTONS
The following procedure applies to all of the cylinders and pistons.

1. Check:
   - Piston wall
   - Cylinder wall

   Vertical scratches → Rebore or replace the cylinder, and replace the piston and piston rings as a set.

2. Measure:
   - Piston-to-cylinder clearance

   a. Measure cylinder bore “C” with the cylinder bore gauge.

   TIP

   Measure cylinder bore “C” by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

<table>
<thead>
<tr>
<th>Bore</th>
<th>66.000–66.010 mm (2.5984–2.5988 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taper limit</td>
<td>0.050 mm (0.0020 in)</td>
</tr>
<tr>
<td>Out of round limit</td>
<td>0.050 mm (0.0020 in)</td>
</tr>
</tbody>
</table>

“C” = maximum of D₁–D₂

“T” = maximum of D₁ or D₂ - maximum of D₅ or D₆

“R” = maximum of D₁, D₃ or D₅ - minimum of D₂, D₄ or D₆
b. If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.

c. Measure piston skirt diameter $D$ “$a$” with the micrometer.

d. If out of specification, replace the piston and piston rings as a set.

e. Calculate the piston-to-cylinder clearance with the following formula.

$$\text{Piston-to-cylinder clearance} = \frac{1}{2}(D - 0.020) - \frac{1}{2}(D - 0.030)$$

f. If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.

---

CHECKING THE PISTON RINGS

1. Measure:
   - Piston ring side clearance
     Out of specification → Replace the piston and piston rings as a set.

TIP

Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.

<table>
<thead>
<tr>
<th>Piston ring</th>
<th>Top ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ring side clearance</td>
<td>0.030–0.065 mm (0.0012–0.0026 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.100 mm (0.0039 in)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2nd ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit</td>
</tr>
</tbody>
</table>

2. Install:
   - Piston ring (into the cylinder)

TIP

Level the piston ring into the cylinder with the piston crown.
3. Measure:
- Piston ring end gap
  Out of specification → Replace the piston ring.

**TIP**
The oil ring expander spacer end gap cannot be measured. If the oil ring rail gap is excessive, replace all three piston rings.

<table>
<thead>
<tr>
<th>Piston ring</th>
<th>Top ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>End gap (installed)</td>
<td>End gap (installed)</td>
</tr>
<tr>
<td>0.15–0.25 mm (0.0059–0.0098 in)</td>
<td>0.40–0.50 mm (0.0157–0.0197 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>Limit</td>
</tr>
<tr>
<td>0.50 mm (0.0197 in)</td>
<td>0.75 mm (0.0295 in)</td>
</tr>
<tr>
<td>2nd ring</td>
<td>Oil ring</td>
</tr>
<tr>
<td>End gap (installed)</td>
<td>End gap (installed)</td>
</tr>
<tr>
<td>0.10–0.35 mm (0.0039–0.0138 in)</td>
<td>0.10–0.35 mm (0.0039–0.0138 in)</td>
</tr>
</tbody>
</table>

**CHECKING THE PISTON PINS**
The following procedure applies to both of the piston pins.
1. Check:
   - Piston pin
     Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.
2. Measure:
   - Piston pin outside diameter “a”
     Out of specification → Replace the piston pin.

<table>
<thead>
<tr>
<th>Piston pin outside diameter</th>
<th>14.991–15.000 mm (0.5902–0.5906 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit</td>
<td>14.971 mm (0.5894 in)</td>
</tr>
</tbody>
</table>

3. Measure:
- Piston pin bore diameter “b”
  Out of specification → Replace the piston.

<table>
<thead>
<tr>
<th>Piston pin bore inside diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.002–15.013 mm (0.5906–0.5911 in)</td>
</tr>
<tr>
<td>Limit</td>
</tr>
<tr>
<td>15.043 mm (0.5922 in)</td>
</tr>
</tbody>
</table>

4. Calculate:
- Piston-pin-to-piston-pin-bore clearance
  Out of specification → Replace the piston pin and piston as a set.

<table>
<thead>
<tr>
<th>Piston-pin-to-piston-pin-bore clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.002–0.022 mm (0.0001–0.0009 in)</td>
</tr>
</tbody>
</table>

**INSTALLING THE PISTONS AND CYLINDER**
The following procedure applies to all of the pistons and cylinders.
1. Install:
   - Top ring
   - 2nd ring
   - O-ring
Be sure to install the top and 2nd rings so that the manufacturer marks or numbers face up.

2. Install:
   - Piston “1”
   - Piston pin “2”
   - Piston pin clips “3” New

TIP
- Apply engine oil onto the piston pin.
- Make sure the mark “a” on the piston points towards the exhaust side of the cylinder.
- Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- Install the piston pin clips so that the clip ends are 3 mm (0.12 in) “b” or more from the cutout in the piston.
- Reinstall each piston into its original cylinder.

3. Install:
   - Dowel pins
   - Cylinder gasket New

4. Lubricate:
   - Piston
   - Piston rings
   - Cylinder
   (with the recommended lubricant)

Recommended lubricant
Engine oil

5. Offset:
   - Piston ring end gaps

TIP
- While compressing the piston rings, install the cylinder.
- Pass the timing chain and timing chain guide (intake side) through the timing chain cavity.
Removing the starter motor

1 Negative battery lead 1
2 Starter motor lead 1
3 Starter motor 1

For installation, reverse the removal procedure.

Order | Job/Parts to remove | Q'ty | Remarks
--- | --- | --- | ---
Storage box | | | Refer to "GENERAL CHASSIS" on page 4-1.
Fuel tank | | | Refer to "FUEL TANK" on page 7-1.
1 | Negative battery lead | 1 |
2 | Starter motor lead | 1 |
3 | Starter motor | 1 |
Disassembling the starter motor

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Starter motor front cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Armature assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Starter motor yoke</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>O-ring</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Insulator</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Brush</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Brush spring</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Brush holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Starter motor rear cover</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.

ₜₐₙₛ 11 Nm (1.1 m·kg, 8.0 ft·lb)
CHECKING THE STARTER MOTOR

1. Check:
   • Commutator
     Dirt → Clean with 600 grit sandpaper.

2. Measure:
   • Mica undercut “a”
     Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

   Mica undercut (depth)
   0.70 mm (0.03 in)

TIP

The mica of the commutator must be undercut to ensure proper operation of the commutator.

3. Measure:
   • Armature assembly resistances (commutator and insulation)
     Out of specification → Replace the starter motor.

   a. Measure the armature assembly resistances with the pocket tester.

   Pocket tester
   90890-03112
   Analog pocket tester
   YU-03112-C

   b. If any resistance is out of specification, replace the starter motor.

ASSEMBLING THE STARTER MOTOR

1. Install:
   • Insulator “1”

   TIP

   Install the insulator so that the slot “a” is positioned as shown in the illustration.
2. Install:
   - Starter motor yoke “1”
   - Starter motor front cover “2”
   - Starter motor rear cover “3”

**TIP**
Align the match marks “a” on the starter motor yoke with the match marks “b” on the front and starter motor rear covers.

---

**INSTALLING THE STARTER MOTOR**

1. Connect:
   - Negative battery lead “1”

**TIP**
Make sure that the negative battery lead “1” does not touch the starter motor bolt “2”.

---
## Removing the V-belt case cover

- **Storage box**: Refer to “GENERAL CHASSIS” on page 4-1.
- **V-belt case air filter element (left)**: Refer to “WATER PUMP” on page 6-9.
- **Fuel tank**: Refer to “FUEL TANK” on page 7-1.
- **Muffler**: Refer to “ENGINE REMOVAL" on page 5-1.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Right passenger footrest</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Crankshaft end access cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>V-belt case air filter case cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>V-belt case air filter case</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>V-belt case air filter element (right)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Rear brake lock cable holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Outer V-belt case</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Outer V-belt case gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Bearing retainer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the V-belt case cover

**Order** | **Job/Parts to remove** | **Q’ty** | **Remarks**
---|---|---|---
12 | Oil seal | 1 | For installation, reverse the removal procedure.
13 | Bearing | 1 |
## Removing the V-belt and primary/secondary sheave

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Primary sheave nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>O-ring</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Primary sheave assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Secondary sheave nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Secondary sheave assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>V-belt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Primary fixed sheave</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>V-belt case air duct joint clamp</td>
<td>1</td>
<td>Loosen.</td>
</tr>
<tr>
<td>10</td>
<td>V-belt case air duct</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Inner V-belt case plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Inner V-belt case</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Plate</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the V-belt and primary/secondary sheave

*1 Apply Shell BT grease ®.

*2 Apply BEL-RAY assembly lube ®.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Inner V-belt case seal</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

*3 24 Nm (2.4 m · kg, 17 ft · lb)  
*4 10 Nm (1.0 m · kg, 7.2 ft · lb)  
*5 24 Nm (2.4 m · kg, 17 ft · lb)  
*6 90 Nm (9.0 m · kg, 65 ft · lb)  
*7 160 Nm (16.0 m · kg, 115 ft · lb)
Disassembling the primary sheave

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cam</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Slider</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Primary sheave weight</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Primary sliding sheave</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oil seal</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.

* Apply BEL-RAY assembly lube®.
Disassembling the secondary sheave

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Secondary sheave spring seat nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Upper spring seat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Secondary sheave compression spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spring seat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Guide pin</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Secondary sliding sheave</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>O-ring</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Oil seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Secondary fixed sheave</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>

* Apply BEL-RAY assembly lube®.
EAS4B5102

REMOVING THE PRIMARY SHEAVE AND SECONDARY SHEAVE
1. Remove:
   • Primary sheave nut “1”
   • Secondary sheave nut “2”

TIP
While holding the primary and secondary sheave with the sheave holder “3”, loosen the nut.

2. Remove:
   • Primary sheave assembly “1”
   • Secondary sheave assembly “2”
   • V-belt “3”

TIP
Before removal, put alignment marks “a” and “b” as shown.
Align these marks during reassembly.

EAS24640

DISASSEMBLING THE SECONDARY SHEAVE
1. Loosen:
   • Secondary sheave spring seat nut “1”

TIP
While holding the secondary fixed sheave “2” with the sheave holder “3”, loosen the secondary sheave spring seat nut with the locknut wrench “4”.
Do not loosen the secondary sheave spring seat nut “1” more than 1/4 turn.

2. Remove:
   • Secondary sheave spring seat nut “1”

TIP
Install the sheave spring compressor “2” and sheave fixed block “3” onto the secondary sheave assembly as shown. Then, compress the spring, and remove the secondary sheave spring seat nut with locknut wrench “4”.

Sheave holder 90890-01481
Locknut wrench 90890-01348 YM-01348

Sheave spring compressor 90890-04134 YM-04134
Locknut wrench 90890-01348 YM-01348
Sheave fixed block 90890-04135
Sheave fixed bracket YM-04135
**CHECKING THE V-BELT**

1. Check:
   - V-belt “1”
     Cracks/damage/wear → Replace.
   - Grease/oil → Clean the primary and secondary sheave.

2. Measure:
   - V-belt width “2”
     Out of specification → Replace.

**CHECKING THE PRIMARY SHEAVE WEIGHTS**

The following procedure applies to all of the primary sheave weights.

1. Check:
   - Primary sheave weight
     Cracks/damage/wear → Replace.

2. Measure:
   - Primary sheave weight outside diameter
     Out of specification → Replace.

**CHECKING THE PRIMARY SHEAVE**

1. Check:
   - Primary sliding sheave
   - Primary fixed sheave
     Cracks/damage/wear → Replace the primary sliding sheave and primary fixed sheave as a set.

2. Check:
   - Torque cam groove “1”
     Damage/wear → Replace the secondary fixed and sliding sheaves as a set.

3. Check:
   - Guide pin “2”
     Damage/wear → Replace the secondary fixed and sliding sheaves as a set.

**CHECKING THE SECONDARY SHEAVE**

1. Check:
   - Secondary fixed sheave
   - Secondary sliding sheave
     Cracks/damage/wear → Replace the secondary fixed and sliding sheaves as a set.

2. Check:
   - Guide pin “2”
     Damage/wear → Replace the secondary fixed and sliding sheaves as a set.

**CHECKING THE V-BELT CASE AIR DUCT**

1. Check:
   - V-belt case air duct
     Cracks/damage → Replace.
ASSEMBLING THE PRIMARY SHEAVE

1. Clean:
   - Primary fixed sheave
   - Primary sliding sheave
   - Collar
   - Cam
   - Primary sheave weights

2. Install:
   - Primary sheave weights “1”
   - Sliders “2”
   - Cam “3”

TIP
Do not apply the grease inside of the primary sheave.

ASSEMBLING THE SECONDARY SHEAVE

1. Lubricate:
   - Secondary fixed sheave inner surface “1”
   - Secondary sliding sheave inner surface “2”
   - Grease nipple groove
   - Oil seals New

3. Install:
   - Guide pins “1”

4. Lubricate:
   - Guide pin groove “2”
   - O-rings “3” New
   (with the recommended lubricant)

5. Install:
   - Secondary sheave spring seat nut “1”

Recommended lubricant
BEL-RAY assembly lube®

Oil seal guide (ø41)
90890-01396
**TIP**
- Install the secondary sheave spring seat nut with its beveled side “a” facing the spring seat.
- Attach the sheave spring compressor “2” and sheave fixed block “3” onto the secondary sheave as shown. Then compress the spring, and temporarily tighten the secondary sheave spring seat nut.

### Sheave spring compressor
90890-04134
YM-04134

### Sheave fixed block
90890-04135

### Sheave fixed bracket
YM-04135

6. Tighten:
- Secondary sheave spring seat nut “1”

**TIP**
While holding the secondary fixed sheave “2” with the rotor holding tool “3”, tighten the secondary sheave spring seat nut “1” with the locknut wrench “4”.

### Sheave holder
90890-01481

### Locknut wrench
90890-01348
YM-01348

---

**Secondary sheave spring seat nut**
90 Nm (9.0 m·kg, 65 ft·lb)

---

**INSTALLING THE PRIMARY SHEAVE ASSEMBLY, SECONDARY SHEAVE ASSEMBLY AND V-BELT**

1. **Apply:**
   - Sealant (onto the inner V-belt case seal)

### Yamaha bond No. 1215
90890-85505
(Three Bond No.1215®)

2. **Install:**
   - V-belt case air duct joint clamp “1”
   - V-belt case air duct “2”

**TIP**
- Align the projection “a” in the V-belt case air duct “2” with the slot “b” on the V-belt case air duct joint clamp “1”.
- Align the projection “c” in the V-belt case air duct “2” with the slot “d” in the inner V-belt case “3”. 
3. Install:
- Primary fixed sheave “1”
- V-belt “2”
- Secondary sheave assembly “3”

**NOTICE**
Do not allow grease to contact the V-belt, primary and secondary sheave.

**TIP**
- When installing the belt, screw M6 (more than 45 mm (1.77 in)) bolts “4” to spread apart the secondary sheave and then install the V-belt. Make sure to install the V-belt with the arrows facing in the direction shown.
- Install the V-belt and secondary sheave assembly then pass the V-belt the primary sheave side.
- Align the “a” and “b” during reassembly.

4. Tighten:
- Secondary sheave nut “1”

**TIP**
While holding the secondary sheave with the sheave holder “2”, tighten the secondary sheave nut.

<table>
<thead>
<tr>
<th>Secondary sheave nut</th>
<th>90 Nm (9.0 m·kg, 65 ft·lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheave holder</td>
<td>90890-01481</td>
</tr>
</tbody>
</table>

5. Tighten:
- Primary sheave nut “1”

**NOTICE**
- Before tightening the nut to remount the primary sheave, make sure that the serrations of the cam are fitted firmly into the serrations of the crankshaft.
- Also, make sure that cam is properly seated.
- Apply grease to the thread and seat of the primary sheave nut.

**TIP**
While holding the primary sheave with the sheave holder “2”, tighten the primary sheave nut.

<table>
<thead>
<tr>
<th>Primary sheave nut</th>
<th>160 Nm (16.0 m·kg, 115 ft·lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheave holder</td>
<td>90890-01481</td>
</tr>
</tbody>
</table>

**Recommended lubricant**
Shell BT grease 3®
INSTALLING THE V-BELT CASE

1. Install:
   - Oil seal “1”
     (into outer V-belt case)

2. Fill the space “b” shown in the illustration with 10 g or more of lithium-soap-based grease.

3. Install:
   - Bearing retainer “1”

**TIP**
   - Install each bearing retainer “1” with its mark “a” facing outward.
   - Apply locking agent (LOCTITE®) to the threads of the bearing retainer bolt.

- Bearing retainer bolt
  11 Nm (1.1 m·kg, 8.0 ft·lb)
  LOCTITE®
**Removing the generator rotor and starter clutch**

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Front cowling/Storage box</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Fuel tank</td>
<td></td>
<td>Refer to “FUEL TANK” on page 7-1.</td>
</tr>
<tr>
<td></td>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-18.</td>
</tr>
<tr>
<td></td>
<td>Engine oil</td>
<td></td>
<td>Drain. Refer to “CHANGING THE ENGINE OIL” on page 3-12.</td>
</tr>
<tr>
<td></td>
<td>Water pump assembly</td>
<td></td>
<td>Refer to “WATER PUMP” on page 6-9.</td>
</tr>
<tr>
<td>1</td>
<td>V-belt case air duct</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Left passenger footrest</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Crankshaft position sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Stator coil coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Generator cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Generator cover gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Starter clutch idle gear shaft</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
### Removing the generator rotor and starter clutch

For installation, reverse the removal procedure.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Starter clutch idle gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Generator rotor nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Generator rotor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Starter clutch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Woodruff key</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Starter clutch gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

1st 65 Nm (6.5 m · kg, 47 ft · lb)

Specified angle 120°

30 Nm (3.0 m · kg, 22 ft · lb)

7 Nm (0.7 m · kg, 5.1 ft · lb)

10 Nm (1.0 m · kg, 7.2 ft · lb)
Removing the stator coil and oil tank

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oil tank</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Oil tank gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Oil strainer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Crankshaft position sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Stator coil</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
EAS24490

REMOVING THE GENERATOR

1. Remove:
   • Generator cover

**TIP**
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.

2. Remove:
   • Generator rotor nut “1”
   • Spacer “2”

**TIP**
• While holding the generator rotor “3” with the sheave holder “4”, loosen the generator rotor nut.
• Do not allow the sheave holder to touch the projection on the generator rotor.

3. Remove:
   • Generator rotor “1”
     (with the flywheel puller “2”)
   • Woodruff key

**TIP**
Make sure the flywheel puller is centered over the generator rotor.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A

EAS24560

REMOVING THE STARTER CLUTCH

1. Remove:
   • Starter clutch bolts “1”
   • Starter clutch

**TIP**
• While holding the generator rotor “2” with the sheave holder “3”, remove the starter clutch bolts.
• Do not allow the sheave holder to touch the projection on the generator rotor.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A
CHECKING THE STARTER CLUTCH

1. Check:
   • Starter clutch rollers “1”
     Damage/wear → Replace.

2. Check:
   • Starter clutch idle gear
   • Starter clutch gear
     Burrs/chips/roughness/wear → Replace the defective part(s).

3. Check:
   • Starter clutch gear contacting surfaces
     Damage/pitting/wear → Replace the starter clutch gear.

4. Check:
   • Starter clutch operation

a. Install the starter clutch gear “1” onto the starter clutch “2” and hold the starter clutch.

b. When turning the starter clutch gear counterclockwise “A”, the starter clutch and the starter clutch gear should engage, otherwise the starter clutch is faulty and must be replaced.

c. When turning the starter clutch gear clockwise “B”, it should turn freely, otherwise the starter clutch is faulty and must be replaced.

CHECKING THE OIL STRAINER

1. Check:
   • Oil strainer
     Damage → Replace.
     Contaminants → Clean with solvent.

INSTALLING THE STARTER CLUTCH

1. Install:
   • Starter clutch
   • Starter clutch bolts “1”

   **TIP**
   • While holding the generator rotor “2” with the sheave holder “3”, tighten the starter clutch bolts.
   • Do not allow the sheave holder to touch the projection on the generator rotor.

   **Starter clutch bolt**
   30 Nm (3.0 m·kg, 22 ft·lb)
   LOCTITE®

   **Sheave holder**
   90890-01701
   Primary clutch holder
   YS-01880-A
INSTALLING THE GENERATOR

1. Install:
   • Woodruff key
   • Generator rotor “1”
   • Spacer “2”
   • Generator rotor nut “3”

   **TIP**
   • Clean the tapered portion of the crankshaft and the generator rotor hub.
   • When installing the generator rotor, make sure the woodruff key is properly sealed in the keyway of the crankshaft.
   • Lubricate the generator rotor nut seats and threads with engine oil.

2. Tighten:
   • Generator rotor nut “1”

   **TIP**
   • While holding the generator rotor “2” with the sheave holder “3”, tighten the generator rotor nut.
   • Do not allow the sheave holder to touch the projection on the generator rotor.

3. Apply:
   • Sealant (onto the crankshaft position sensor lead grommet)

   **Yamaha bond No. 1215**
   90890-85505
   (Three Bond No.1215®)

4. Install:
   • Generator cover
TIP
Tighten the generator cover bolts in stages and in a crisscross pattern.
Removing the clutch

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Generator cover</td>
<td></td>
<td>Refer to &quot;GENERATOR AND STARTER CLUTCH&quot; on page 5-47.</td>
</tr>
<tr>
<td>1</td>
<td>Clutch assembly nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Clutch assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Washer</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
Disassembling the clutch

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Spring stopper plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Clutch spring plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Pressure plate</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Clutch plate 2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Clutch damper spring</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Friction plate</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Clutch plate 1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Clutch spring</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Clutch boss nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Primary drive gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Bearing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Clutch boss</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Thrust plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Clutch weight</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

\[\text{\textbullet} \ 130 \text{Nm (13.0 m\cdot kg, 94 ft\cdot lb)}\]
Disassembling the clutch

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>Clutch housing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.

\[ 130 \text{Nm (13.0 m \cdot kg, 94 ft \cdot lb)} \]
REMOVING THE CLUTCH

1. Remove:
   • Clutch assembly nut “1”
   • Clutch assembly “2”

TIP
   • Before removal, put alignment marks “a” and “b” as shown.
   • While holding the clutch assembly with the rotor holding tool “3”, loosen the clutch assembly nut.
   • Align these marks during reassembly.

DISASSEMBLING THE CLUTCH

1. Remove:
   • Circlip “1”

TIP
   While compressing the clutch springs with the clutch spring compressor “2”, remove the circlip.

2. Remove:
   • Spring stopper plate “1”

TIP
   To ensure proper balance of the clutch assembly, one to three holes “a”, or no hole at all, may have been drilled in the spring stopper plate. Before removing the spring stopper plate, make alignment marks on both the plate and the clutch housing so that the plate can be reinstalled in its original position.

3. Loosen:
   • Clutch boss nut “1”

TIP
   While holding the clutch boss “2” with the universal clutch holder “3”, loosen the clutch boss nut.

Universal clutch holder
90890-04086
YM-91042
CHECKING THE FRICTION PLATES

The following procedure applies to all of the friction plates.
1. Check:
   • Friction plate
     Damage/wear → Replace the friction plates as a set.
2. Measure:
   • Friction plate thickness
     Out of specification → Replace the friction plates as a set.

TIP
Measure the friction plate at four places.

<table>
<thead>
<tr>
<th>Friction plate thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.75–3.05 mm (0.108–0.120 in)</td>
</tr>
<tr>
<td>Wear limit</td>
</tr>
<tr>
<td>2.65 mm (0.1043 in)</td>
</tr>
</tbody>
</table>

CHECKING THE CLUTCH PLATES

The following procedure applies to all of the clutch plates.
1. Check:
   • Clutch plate
     Damage → Replace the clutch plates as a set.
2. Measure:
   • Clutch plate warpage
     (with a surface plate and thickness gauge “1”)
     Out of specification → Replace the clutch plates as a set.

<table>
<thead>
<tr>
<th>Clutch plate 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warpage limit</td>
</tr>
<tr>
<td>0.10 mm (0.0039 in)</td>
</tr>
<tr>
<td>Clutch plate 2</td>
</tr>
<tr>
<td>Warpage limit</td>
</tr>
<tr>
<td>0.20 mm (0.0079 in)</td>
</tr>
</tbody>
</table>

CHECKING THE CLUTCH DAMPER SPRINGS

The following procedure applies to all of the clutch damper springs.
1. Check:
   • Clutch damper spring
     Damage → Replace.
2. Measure:
   • Clutch damper spring free height “a”
     Out of specification → Replace the clutch damper springs as a set.

<table>
<thead>
<tr>
<th>Clutch damper spring height</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.50 mm (0.14 in)</td>
</tr>
<tr>
<td>Minimum height</td>
</tr>
<tr>
<td>3.10 mm (0.12 in)</td>
</tr>
</tbody>
</table>

CHECKING THE CLUTCH SPRING PLATE

1. Check:
   • Clutch spring plate
     Damage → Replace.
2. Measure:
   • Clutch spring plate free height “a”
     Out of specification → Replace the clutch spring plate.

<table>
<thead>
<tr>
<th>Clutch spring plate height</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.70 mm (0.19 in)</td>
</tr>
<tr>
<td>Minimum height</td>
</tr>
<tr>
<td>4.40 mm (0.17 in)</td>
</tr>
</tbody>
</table>
CHECKING THE CLUTCH SPRINGS
The following procedure applies to all of the clutch springs.

1. Check:
   • Clutch spring
     Damage → Replace the clutch springs as a set.

2. Measure:
   • Clutch spring free length
     Out of specification → Replace the clutch springs as a set.

   Clutch spring free length
   25.80 mm (1.02 in)
   Minimum length
   20.40 mm (0.80 in)

CHECKING THE CLUTCH HOUSING

1. Check:
   • Clutch housing dogs
     Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

TIP
Pitting on the clutch housing dogs will cause erratic clutch operation.

CHECKING THE CLUTCH BOSS

1. Check:
   • Clutch boss splines
     Damage/pitting/wear → Replace the clutch boss.

TIP
Pitting on the clutch boss splines will cause erratic clutch operation.

CHECKING THE PRESSURE PLATE

1. Check:
   • Pressure plate
     Cracks/damage → Replace.

ASSEMBLING THE CLUTCH

1. Lubricate:
   • Friction plates
   • Clutch plate
     (with the recommended lubricant)
2. Install:
   • Clutch boss
   • Primary drive gear
   • Clutch boss nut

3. Tighten:
   • Clutch boss nut “1”

**TIP**
While holding the clutch boss “2” with the universal clutch holder “3”, tighten the clutch boss nut.

**Recommended lubricant**

| Engine oil |

| **Clutch boss nut** |

130 Nm (13.0 m·kg, 94 ft·lb)

| **Clutch spring compressor** |

90890-01482

4. Install:
   • Clutch weights “1”

**TIP**
Install the weights in the clutch housing at the intervals shown in the illustration.

5. Install:
   • Thrust plate “1”
   • Clutch springs
   • Clutch damper springs “2”
   • Clutch plates 2 “3”

6. Install:
   • Circlip “1”

**TIP**
While compressing the clutch springs with the clutch spring compressor “2”, install the circlip.

**Friction plates “4”**
**Clutch plates 1 “5”**
**Pressure plate “6”**
**Clutch spring plate “7”**

**INSTALLING THE CLUTCH**

1. Install:
   • Clutch assembly “1”
   • Clutch assembly nut “2”
**TIP**

- Align the “a” and “b” during reassembly.
- While holding the clutch assembly with the rotor holding tool “3”, tighten the clutch assembly nut.

---

**Clutch assembly nut**

65 Nm (6.5 m·kg, 47 ft·lb)

**Rotor holding tool**

90890-01235

Universal magneto & rotor holder

YU-01235
Removing the oil pump

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Starter clutch gear</td>
<td></td>
<td>Refer to &quot;GENERATOR AND STARTER CLUTCH&quot; on page 5-47.</td>
</tr>
<tr>
<td>1</td>
<td>Oil pump assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Oil pump drive chain</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Gasket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Oil delivery pipe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Oil pipe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Relief valve assembly</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

\[10 \text{Nm (1.0 m·kg, 7.2 ft·lb)}\]
## Disassembling the oil pump

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oil pump housing 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oil pump outer rotor 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Oil pump inner rotor 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oil pump housing center</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Oil pump outer rotor 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Oil pump inner rotor 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Oil pump driven gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Oil pump housing 2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.
CHECKING THE OIL PUMP

1. Check:
   • Oil pump driven gear “1”
   • Oil pump housing 2 “2”
   • Oil pump housing 1 “3”
   Cracks/damage/wear → Replace the defective part(s).

2. Measure:
   • Inner-rotor-to-outer-rotor-tip clearance “a”
   • Outer-rotor-to-oil-pump-housing clearance “b”
   • Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance “c”
   Out of specification → Replace the oil pump.

3. Check:
   • Oil pump operation
     Rough movement → Repeat steps (1) and (2) or replace the defective part(s).

CHECKING THE RELIEF VALVE

1. Check:
   • Relief valve body
     Damage/wear → Replace.

CHECKING THE OIL PIPES

1. Check:
   • Oil pipe
   • Oil delivery pipe
     Damage → Replace.
     Obstruction → Wash and blow out with compressed air.

CHECKING THE OIL PUMP DRIVE CHAIN

1. Check:
   • Oil pump drive chain
     Cracks/stiffness → Replace the oil pump chain and oil pump driven sprocket as a set.
ASSEMBLING THE OIL PUMP

1. Lubricate:
   • Inner rotor
   • Outer rotor
   • Oil pump shaft
     (with the recommended lubricant)

   **Recommended lubricant**
   Engine oil

2. Install:
   • Inner rotors

   **TIP**
   When installing the inner rotor, align the pin “1” in the oil pump shaft with the groove “a” in the inner rotor.

3. Check:
   • Oil pump operation
     Refer to “CHECKING THE OIL PUMP” on page 5-64.

INSTALLING THE OIL PUMP

1. Install:
   • Oil pump assembly

   **Oil pump bolt**
   10 Nm (1.0 m·kg, 7.2 ft·lb)

**NOTICE**
After tightening the bolts, make sure the oil pump turns smoothly.
Separating the crankcase

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Engine</td>
<td></td>
<td>Refer to “ENGINE REMOVAL” on page 5-1.</td>
</tr>
<tr>
<td></td>
<td>Cylinder head</td>
<td></td>
<td>Refer to “CYLINDER HEAD” on page 5-15.</td>
</tr>
<tr>
<td></td>
<td>Cylinder/Pistons</td>
<td></td>
<td>Refer to “CYLINDER AND PISTONS” on page 5-26.</td>
</tr>
<tr>
<td></td>
<td>Starter clutch gear</td>
<td></td>
<td>Refer to “GENERATOR AND STARTER CLUTCH” on page 5-47.</td>
</tr>
<tr>
<td></td>
<td>Clutch assembly</td>
<td></td>
<td>Refer to “CLUTCH” on page 5-54.</td>
</tr>
<tr>
<td></td>
<td>Oil pump assembly</td>
<td></td>
<td>Refer to “OIL PUMP” on page 5-62.</td>
</tr>
<tr>
<td></td>
<td>Inner V-belt case</td>
<td></td>
<td>Refer to “V-BELT AUTOMATIC TRANSMISSION” on page 5-35.</td>
</tr>
<tr>
<td>1</td>
<td>Centerstand assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Timing chain</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Timing chain guide (intake side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Left crankcase</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oil strainer</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Separating the crankcase

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Right crankcase</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
Removing the oil seals and bearings

For installation, reverse the removal procedure.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crankshaft assembly</td>
<td></td>
<td>Refer to &quot;CRANKSHAFT&quot; on page 5-71.</td>
</tr>
<tr>
<td></td>
<td>Transmission</td>
<td></td>
<td>Refer to &quot;TRANSMISSION&quot; on page 5-79.</td>
</tr>
<tr>
<td>1</td>
<td>Bearing retainer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Oil seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bearing</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** 12 Nm (1.2 m·kg, 8.7 ft·lb)
DISASSEMBLING THE CRANKCASE

1. Remove:
   • Crankcase bolts

   **TIP**
   Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.
   - M8 × 110 mm bolts “1”
   - M6 × 50 mm bolts “2”
   - M6 × 35 mm bolts “3”

2. Remove:
   • Left crankcase

   **NOTICE**
   Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate even.

CHECKING THE CRANKCASE

1. Thoroughly wash the crankcase halves in a mild solvent.
2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
3. Check:
   • Crankcase
     Cracks/damage → Replace.
   • Oil delivery passages
     Obstruction → Blow out with compressed air.

CHECKING THE TIMING CHAIN

1. Check:
   • Timing chain
     Damage/stiffness → Replace the timing chain and camshafts as a set.

ASSEMBLING THE CRANKCASE

1. Thoroughly clean all the gasket mating surfaces and crankcase mating surfaces.
2. Apply:
   • Sealant (onto the crankcase mating surfaces)

   **Yamaha bond No. 1215**
   90890-85505
   (Three Bond No.1215®)

   **TIP**
   Do not allow any sealant to come into contact with the oil gallery.

3. Install:
   • Dowel pins
   • Left crankcase

4. Install:
   • Crankcase bolts (M8)
   • Crankcase bolts (M6)

   **Crankcase bolt (M8)**
   24 Nm (2.4 m·kg, 17 ft·lb)
   **Crankcase bolt (M6)**
   10 Nm (1.0 m·kg, 7.2 ft·lb)

   **TIP**
   Tighten each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern.
   - M8 × 110 mm bolts “1”
   - M6 × 50 mm bolts “2”
5. Check:
- Crankshaft and transmission operation
  Rough movement → Repair.

- M6 × 35 mm bolts “3”
Removing the crankshaft assembly

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Crankshaft assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Balancer cylinder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Crankshaft journal bearing</td>
<td>2</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>

Separate. Refer to "CRANKCASE" on page 5-66.

58 Nm (5.8 m·kg, 42 ft·lb)
Removing the connecting rods

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connecting rod cap</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Big end lower bearing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Connecting rod</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Big end upper bearing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Circlip</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Balancer piston pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Balancer piston</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Balancer connecting rod cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Balancer big end lower bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Balancer connecting rod</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Balancer big end upper bearing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
REMOVING THE CONNECTING RODS
The following procedure applies to all of the connecting rods.
1. Remove:
   • Connecting rod cap
   • Connecting rod “1”
   • Big end bearings

TIP
Identify the position of each big end bearing so that it can be reinstalled in its original place.

REMOVING THE CRANKSHAFT JOURNAL BEARINGS
The following procedure applies to both of the crankshaft main journal bearings.
1. Remove:
   • Crankshaft assembly
   • Crankshaft journal bearing “1”

TIP
Remove the crankshaft journal bearing using the plane bearing installer “2”.

CHECKING THE CRANKSHAFT AND CONNECTING RODS
1. Measure:
   • Crankshaft runout
     Out of specification → Replace the crankshaft.

   Runout limit C
   0.030 mm (0.0012 in)

2. Check:
   • Crankshaft journal surfaces
   • Crankshaft pin surfaces
   • Bearing surfaces
     Scratches/wear → Replace the crankshaft.
3. Measure:
   • Crankshaft-pin-to-big-end-bearing clearance
     Out of specification → Replace the big end bearings.

   ![Oil clearance (using Plastigauge®)]
   0.026–0.050 mm (0.0010–0.0020 in)

   The following procedure applies to all of the connecting rods.

   NOTICE

   Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.

   a. Clean the big end bearings, crankshaft pins, and the inside of the connecting rod halves.
   b. Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

   **TIP**

   Align the projections “a” on the big end bearings with the notches “b” in the connecting rod and connecting rod cap.

   ![Diagrams showing cleanliness and installation steps]

   c. Put a piece of Plastigauge® “1” on the crankshaft pin.
   d. Assemble the connecting rod halves.

   **TIP**

   • Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
   • Lubricate the bolts threads and nut seats with molybdenum disulfide grease.
   • Make sure the “Y” mark “c” on the connecting rod faces towards the left side of the crankshaft.
   • Make sure the characters “d” on both the connecting rod and connecting rod cap are aligned.

   ![Diagram showing alignment steps]

   e. Tighten the connecting rod nuts.
   f. Remove the connecting rod and big end bearings.
   Refer to “INSTALLING THE CONNECTING RODS” on page 5-77.
   g. Measure the compressed Plastigauge® width “e” on the crankshaft pin.
   If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.

   ![Diagram showing measurement steps]

4. Select:
   • Big end bearings (P₁–P₃)

   **TIP**

   • The numbers “A” stamped into the crankshaft web and the numbers “B” on the connecting rods are used to determine the replacement big end bearing sizes.
• P₁–P₃ refer to the bearings shown in the crankshaft illustration.

For example, if the connecting rod P₁ and the crankshaft web P₁ numbers are 5 and 1 respectively, then the bearing size for P₁ is:

P₁ (connecting rod) - P₁ (crankshaft)
= 5 - 1 = 4 (green)

Bearing color code

5. Measure:
  • Crankshaft-journal-to-crankshaft-journal bearing clearance.
    Out of specification → Replace the crankshaft journal bearings.

The following procedure applies to all of the crankshaft journal bearings.

**NOTICE**

Do not interchange the crankshaft journal bearings. To obtain the correct crankshaft-journal-to-crankshaft-journal-bearing clearance and prevent engine damage, the crankshaft journal bearings must be installed in their original positions.

**NOTICE**

On the journal, the larger value is used as a basis for calculation of the oil clearance, and on the journal bearing, the smaller value is used.

a. Clean the crankshaft journal bearings, crankshaft journals, and bearing portions of the crankcase.

b. Check the bearing surface. If the bearing surface is worn or scratched, both bearings should be replaced.

**TIP**

If either of the right or left journal bearing is worn or scratched, both bearings should be replaced as a set.

c. Measure the crankshaft journal diameter “a” of each crankshaft journal at two places. If it is out of specification, replace the crankshaft.

**Journal oil clearance (using plastigauge®)**

0.040–0.082 mm (0.0016–0.0032 in)

**Crankshaft journal diameter**

55.032–55.074 mm (2.1666–2.1683 in)
d. Measure the crankshaft journal bearing inside diameter “b” of each crankshaft journal bearing at two places.

![Image of a crankshaft with a measurement tool indicating the diameter “b”]

6. Select:
   - Crankshaft journal bearings (J1–J2)

TIP
- The numbers “A” stamped into the crankshaft web and the numbers “B” on the crankcase are used to determine the replacement crankshaft journal bearing size.
- J1–J2 refer to the bearings shown in the crankshaft illustration.

For example, if the crankcase J1 and the crankshaft web J1 numbers are 4 and 2 respectively, then the bearing size for J1 is:

```
J1 (crankcase) - J1 (crankshaft web) = 4 - 2 = 2 (black)
```

Journal oil clearance:
Crankshaft journal bearing inside diameter - Crankshaft journal diameter = 45.03 - 44.98 = 0.05 mm

If the oil clearance is out of specification, select replacement bearings.

```
For example, if the crankcase J1 and the crankshaft web J1 numbers are 4 and 2 respectively, then the bearing size for J1 is:
```

![Diagram illustrating the installation of crankshaft journal bearings]

**Bearing color code**

### INSTALLING THE CRANKSHAFT JOURNAL BEARINGS

The following procedure applies to both of the crankshaft main journal bearings.

1. Attach:
   - Crankshaft journal bearing “1”

TIP
Attach the crankshaft journal bearing to the plane bearing installer “2”.

2. Install:
   - Crankshaft journal bearing

TIP
- Align the projection “a” on the bearing with the projection “b” on the crankcase.
- Place an iron “3” plate beneath the crankcase and press fit until the end of the plain bearing installer touches the iron plate.
INSTALLING THE CONNECTING RODS

1. Lubricate:
   • Bolt threads
   • Nut seats
     (with the recommended lubricant)

2. Lubricate:
   • Crankshaft pins
   • Big end bearings
   • Connecting rod inner surface
     (with the recommended lubricant)

3. Install:
   • Big end bearings
   • Connecting rods
   • Connecting rod caps
     (onto the crankshaft pins)

   TIP
   • Align the projections “a” on the big end bearings with the notches “b” in the connecting rods and connecting rod caps.
   • Be sure to reinstall each big end bearing in its original place.
   • Make sure the “Y” marks “c” on the connecting rods face towards the left side of the crankshaft.

4. Tighten:
   • Connecting rod nuts

   TIP
   Tighten the connecting rod bolts using the following procedure.
   a. Tighten the connecting rod nuts with a torque wrench.
   b. Put a mark “1” on the corner of the connecting rod nut “2” and the connecting rod cap “3”.

   WARNING
   • Replace the connecting rod bolts and nuts with new ones.
   • Clean the connecting rod bolts and nuts.

Recommended lubricant
Molybdenum disulfide grease

Recommended lubricant
Engine oil

Connecting rod nut (1st)
16 Nm (1.6 m·kg, 11 ft·lb)
c. Tighten the connecting rod nuts further to reach the specified angle 90°.

**WARNING**
If the connecting rod nut is tightened more than the specified angle, do not loosen the nut and then retighten it. Instead, replace the connecting rod bolt and nut with a new one and perform the procedure again.

**NOTICE**
Do not use a torque wrench to tighten the connecting rod nut to the specified angle. Tighten the nut until it is at the specified angle.

**TIP**
On a hexagonal nut, note that the angle from one corner to another is 60°.

5. Install:
- Balancer connecting rod
- Balancer connecting rod cap

**Notice**
When tightening the nuts, be sure to use a beam type torque wrench.
- Tighten the nuts to the specified torque. Apply continuous torque between 30 Nm (3.0 m-kg, 22 ft-lb) and 60 Nm (6.0 m-kg, 43 ft-lb) without pausing. After reaching 30 Nm (3.0 m-kg, 22 ft-lb), DO NOT STOP TIGHTENING until the specified torque is achieved. If the tightening is interrupted between 30 Nm (3.0 m-kg, 22 ft-lb) and 60 Nm (6.0 m-kg, 43 ft-lb), loosen the nut to less than 30 Nm (3.0 m-kg, 22 ft-lb) and start again.

**Installing the Crankshaft Assembly**
1. Install:
   - Crankshaft assembly “1”
   - Balancer piston cylinder “2”

**Notice**
To avoid scratching the crankshaft and to ease the installation procedure, apply grease onto the oil seal lips and apply engine oil onto each bearing.
Removing the transmission

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crankcase</td>
<td></td>
<td>Separate.</td>
</tr>
<tr>
<td>1</td>
<td>Secondary shaft</td>
<td>1</td>
<td>Refer to &quot;CRANKCASE&quot; on page 5-66.</td>
</tr>
<tr>
<td>2</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Primary driven gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Main axle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1st pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Drive axle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1st wheel gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Circlip</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>
CHECKING THE TRANSMISSION

1. Measure:
   • Main axle runout  
     (with a centering device and dial gauge)  
     Out of specification → Replace the main axle.

   Main axle runout limit 
   0.08 mm (0.0032 in)

2. Measure:
   • Drive axle runout  
     (with a centering device and dial gauge)  
     Out of specification → Replace the drive axle.

   Drive axle runout limit 
   0.08 mm (0.0032 in)

3. Measure:
   • Secondary shaft runout  
     (with a centering device and dial gauge)  
     Out of specification → Replace the secondary shaft.

   Maximum secondary shaft runout 
   0.08 mm (0.0031 in)

4. Check:
   • Transmission gear movement  
     Rough movement → Replace the defective part(s).

5. Check:
   • Circlips  
     Bends/damage/looseness → Replace.
COOLING SYSTEM

RADIATOR .................................................................................................................. 6-1
  CHECKING THE RADIATOR ..................................................................................... 6-3
  INSTALLING THE RADIATOR ................................................................................. 6-3

OIL COOLER .................................................................................................................. 6-4
  CHECKING THE OIL COOLER .................................................................................. 6-6
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THERMOSTAT .............................................................................................................. 6-7
  CHECKING THE THERMOSTAT ................................................................................ 6-8
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WATER PUMP ............................................................................................................. 6-9
  DISASSEMBLING THE WATER PUMP .................................................................... 6-11
  CHECKING THE WATER PUMP .............................................................................. 6-11
  ASSEMBLING THE WATER PUMP .......................................................................... 6-11
  INSTALLING THE WATER PUMP ............................................................................ 6-12
### Removing the radiator

**Footrest boards**
- Refer to "GENERAL CHASSIS" on page 4-1.

**Coolant**
- Drain.
- Refer to "CHANGING THE COOLANT" on page 3-18.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coolant reservoir hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Coolant reservoir</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Radiator cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Cooling system air bleed hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Radiator filler pipe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Radiator filler hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Radiator inlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Fast idle plunger outlet coolant hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>9</td>
<td>Radiator outlet hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>10</td>
<td>Radiator fan motor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>11</td>
<td>Radiator guard</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Radiator</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Torque Specifications**
- **Footrest boards**: 7 Nm (0.7 m·kg, 5.1 ft·lb)
- **Coolant reservoir hose**: 30 Nm (3.0 m·kg, 22 ft·lb)
- **Fast idle plunger outlet coolant hose**: 7 Nm (0.7 m·kg, 5.1 ft·lb)
Removing the radiator

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Radiator fan</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Radiator bracket</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
CHECKING THE RADIATOR

1. Check:
• Radiator fins
  Obstruction → Clean.
  Apply compressed air to the rear of the radiator.
  Damage → Repair or replace.

TIP
Straighten any flattened fins with a thin, flat-head screwdriver.

2. Check:
• Radiator hoses
• Radiator pipes
  Cracks/damage → Replace.

3. Measure:
• Radiator cap opening pressure
  Below the specified pressure → Replace the radiator cap.

   Radiator cap opening pressure
   107.9–137.3 kPa (15.6–19.9 psi)
   (1.08–1.37 kgf/cm²)

4. Check:
• Radiator fan
  Damage → Replace.
  Malfunction → Check and repair.
  Refer to “COOLING SYSTEM” on page 8-25.

INSTALLING THE RADIATOR

1. Fill:
• Cooling system
  (with the specified amount of the recommended coolant)
  Refer to “CHANGING THE COOLANT” on page 3-18.

2. Check:
• Cooling system
  Leaks → Repair or replace any faulty part.

3. Measure:
• Radiator cap opening pressure
  Below the specified pressure → Replace the radiator cap.
  Refer to “CHECKING THE RADIATOR” on page 6-3.
Removing the oil cooler

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Storage box</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Fuel tank</td>
<td></td>
<td>Refer to “FUEL TANK” on page 7-1.</td>
</tr>
<tr>
<td></td>
<td>Engine oil</td>
<td></td>
<td>Drain. Refer to “CHANGING THE ENGINE OIL” on page 3-12.</td>
</tr>
<tr>
<td></td>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-18.</td>
</tr>
<tr>
<td>1</td>
<td>Oil filter cartridge</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Oil cooler inlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oil cooler outlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Radiator inlet hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Thermostat outlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Coolant pipe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oil filter cartridge union bolt</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the oil cooler

Order | Job/Parts to remove | Q’ty | Remarks
--- | --- | --- | ---
8 | Oil cooler | 1 | For installation, reverse the removal procedure.
CHECKING THE OIL COOLER
1. Check:
   • Oil cooler
     Cracks/damage → Replace.
2. Check:
   • Oil cooler inlet hose
   • Oil cooler outlet hose
     Cracks/damage/wear → Replace.

INSTALLING THE OIL COOLER
1. Clean:
   • Mating surfaces of the oil cooler and the crankcase
     (with a cloth dampened with lacquer thinner)
2. Install:
   • O-ring
   • Oil cooler “1”
   • Oil filter cartridge union bolt “2”

TIP
• Before installing the oil cooler, lubricate the union bolt threads and washer with engine oil.
• Make sure that the O-ring is positioned properly.
• Align the projection “a” on the oil cooler with the slot “b” in the crankcase.

3. Install:
   • Oil filter cartridge

Fill:
• Cooling system
  (with the specified amount of the recommended coolant)
  Refer to “CHANGING THE COOLANT” on page 3-18.
• Crankcase
  (with the specified amount of the recommended engine oil)
  Refer to “CHANGING THE ENGINE OIL” on page 3-12.

Check:
• Cooling system
  Leaks → Repair or replace any faulty part.

Measure:
• Radiator cap opening pressure
  Below the specified pressure → Replace the radiator cap.
  Refer to “CHECKING THE RADIATOR” on page 6-3.

4. Fill:

Oil filter cartridge union bolt
63 Nm (6.3 m·kg, 45 ft·lb)

Oil filter wrench
90890-01469
YM-01469

Oil filter cartridge
17 Nm (1.7 m·kg, 12 ft·lb)

Refer to “CHANGING THE ENGINE OIL” on page 3-12.
Removing the thermostat

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Storage box</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Fuel tank</td>
<td></td>
<td>Refer to “FUEL TANK” on page 7-1.</td>
</tr>
<tr>
<td></td>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-18.</td>
</tr>
<tr>
<td>1</td>
<td>Coolant temperature sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Coolant temperature sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Copper washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Cooling system air bleed hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Thermostat outlet hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Thermostat cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Thermostat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Fast idle plunger inlet coolant hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>9</td>
<td>Coolant hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
CHECKING THE THERMOSTAT

1. Check:
   - Thermostat
     Does not open at 71–85 °C (159.8–185.0 °F) → Replace.

   a. Suspend the thermostat “1” in a container “2” filled with water.
   b. Slowly heat the water “3”.
   c. Place a thermometer “4” in the water.
   d. While stirring the water, observe the thermostat and thermometer’s indicated temperature.

   If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

INSTALLING THE THERMOSTAT ASSEMBLY

1. Install:
   - Thermostat

   TIP
   Install the thermostat with its breather hole “a” facing forward.

2. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-18.

3. Check:
   - Cooling system
     Leaks → Repair or replace any faulty part.

4. Measure:
   - Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR” on page 6-3.
Removing the water pump

- **Left footrest board**: Refer to "GENERAL CHASSIS" on page 4-1.
- **Coolant**: Drain. Refer to "CHANGING THE COOLANT" on page 3-18.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V-belt case air filter element joint clamp screw</td>
<td>1</td>
<td>Loosen.</td>
</tr>
<tr>
<td>2</td>
<td>V-belt case air filter element (left)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Generator cover protector cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Generator cover protector</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Oil cooler inlet hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Coolant hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Radiator outlet hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>Water pump inlet pipe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Water pump outlet pipe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Water pump assembly</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
</tbody>
</table>

**Nm (m · kg, ft · lb)**
- 10 Nm (1.0 m · kg, 7.2 ft · lb)
- 7 Nm (0.7 m · kg, 5.1 ft · lb)
Disassembling the water pump

**Order** | **Job/Parts to remove** | **Q’ty** | **Remarks**
--- | --- | --- | ---
1 | Water pump housing cover | 1 | 
2 | O-ring | 1 | 
3 | Circlip | 1 | 
4 | Impeller shaft | 1 | 
5 | Rubber damper holder | 1 | 
6 | Rubber damper | 1 | 
7 | Water pump seal | 1 | 
8 | Bearing | 1 | 
9 | Oil seal | 1 | 
10 | Water pump housing | 1 | 

**TIP**

It is not necessary to remove the impeller shaft, unless the coolant level is extremely low or coolant contains engine oil.

For assembly, reverse the disassembly procedure.
DISASSEMBLING THE WATER PUMP
1. Remove:
   • Rubber damper holder “1”
   • Rubber damper “2”
     (from the impeller, with a thin, flat-head screwdriver)
   
   **TIP**
   Do not scratch the impeller shaft.

2. Remove:
   • Water pump seal “1”
   
   **TIP**
   Remove the water pump seal from the inside of the water pump housing.

3. Remove:
   • Bearing “1”
   • Oil seal “2”
   
   **TIP**
   Remove the bearing and oil seal from the outside of the water pump housing.

CHECKING THE WATER PUMP
1. Check:
   • Water pump housing cover
   • Water pump housing
   • Impeller shaft
   • Water pump seal
   • Oil seal
   • Rubber damper
   • Rubber damper holder
     Cracks/damage/wear → Replace.
   
2. Check:
   • Bearing
     Rough movement → Replace.

3. Check:
   • Water pump inlet pipe
   • Water pump outlet pipe
     Cracks/damage/wear → Replace.

ASSEMBLING THE WATER PUMP
1. Install:
   • Oil seal “1” New
   
   **TIP**
   • Before installing the oil seal, apply tap water or coolant onto its outer surface.
   • Install the oil seal with a socket that matches its outside diameter.

   **Installed depth of oil seal “a”**
   11.5 mm (0.45 in)

2. Install:
   • Water pump seal “1” New
   
   **NOTICE**
   Never lubricate the water pump seal surface with oil or grease.
   
   **TIP**
   • Install the water pump seal with the special tools.
Before installing the water pump seal, apply Yamaha bond No.1215 “2” to the water pump housing “3”.

**NOTICE**

Make sure the rubber damper and rubber damper holder are flush with the impeller.

**INSTALLING THE WATER PUMP**

1. Install:
   - O-ring
   - Water pump assembly

**TIP**

- Align the projection “a” on the oil pump shaft and water pump shaft groove “b”.
- Lubricate the O-ring with a thin coat of lithium-soap-based grease.

**EAS26580**

**Water pump assembly bolt**

$10 \text{ Nm (1.0 m·kg, 7.2 ft·lb)}$

2. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
   Refer to “CHANGING THE COOLANT” on page 3-18.
3. Check:
   • Cooling system
     Leaks → Repair or replace any faulty part.

4. Measure:
   • Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR” on page 6-3.
FUEL SYSTEM

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  REMOVING THE FUEL TANK ..................................................................... 7-3
  REMOVING THE FUEL PUMP ................................................................. 7-3
  CHECKING THE FUEL PUMP BODY ....................................................... 7-3
  CHECKING THE ROLLOVER VALVE ...................................................... 7-3
  INSTALLING THE FUEL PUMP .............................................................. 7-3
  CHECKING THE FUEL PRESSURE ........................................................ 7-3

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  CHECKING THE INJECTORS ................................................................. 7-8
  CHECKING THE THROTTLE BODY ...................................................... 7-8
  ADJUSTING THE THROTTLE POSITION SENSOR ................................ 7-8
Removing the fuel tank

**Order** | **Job/Parts to remove** | **Q’ty** | **Remarks**
--- | --- | --- | ---
Storage box |  |  | Refer to “GENERAL CHASSIS” on page 4-1.
1 | Fuel tank breather hose | 2 |  |
2 | Rollover valve | 1 |  |
3 | Fuel tank | 1 |  |
4 | Fuel pump bracket | 1 |  |
5 | Fuel pump | 1 |  |
6 | Fuel pump gasket | 1 | For installation, reverse the removal procedure.

**T R.**

- **4 Nm (0.4 m·kg, 2.9 ft·lb)**
- **10 Nm (1.0 m·kg, 7.2 ft·lb)**

(6) New
Removing the canister

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Storage box</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Fuel tank</td>
<td></td>
<td>Refer to “FUEL TANK” on page 7-1.</td>
</tr>
<tr>
<td>1</td>
<td>Fuel tank breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Canister purge hose (3-way joint to canister)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Canister purge hose (throttle body to 3-way joint)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Canister</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>
REMOVING THE FUEL TANK
1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
   • Fuel tank

REMOVING THE FUEL PUMP
1. Remove:
   • Fuel pump

**NOTICE**
- Do not drop the fuel pump or give it a strong shock.
- Do not touch the base section of the fuel sender.

CHECKING THE FUEL PUMP BODY
1. Check:
   • Fuel pump body
     - Obstruction → Clean.
     - Cracks/damage → Replace the fuel pump assembly.

CHECKING THE ROLLOVER VALVE
1. Check:
   • Rollover valve “1”
     - Damage/faulty → Replace.

**TIP**
- Check that air flows smoothly only in the direction of the arrow shown in the illustration.
- The rollover valve must be in an upright position when checking the airflow.

INSTALLING THE FUEL PUMP
1. Install:
   • Fuel pump

**TIP**
- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Install the fuel pump as shown in the illustration.
- Align projection “a” on the fuel pump with point “b” of the fuel tank.
- Tighten the fuel pump bolts in the proper tightening sequence as shown.

**TIP**
- Check that air flows smoothly only in the direction of the arrow shown in the illustration.
- The rollover valve must be in an upright position when checking the airflow.

**TIP**
- Check that air flows smoothly only in the direction of the arrow shown in the illustration.
- The rollover valve must be in an upright position when checking the airflow.

**NOTICE**
Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.
- Although the fuel has been removed from the fuel tank, be careful when removing the fuel hose, since there may be fuel remaining in it.
- Do not disconnect the fuel hose from the fuel hose connector. Disconnect the connector from the fuel pump.

**TIP**
Before removing the hose, place a few rags in the area under where it will be removed.
b. Connect the pressure gauge “1” and fuel pressure adapter “2” to the fuel pump and the fuel hose “3”.

A

Pressure gauge
90890-03153
YU-03153
Fuel pressure adapter
90890-03181

TIP
Before removing the special tools, place a few rags in the area under where they will be removed.

Pressure gauge
90890-03153
YU-03153
Fuel pressure adapter
90890-03181

2

1

c. Start the engine.
d. Measure the fuel pressure.
   Faulty → Replace the fuel pump.

TIP
Before removing the special tools, place a few rags in the area under where they will be removed.

Output pressure
246.0–254.0 kPa (35.7–36.8 psi)
(2.46–2.54 kgf/cm²)

2

1

3

f. Remove the pressure gauge and fuel pressure adapter.
## Removing the throttle body assembly

**Order** | **Job/Parts to remove**                          | **Q’ty** | **Remarks**                                                                 
---|-------------------------------------------------|---------|-----------------------------------------------------------------------------
    | Storage box                                     |         | Refer to “GENERAL CHASSIS” on page 4-1.                                    
    | Fuel tank/Canister purge hoses                  |         | Refer to “FUEL TANK” on page 7-1.                                          
    | Coolant                                         |         | Drain. Refer to “CHANGING THE COOLANT” on page 3-18.                       
1  | Intake air temperature sensor coupler           | 1       | Disconnect.                                                                 
2  | Intake air temperature sensor                   | 1       |                                                                             
3  | Cylinder head breather hose                     | 1       |                                                                             
4  | Fast idle plunger intake hose                   | 1       |                                                                             
5  | Air filter case joint clamp screw               | 2       | Loosen.                                                                     
6  | Air filter case                                 | 1       |                                                                             
7  | Throttle cable                                  | 2       |                                                                             
8  | Fast idle plunger outlet coolant hose           | 1       |                                                                             
9  | Fast idle plunger inlet coolant hose            | 1       |                                                                             
10 | Throttle position sensor coupler                | 1       | Disconnect.                                                                 
11 | Throttle body joint clamp screw                 | 2       | Loosen.                                                                     

**Torque Specifications**

- **10 Nm (1.0 m·kg, 7.2 ft·lb)**
- **9 Nm (0.9 m·kg, 6.5 ft·lb)**
- **12 Nm (1.2 m·kg, 8.7 ft·lb)**

**New**

- New

**E**

- E
Removing the throttle body assembly

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Throttle body assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Plastic band</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Coupler cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Fuel injector #1 coupler</td>
<td>1</td>
<td>Green</td>
</tr>
<tr>
<td>16</td>
<td>Fuel injector #2 coupler</td>
<td>1</td>
<td>Black</td>
</tr>
<tr>
<td>17</td>
<td>Fuel injector #1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Fuel injector #2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Intake air pressure sensor hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Intake manifold #1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Intake manifold #2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
Disassembling the throttle body assembly

Before disassembling the throttle body assembly, make sure to note the number of times the air screw is turned out from the seated position to its set position.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Throttle position sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Fast idle plunger</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Idling speed adjusting screw</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Air screw</td>
<td>2</td>
<td>For assembly, reverse the disassembly pro-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cedure.</td>
</tr>
</tbody>
</table>
CHECKING THE INJECTORS

1. Check:
   - Injectors
     Damage → Replace.

CHECKING THE THROTTLE BODY

1. Check:
   - Throttle body
     Cracks/damage → Replace the throttle body.
2. Check:
   - Fuel passages
     Obstructions → Clean.

a. Wash the throttle body in a petroleum-based solvent.
   Do not use any caustic carburetor cleaning solution.
b. Blow out all of the passages with compressed air.

d. Measure the throttle position sensor output voltage.
e. Adjust the throttle position sensor angle so that the output voltage is within the specified range.

f. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws “3”.

ADJUSTING THE THROTTLE POSITION SENSOR

TIP

Before adjusting the throttle position sensor, the engine idling speed should be properly adjusted.

1. Check:
   - Throttle position sensor
     Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 8-77.
2. Adjust:
   - Throttle position sensor angle

a. Connect the throttle position sensor coupler.
b. Connect the pocket tester (AC 20 V) to the throttle position sensor coupler as shown.
c. Turn the main switch to “ON”.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

- Positive tester probe
  Yellow “1”
- Negative tester probe
  Black/Blue “2”
ELECTRICAL SYSTEM

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IGNITION SYSTEM

1. Crankshaft position sensor
4. Main switch
11. Ignition fuse
14. Battery
15. Main fuse
20. Engine stop switch
28. Sidestand switch
29. ECU (engine control unit)
30. Ignition coil
31. Spark plug
39. Lean angle sensor
**TROUBLESHOOTING**

The ignition system fails to operate (no spark or intermittent spark).

**TIP**

- Before troubleshooting, remove the following part(s):
  1. Footrest boards
  2. Front cowling assembly

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuses. (Main and ignition) Refer to “CHECKING THE FUSES” on page 8-65. NG → Replace the fuse(s). OK ↓</td>
</tr>
<tr>
<td>2.</td>
<td>Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66. NG → • Clean the battery terminals. • Recharge or replace the battery. OK ↓</td>
</tr>
<tr>
<td>3.</td>
<td>Check the spark plugs. Refer to “CHECKING THE SPARK PLUGS” on page 3-9. NG → Re-gap or replace the spark plugs. OK ↓</td>
</tr>
<tr>
<td>4.</td>
<td>Check the ignition spark gap. Refer to “CHECKING THE IGNITION SPARK GAP” on page 8-72. NG → Ignition system is OK. OK ↓</td>
</tr>
<tr>
<td>5.</td>
<td>Check the spark plug caps. Refer to “CHECKING THE SPARK PLUG CAPS” on page 8-71. NG → Replace the spark plug caps. OK ↓</td>
</tr>
<tr>
<td>6.</td>
<td>Check the ignition coil. Refer to “CHECKING THE IGNITION COIL” on page 8-71. NG → Replace the ignition coil. OK ↓</td>
</tr>
<tr>
<td>7.</td>
<td>Check the crankshaft position sensor. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 8-72. NG → Replace the crankshaft position sensor/stator assembly. OK ↓</td>
</tr>
<tr>
<td>8.</td>
<td>Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-61. NG → Replace the main switch. OK ↓</td>
</tr>
<tr>
<td>Step</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>9.</td>
<td>Check the engine stop switch.</td>
</tr>
<tr>
<td>10.</td>
<td>Check the sidestand switch.</td>
</tr>
<tr>
<td>11.</td>
<td>Check the lean angle sensor.</td>
</tr>
<tr>
<td>12.</td>
<td>Check the entire ignition system wiring.</td>
</tr>
</tbody>
</table>

Replace the ECU (engine control unit).
4. Main switch
9. Signaling system fuse
11. Ignition fuse
14. Battery
15. Main fuse
16. Starter relay
17. Starter motor
18. Diode 1
20. Engine stop switch
21. Start switch
22. Front brake light switch
23. Diode 2
24. Starting circuit cut-off relay
28. Sidestand switch
57. Rear brake light switch
STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to “ ” and the main switch is set to “ON” (both switches are closed), the starter motor can only operate if at least one of the following conditions is met:

• The front brake lever is pulled to the handlebar (the front brake light switch is closed) and the sidestand is up (the sidestand switch is closed).
• The rear brake lever is pulled to the handlebar (the rear brake light switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor. When at least one of the above conditions has been met, the starting circuit cut-off relay is closed and the engine can be started by pressing the start switch “ ”.
1. Battery
2. Main fuse
3. Main switch
4. Ignition fuse
5. Engine stop switch
6. Diode 2
7. Starting circuit cut-off relay
8. Sidestand switch
9. Signaling system fuse
10. Front brake light switch
11. Rear brake light switch
12. Start switch
13. Diode 1
14. Starter relay
15. Starter motor
ELECTRIC STARTING SYSTEM

TROUBLESHOOTING
The starter motor fails to turn.

TIP
• Before troubleshooting, remove the following part(s):
  1. Front cowling assembly
  2. Storage box
  3. Fuel tank

1. Check the fuses.
   (Main, ignition and signaling system)
   Refer to “CHECKING THE FUSES” on page 8-65.
   NG → Replace the fuse(s).
   OK ↓

2. Check the battery.
   Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.
   NG → • Clean the battery terminals.
       • Recharge or replace the battery.
   OK ↓

3. Check the starter motor operation.
   Refer to “CHECKING THE STARTER MOTOR OPERATION” on page 8-73.
   OK → Starter motor is OK. Perform the electric starting system troubleshooting, starting
       with step 5.
   NG ↓

4. Check the starter motor.
   Refer to “CHECKING THE STARTER MOTOR” on page 5-33.
   NG → Repair or replace the starter motor.
   OK ↓

5. Check the diode 1.
   Refer to “CHECKING THE DIODE” on page 8-71.
   NG → Replace the diode 1.
   OK ↓

6. Check the starting circuit cut-off relay.
   Refer to “CHECKING THE RELAYS” on page 8-69.
   NG → Replace the starting circuit cut-off relay.
   OK ↓

7. Check the starter relay.
   Refer to “CHECKING THE RELAYS” on page 8-69.
   NG → Replace the starter relay.
   OK ↓
### ELECTRIC STARTING SYSTEM

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-61.</td>
<td>NG → Replace the main switch.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Check the engine stop switch. Refer to “CHECKING THE SWITCHES” on page 8-61.</td>
<td>NG → The engine stop switch is faulty. Replace the right handlebar switch.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Check the sidestand switch. Refer to “CHECKING THE SWITCHES” on page 8-61.</td>
<td>NG → Replace the sidestand switch.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Check the front brake light switch. Refer to “CHECKING THE SWITCHES” on page 8-61.</td>
<td>NG → Replace the front brake light switch.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Check the rear brake light switch. Refer to “CHECKING THE SWITCHES” on page 8-61.</td>
<td>NG → Replace the rear brake light switch.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Check the start switch. Refer to “CHECKING THE SWITCHES” on page 8-61.</td>
<td>NG → The start switch is faulty. Replace the right handlebar switch.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Check the entire starting system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-5.</td>
<td>NG → Properly connect or repair the starting system wiring.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
</tbody>
</table>

The starting system circuit is OK.
2. AC magneto
3. Rectifier/regulator
14. Battery
15. Main fuse
TROUBLESHOOTING
The battery is not being charged.

TIP
• Before troubleshooting, remove the following part(s):
  1. Front cowling assembly

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuse. (Main) Refer to &quot;CHECKING THE FUSES&quot; on page 8-65.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Replace the fuse.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check the battery. Refer to &quot;CHECKING AND CHARGING THE BATTERY&quot; on page 8-66.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>• Clean the battery terminals. • Recharge or replace the battery.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Check the stator coil. Refer to &quot;CHECKING THE STATOR COIL&quot; on page 8-74.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Replace the crankshaft position sensor/stator assembly.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Check the rectifier/regulator. Refer to &quot;CHECKING THE RECTIFIER/REGULATOR&quot; on page 8-74.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Replace the rectifier/regulator.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Check the entire charging system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-11.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Properly connect or repair the charging system wiring.</td>
<td></td>
</tr>
</tbody>
</table>

OK ↓

This circuit is OK.
4. Main switch  
5. Storage box light switch  
6. Storage box light  
8. Backup fuse (odometer and clock)  
10. Headlight fuse  
13. Taillight fuse  
14. Battery  
15. Main fuse  
29. ECU (engine control unit)  
47. License plate light  
51. Tail/brake light  
54. Dimmer switch  
59. Front right turn signal/position light  
60. Front left turn signal/position light  
61. Headlight relay  
62. Headlight (high beam)  
63. Headlight (low beam)  
70. Meter light  
71. High beam indicator light
**TROUBLESHOOTING**

Any of the following fail to light: headlight, high beam indicator light, taillight, license plate light, position lights, or meter light.

**TIP**

- Before troubleshooting, remove the following part(s):
  1. Front cowling assembly
  2. Mudguard

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the condition of each bulb and bulb socket. Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 8-64.</td>
<td>NG → Replace the bulb(s) and bulb socket(s).</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check the fuses. (Main, headlight, ignition, taillight and backup) Refer to “CHECKING THE FUSES” on page 8-65.</td>
<td>NG → Replace the fuse(s).</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.</td>
<td>NG → • Clean the battery terminals. • Recharge or replace the battery.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-61.</td>
<td>NG → Replace the main switch.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Check the dimmer switch. Refer to “CHECKING THE SWITCHES” on page 8-61.</td>
<td>NG → The dimmer switch is faulty. Replace the left handlebar switch.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Check the headlight relay. Refer to “CHECKING THE RELAYS” on page 8-69.</td>
<td>NG → Replace the headlight relay.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Check the storage box light switch. Refer to “CHECKING THE SWITCHES” on page 8-61.</td>
<td>NG → Replace the storage box light switch.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
</tbody>
</table>
8. Check the entire lighting system wiring.
Refer to “CIRCUIT DIAGRAM” on page 8-15.

NG →
Properly connect or repair the lighting system wiring.

OK ↓
Replace the ECU (engine control unit) or meter assembly.
4. Main switch
8. Backup fuse (odometer and clock)
9. Signaling system fuse
11. Ignition fuse
13. Tail light fuse
14. Battery
15. Main fuse
22. Front brake light switch
27. Fuel sender
29. ECU (engine control unit)
40. Speed sensor
49. Rear left turn signal light
50. Rear right turn signal light
51. Tail/brake light
52. Turn signal relay
55. Horn switch
56. Turn signal switch
57. Rear brake light switch
58. Horn
59. Front right turn signal/position light
60. Front left turn signal/position light
65. Multi-function meter
67. Speedometer
68. Fuel meter
72. Right turn signal indicator light
73. Left turn signal indicator light
TROUBLESHOOTING

• Any of the following fail to light: turn signal light, brake light or an indicator light.
• The horn fails to sound.
• The fuel meter fails to operate.
• The speedometer fails to operate.

**TIP**

• Before troubleshooting, remove the following part(s):
  1. Front cowling assembly
  2. Storage box

### Checking the Signaling System

The horn fails to sound.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check the horn switch.</td>
<td>Refer to “CHECKING THE SWITCHES” on page 8-61.</td>
<td>NG → The horn switch is faulty. Replace the left handlebar switch.</td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Check the horn.</td>
<td>Refer to “CHECKING THE HORN” on page 8-75.</td>
<td>NG → Replace the horn.</td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Check the condition of each of the signaling system circuits. Refer to “Checking the signaling system”.

1. Check the fuses.
   (Main, ignition, signaling system, taillight and backup)
   Refer to “CHECKING THE FUSES” on page 8-65.
   NG → Replace the fuse(s).
   OK ↓

2. Check the battery.
   Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.
   NG → • Clean the battery terminals.
   • Recharge or replace the battery.
   OK ↓

3. Check the main switch.
   Refer to “CHECKING THE SWITCHES” on page 8-61.
   NG → Replace the main switch.
   OK ↓

4. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-19.
   NG → Properly connect or repair the signaling system wiring.
   OK ↓

Check the condition of each of the signaling system circuits. Refer to “Checking the signaling system”.
3. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-19.

NG → Properly connect or repair the signaling system wiring.

OK ↓

This circuit is OK.

The turn signal light, turn signal indicator light or both fail to blink.

1. Check the turn signal light bulb and socket. Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 8-64.

NG → Replace the turn signal light bulb, socket or both.

OK ↓

2. Check the turn signal switch. Refer to “CHECKING THE SWITCHES” on page 8-61.

NG → The turn signal switch is faulty. Replace the left handlebar switch.

OK ↓

1. Check the tail/brake light bulb and socket. Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 8-64.

NG → Replace the tail/brake light bulb, socket or both.

OK ↓

2. Check the front brake light switch. Refer to “CHECKING THE SWITCHES” on page 8-61.

NG → Replace the front brake light switch.

OK ↓

3. Check the rear brake light switch. Refer to “CHECKING THE SWITCHES” on page 8-61.

NG → Replace the rear brake light switch.

OK ↓

4. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-19.

NG → Properly connect or repair the signaling system wiring.

OK ↓

This circuit is OK.
The fuel meter fails to operate.

1. Check the fuel sender.
   Refer to “CHECKING THE FUEL SENDER” on page 8-75.
   OK ↓
   NG → Replace the fuel pump assembly.

2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-19.
   OK ↓
   NG → Properly connect or repair the signaling system wiring.

Replace the meter assembly.

The speedometer fails to operate.

1. Check the speed sensor.
   Refer to “CHECKING THE SPEED SENSOR” on page 8-76.
   OK ↓
   NG → Replace the speed sensor.

2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 8-19.
   OK ↓
   NG → Properly connect or repair the signaling system wiring.

Replace the meter assembly.

Check the turn signal relay.
Refer to “CHECKING THE TURN SIGNAL RELAY” on page 8-70.

OK ↓
NG → Replace the turn signal relay.

Check the entire signaling system wiring.
Refer to “CIRCUIT DIAGRAM” on page 8-19.

OK ↓
NG → Properly connect or repair the signaling system wiring.

Replace the meter assembly.

Check the entire signaling system wiring.
Refer to “CIRCUIT DIAGRAM” on page 8-19.

OK ↓
NG → Properly connect or repair the signaling system wiring.

Replace the meter assembly.
4. Main switch
11. Ignition fuse
12. Radiator fan fuse
14. Battery
15. Main fuse
29. ECU (engine control unit)
34. Coolant temperature sensor
45. Radiator fan motor relay
46. Radiator fan motor
65. Multi-function meter
66. Coolant temperature meter
**COOLING SYSTEM**

### TROUBLESHOOTING

**TIP**

- Before troubleshooting, remove the following part(s):
  1. Front cowling assembly
  2. Storage box
  3. Fuel tank

<table>
<thead>
<tr>
<th>Step</th>
<th>Check</th>
<th>NG →</th>
<th>OK ↓</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuses. (Main, ignition and radiator fan) Refer to “CHECKING THE FUSES” on page 8-65.</td>
<td>Replace the fuse(s).</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.</td>
<td>• Clean the battery terminals. • Recharge or replace the battery.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Check the main switch. Refer to “CHECKING THE SWITCHES” on page 8-61.</td>
<td>Replace the main switch.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Check the radiator fan motor. Refer to “CHECKING THE RADIATOR FAN MOTOR” on page 8-76.</td>
<td>Replace the radiator fan motor.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Check the radiator fan motor relay. Refer to “CHECKING THE RELAYS” on page 8-69.</td>
<td>Replace the radiator fan motor relay.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Check the coolant temperature sensor. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 8-76.</td>
<td>Replace the coolant temperature sensor.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Check the entire cooling system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-25.</td>
<td>Properly connect or repair the cooling system wiring.</td>
<td></td>
</tr>
</tbody>
</table>

Replace the ECU (engine control unit) or meter assembly.
1. Crankshaft position sensor
4. Main switch
7. Fuel injection system fuse
9. Signaling system fuse
10. Headlight fuse
11. Ignition fuse
14. Battery
15. Main fuse
20. Engine stop switch
23. Diode 2
24. Starting circuit cut-off relay
25. Fuel injection system relay
28. Sidestand switch
29. ECU (engine control unit)
30. Ignition coil
31. Spark plug
32. Fuel injector #1
33. Fuel injector #2
34. Coolant temperature sensor
35. Intake air temperature sensor
36. Intake air pressure sensor
37. O2 sensor
38. Throttle position sensor
39. Lean angle sensor
40. Speed sensor
41. Grip warmer relay (OPTION)
45. Radiator fan motor relay
61. Headlight relay
65. Multi-function meter
69. Engine trouble warning light
ECU SELF-DIAGNOSTIC FUNCTION

The ECU (engine control unit) is equipped with a self-diagnostic function in order to ensure that the fuel injection system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, a fault code is stored in the memory of the ECU (engine control unit).

- To inform the rider that the fuel injection system is not functioning, the engine trouble warning light flashes when the start switch is being pushed to start the engine.
- If a malfunction is detected in the system by the self-diagnostic function, the ECU (engine control unit) provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating the engine trouble warning light.
- After the engine has been stopped, the lowest fault code number appears on the clock LCD. Once a fault code has been displayed, it remains stored in the memory of the ECU (engine control unit) until it is deleted.

### Engine trouble warning light indication and FI system operation

<table>
<thead>
<tr>
<th>Warning light indication</th>
<th>ECU (engine control unit) operation</th>
<th>FI operation</th>
<th>Vehicle operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashing*</td>
<td>Warning provided when unable to start engine</td>
<td>Operation stopped</td>
<td>Cannot be operated</td>
</tr>
<tr>
<td>Remains on</td>
<td>Malfunction detected</td>
<td>Operated with substitute characteristics in accordance with the description of the malfunction</td>
<td>Can or cannot be operated depending on the fault code</td>
</tr>
</tbody>
</table>

* The warning light flashes when any one of the conditions listed below is present and the start switch is pushed:

- **12:** Crankshaft position sensor
- **19:** Sidestand switch (open circuit in the wire to the ECU (engine control unit))
- **30:** Lean angle sensor (latch up detected)
- **41:** Lean angle sensor (open or short-circuit)
- **50:** ECU (engine control unit) internal malfunction (faulty ECU (engine control unit) memory)

### Checking for a defective engine trouble warning light bulb

The engine trouble warning light comes on for 1.4 seconds after the main switch has been turned to “ON” and when the start switch is being pushed. If the warning light does not come on under these conditions, the warning light bulb may be defective.
SELF-DIAGNOSTIC FUNCTION TABLE
If the ECU (engine control unit) detects an abnormal signal from a sensor while the vehicle is being driven, the ECU (engine control unit) illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction. When an abnormal signal is received from a sensor, the ECU (engine control unit) processes the specified values that are programmed for each sensor in order to provide the engine with alternate operating instructions that enable the engine to continue to operate or stop operating, depending on the conditions.

The ECU (engine control unit) takes fail-safe actions in two ways: one in which the sensor output is set to a prescribed value, and the other in which the ECU (engine control unit) directly operates an actuator. Details on the fail-safe actions are given in the table below.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
<th>Symptom</th>
<th>Able / unable to start</th>
<th>Able / unable to drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Crankshaft position sensor</td>
<td>No normal signals are received from the crankshaft position sensor.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>13</td>
<td>Intake air pressure sensor (open or short circuit)</td>
<td>Intake air pressure sensor-open or short circuit detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>14</td>
<td>Intake air pressure sensor (pipe system)</td>
<td>Intake air pressure sensor-pipe system malfunction (clogged or detached hose).</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>15</td>
<td>Throttle position sensor (open or short circuit)</td>
<td>Throttle position sensor-open or short circuit detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>16</td>
<td>Throttle position sensor (stuck)</td>
<td>The throttle position sensor is stuck.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>19</td>
<td>Sidestand switch (open circuit wire harness to ECU (engine control unit))</td>
<td>Open circuit is detected in the input line from the sidestand switch to the ECU (engine control unit).</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>Fault code No.</td>
<td>Item</td>
<td>Symptom</td>
<td>Able / unable to start</td>
<td>Able / unable to drive</td>
</tr>
<tr>
<td>---------------</td>
<td>------</td>
<td>---------</td>
<td>------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>21</td>
<td>Coolant temperature sensor</td>
<td>Coolant temperature sensor-open or short circuit detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>22</td>
<td>Intake air temperature sensor</td>
<td>Intake air temperature sensor-open or short circuit detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>24</td>
<td>O₂ sensor</td>
<td>No normal signal is received from the O₂ sensor.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>30</td>
<td>Lean angle sensor</td>
<td>Latch up detected. No normal signal is received from the lean angle sensor.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>33</td>
<td>Ignition coil (faulty ignition)</td>
<td>Malfunction detected in the primary wire of the ignition coil.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>37</td>
<td>Fast idle plunger (stuck fully open)</td>
<td>Engine speed is high when the engine is idling.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>41</td>
<td>Lean angle sensor (open or short circuit)</td>
<td>Lean angle sensor-open or short circuit detected.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>43</td>
<td>Fuel system voltage (monitor voltage)</td>
<td>The ECU (engine control unit) is unable to monitor the battery voltage (an open or short circuit in the line to the ECU).</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>44</td>
<td>Error in writing the amount of CO adjustment on EEPROM</td>
<td>Error is detected while reading or writing on EEPROM (CO adjustment value).</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>46</td>
<td>Vehicle system power supply (Monitoring voltage)</td>
<td>Power supply to the fuel injection system is not normal.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>50</td>
<td>ECU (engine control unit) internal malfunction (memory check error)</td>
<td>Faulty ECU (engine control unit) memory. (When this malfunction is detected in the ECU (engine control unit), the fault code number might not appear on the meter.)</td>
<td>Unable</td>
<td>Unable</td>
</tr>
</tbody>
</table>

**Communication error with the meter**

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
<th>Symptom</th>
<th>Able / unable to start</th>
<th>Able / unable to drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Er-1</td>
<td>ECU (engine control unit) internal malfunction (output signal error)</td>
<td>No signals are received from the ECU (engine control unit).</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>Er-2</td>
<td>ECU (engine control unit) internal malfunction (output signal error)</td>
<td>No signals are received from the ECU (engine control unit) within the specified duration.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>Er-3</td>
<td>ECU (engine control unit) internal malfunction (output signal error)</td>
<td>Data from the ECU (engine control unit) cannot be received correctly.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
</tbody>
</table>
THE ENGINE OPERATION IS NOT NORMAL AND THE ENGINE TROUBLE WARNING LIGHT COMES ON.

1. Check:
   • Fault code number
   a. Check the fault code number displayed on the meter.
   b. Identify the system with the malfunction. Refer to “Self-Diagnostic Function table”.
   c. Identify the probable cause of malfunction. Refer to “Diagnostic code table”.

2. Checking and repair the probable case of malfunction.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
<th>Symptom</th>
<th>Able / unable to start</th>
<th>Able / unable to drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Er-4</td>
<td>ECU (engine control unit) internal malfun-</td>
<td>Non-registered data has been received from the meter.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td></td>
<td>tion (input signal error)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Perform ECU (engine control unit) reinstate-ment action.
   Refer to “Reinstatement method” of table in “TROUBLESHOOTING DETAILS” on page 8-40.

4. Turn the main switch to “OFF” and back to “ON”, and then check that no fault code number is displayed.

5. Erase the malfunction history in the diagnostic mode. Refer to “Sensor operation table (Diagnostic code No.62)”.

TIP
Turning the main switch to “OFF” will not erase the malfunction history.

THE ENGINE OPERATION IS NOT NORMAL BUT THE ENGINE TROUBLE WARNING LIGHT DOES NOT COME ON.

1. Check the operation of following sensors and actuators in the diagnostic mode. Refer to “Sensor operation table” and “Actuator operation table”.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>No fault code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check and repair. Refer to “TROUBLESHOOTING DETAILS” on page 8-40. Monitor the operation of the sensors and actuators in the diagnostic mode. Refer to “Sensor operation table” and “Actuator operation table”.</td>
<td>Check and repair. Refer to “Self-Diagnostic Function table”.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>No fault code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>01: Throttle position sensor (throttle angle)</td>
<td>30: Ignition coil</td>
</tr>
<tr>
<td>36: Fuel injector #1</td>
<td>37: Fuel injector #2</td>
</tr>
</tbody>
</table>

If a malfunction is detected in the sensors or actuators, repair or replace all faulty parts. If no malfunction is detected in the sensors and actuators, check and repair the inner parts of the engine.

TIP
If fault codes are displayed, repeat steps (1) to (4) until no fault code number is displayed.
DIAGNOSTIC MODE

Setting the diagnostic mode
1. Turn the main switch to “OFF” and set the engine stop switch to “○”.
2. Disconnect the wire harness coupler from the fuel pump.
3. Simultaneously press and hold the “SELECT” and “RESET” buttons, turn the main switch to “ON”, and continue to press the buttons for 8 seconds or more.

TIP

• All displays on the meter disappear except the clock and odometer/tripmeter displays.
• “dIAG” appears on the odometer/tripmeter LCD.

4. Simultaneously press the “SELECT” and “RESET” buttons for 2 seconds or more to execute the selection.
5. Set the engine stop switch to “○”.
6. Select the diagnostic code number corresponding to the fault code number by pressing the “SELECT” and “RESET” buttons.

TIP

• To decrease the selected diagnostic code number, press the “RESET” button. Press the “RESET” button for 1 second or longer to automatically decrease the diagnostic code numbers.
• To increase the selected diagnostic code number, press the “SELECT” button. Press the “SELECT” button for 1 second or longer to automatically increase the diagnostic code numbers.

7. Verify the operation of the sensor or actuator.
   • Sensor operation
     The data representing the operating condition of the sensor appears on the odometer/tripmeter LCD.
   • Actuator operation
     Set the engine stop switch to “○” to operate the actuator.

TIP

If the engine stop switch is set to “○”, set it to “○”, and then set it to “○” again.
8. Turn the main switch to “OFF” to cancel the diagnostic mode.

## Diagnostic code table

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Symptom</th>
<th>Probable cause of malfunction</th>
<th>Diagnostic code No.</th>
</tr>
</thead>
</table>
| 12            | No normal signals are received from the crankshaft position sensor.     | • Open or short circuit in wire harness.  
• Defective crankshaft position sensor.  
• Malfunction in generator rotor.  
• Malfunction in ECU (engine control unit).  
• Improperly installed sensor.   | —                                                                                                                                             |
| 13            | Intake air pressure sensor: open or short circuit detected.             | • Open or short circuit in wire harness.  
• Defective intake air pressure sensor.  
• Malfunction in ECU (engine control unit).   | 03                                                                                                                                             |
| 14            | Intake air pressure sensor: hose system malfunction (clogged or detached hose). | • Intake air pressure sensor hose is detached, clogged, kinked, or pinched.  
• Malfunction of the intake air pressure sensor in the intermediate electrical potential.  
• Malfunction in ECU (engine control unit).   | 03                                                                                                                                             |
| 15            | Throttle position sensor: open or short circuit detected.              | • Open or short circuit in wire harness.  
• Defective throttle position sensor.  
• Malfunction in ECU (engine control unit).  
• Improperly installed throttle position sensor.   | 01                                                                                                                                             |
| 16            | Stuck throttle position sensor detected.                               | • Stuck throttle position sensor.  
• Malfunction in ECU (engine control unit).   | 01                                                                                                                                             |
| 19            | A break or disconnection of the blue/black lead of the ECU (engine control unit) is detected. | • Open or short circuit in wire harness.  
• Malfunction in ECU (engine control unit).   | 20                                                                                                                                             |
| 21            | Coolant temperature sensor: open or short circuit detected.            | • Open or short circuit in wire harness.  
• Defective coolant temperature sensor.  
• Malfunction in ECU (engine control unit).  
• Improperly installed coolant temperature sensor.   | 06                                                                                                                                             |
| 22            | Intake air temperature sensor: open or short circuit detected.         | • Open or short circuit in wire harness.  
• Defective intake temperature sensor.  
• Malfunction in ECU (engine control unit).  
• Improperly installed intake air temperature sensor.   | 05                                                                                                                                             |
| 24            | No normal signal is received from the O₂ sensor.                       | • Open or short circuit in wire harness.  
• Defective O₂ sensor.  
• Malfunction in ECU (engine control unit).  
• Improperly installed O₂ sensor.   | —                                                                                                                                             |
| 30            | Latch up detected. No normal signal is received from the lean angle sensor. | • The vehicle has overturned.  
• Defective lean angle sensor.  
• Malfunction in ECU (engine control unit).  
• Improperly installed lean angle sensor.   | 08                                                                                                                                             |
| 33            | Malfunction detected in the primary wire of the ignition coil.         | • Open or short circuit in wire harness.  
• Malfunction in ignition coil.  
• Malfunction in ECU (engine control unit).  
• Malfunction in a component of ignition cut-off circuit system.   | 30                                                                                                                                             |
<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Symptom</th>
<th>Probable cause of malfunction</th>
<th>Diagnostic code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>Engine speed is high when the engine is idling.</td>
<td>• Stuck fast idle plunger (in fully open position). • Malfunction in ECU (engine control unit).</td>
<td>01</td>
</tr>
<tr>
<td>41</td>
<td>Lean angle sensor: open or short circuit detected.</td>
<td>• Open or short circuit in wire harness. • Defective lean angle sensor. • Malfunction in ECU (engine control unit).</td>
<td>08</td>
</tr>
<tr>
<td>43</td>
<td>The ECU (engine control unit) is unable to monitor the battery voltage (an open or short circuit in the line to the ECU).</td>
<td>• Open circuit in wire harness. • Malfunction in ECU (engine control unit). • Defective fuel injection system relay.</td>
<td>50</td>
</tr>
<tr>
<td>44</td>
<td>Error is detected while reading or writing on EE-PROM (CO adjustment value).</td>
<td>• Malfunction in ECU (engine control unit). (The CO adjustment value is not properly written on or read from the internal memory).</td>
<td>60</td>
</tr>
<tr>
<td>46</td>
<td>Power supply to the fuel injection system is not normal.</td>
<td>Malfunction in the charging system. Refer to “CHARGING SYSTEM” on page 8-11.</td>
<td>—</td>
</tr>
<tr>
<td>50</td>
<td>Faulty ECU (engine control unit) memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)</td>
<td>• Malfunction in ECU (engine control unit). (The program and data are not properly written on or read from the internal memory.)</td>
<td>—</td>
</tr>
<tr>
<td>Er-1</td>
<td>No signals are received from the ECU (engine control unit).</td>
<td>• Open or short circuit in communication line. • Malfunction in meter. • Malfunction in ECU (engine control unit).</td>
<td>—</td>
</tr>
<tr>
<td>Er-2</td>
<td>No signals are received from the ECU (engine control unit) within the specified duration.</td>
<td>• Open or short circuit in communication line. • Malfunction in meter. • Malfunction in ECU (engine control unit).</td>
<td>—</td>
</tr>
<tr>
<td>Er-3</td>
<td>Data from the ECU (engine control unit) cannot be received correctly.</td>
<td>• Open or short circuit in communication line. • Malfunction in meter. • Malfunction in ECU (engine control unit).</td>
<td>—</td>
</tr>
<tr>
<td>Er-4</td>
<td>Non-registered data has been received from the meter.</td>
<td>• Open or short circuit in communication line. • Malfunction in meter. • Malfunction in ECU (engine control unit).</td>
<td>—</td>
</tr>
</tbody>
</table>
### Sensor operation table

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Meter display</th>
<th>Checking method</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Throttle angle</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Fully closed position</td>
<td>(15–16)</td>
<td>Check with throttle fully closed.</td>
</tr>
<tr>
<td></td>
<td>• Fully opened position</td>
<td>(97–102)</td>
<td>Check with throttle fully open.</td>
</tr>
<tr>
<td>03</td>
<td>Pressure difference (atmospheric pressure</td>
<td>Displays the intake</td>
<td>Set the engine stop switch to “○”, and then push the start switch “@”. (If the display value changes, the performance is OK.)</td>
</tr>
<tr>
<td></td>
<td>and intake air pressure)</td>
<td>air pressure.</td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>Intake air temperature</td>
<td>Displays the intake</td>
<td>Compare the actually measured intake air temperature with the meter display value. (*1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>air temperature.</td>
<td></td>
</tr>
<tr>
<td>06</td>
<td>Coolant temperature</td>
<td>Displays the coolant</td>
<td>Compare the actually measured coolant temperature with the meter display value.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>temperature.</td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>Vehicle speed pulse</td>
<td>0–999</td>
<td>Check that the number increases when the front wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.</td>
</tr>
<tr>
<td>08</td>
<td>Lean angle sensor</td>
<td>0.4–1.4 V</td>
<td>Remove the lean angle sensor and incline it more than 65 degrees.</td>
</tr>
<tr>
<td></td>
<td>• Upright</td>
<td>3.8–4.2 V</td>
<td></td>
</tr>
<tr>
<td>09</td>
<td>Fuel system voltage (battery voltage)</td>
<td>Approximately 12.0</td>
<td>Compare with the actually measured battery voltage. (If the battery voltage is lower, perform recharging.)</td>
</tr>
<tr>
<td>20</td>
<td>Sidestand switch</td>
<td>ON</td>
<td>Extend and retract the sidestand.</td>
</tr>
<tr>
<td></td>
<td>• Stand retracted</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>EEPROM fault code display</td>
<td>00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• No fault</td>
<td>01 or 02 (cylinder fault code)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Fault detected</td>
<td>(If both cylinders are defective, the display alternates every two seconds.)</td>
<td></td>
</tr>
</tbody>
</table>
### Malfunction History Code Display

- **No history**
- **History exists**

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Meter display</th>
<th>Checking method</th>
</tr>
</thead>
</table>
| 61                  | Malfunction history code display  
• No history  
• History exists | 00  
Fault codes 12–50  
• (If more than one code number is detected, the display alternates every two seconds to show all the detected code numbers. When all code numbers are shown, the display repeats the same process.) | — |

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Meter display</th>
<th>Checking method</th>
</tr>
</thead>
</table>
| 62                  | Malfunction history code erasure  
• No history  
• History exists | 00  
Up to 17 fault codes | —  
To erase the history, set the engine stop switch to “○” |

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Meter display</th>
<th>Checking method</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>Control number</td>
<td>00–255</td>
<td>—</td>
</tr>
</tbody>
</table>

*1 If it is not possible to check the intake temperature, use the ambient temperature as reference (use the compared values for reference).

### Actuator Operation Table

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Actuation</th>
<th>Checking method</th>
</tr>
</thead>
</table>
| 30                  | Ignition coil | Actuates the ignition coil five times at one-second intervals.  
Illuminates the engine trouble warning light. | Check the spark five times.  
• Connect an ignition checker. |
| 36                  | Fuel injector #1 | Actuates the injector #1 five times at one-second intervals.  
Illuminates the engine trouble warning light. | Check the operating sound of the injector #1 five times. |
| 37                  | Fuel injector #2 | Actuates the injector #2 five times at one-second intervals.  
Illuminates the engine trouble warning light. | Check the operating sound of the injector #2 five times. |
## TROUBLESHOOTING DETAILS

This section describes the measures per fault code number displayed on the meter. Check and service the items or components that are the probable cause of the malfunction following the order given. After the check and service of the malfunctioning part have been completed, reset the meter display according to the reinstatement method.

**Fault code No.:**

Code number displayed on the meter when the engine failed to work normally. Refer to “Self-Diagnostic Function table”.

**Diagnostic code No.:**

Diagnostic code number to be used when the diagnostic mode is operated. Refer to “DIAGNOSTIC MODE” on page 8-35.

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Actuation</th>
<th>Checking method</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>Fuel injection system relay</td>
<td>Actuates the fuel injection system relay five times at one-second intervals. Illuminates the engine trouble warning light. (The engine trouble warning light is OFF when the relay is ON, and the engine trouble warning light is ON when the relay is OFF).</td>
<td>Check the operating sound of the fuel injection system relay five times.</td>
</tr>
<tr>
<td>51</td>
<td>Radiator fan motor relay</td>
<td>Actuates the radiator fan motor relay for five cycles of five seconds. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.</td>
<td>Check the operating sound of the radiator fan motor relay five times.</td>
</tr>
<tr>
<td>52</td>
<td>Headlight relay</td>
<td>Actuates the headlight relay five cycles of five seconds. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.</td>
<td>Check the operating sound of the headlight relay five times.</td>
</tr>
<tr>
<td>57</td>
<td>Grip warmer relay</td>
<td>Actuates the grip warmer relay. (The light is off when the relay is off, and the light is on when the relay is on.) Illuminates the engine trouble warning light.</td>
<td>Check the operating sound of the grip warmer relay one time.</td>
</tr>
<tr>
<td>Fault code No.</td>
<td>Symptom</td>
<td>Diagnostic code No.</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>--------------------</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>No normal signals are received from the crankshaft position sensor.</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Installed condition of crankshaft position sensor.</td>
<td>Check the installed area for looseness or pinching.</td>
<td>Cranking the engine.</td>
</tr>
<tr>
<td>2</td>
<td>Connections • Crankshaft position sensor coupler • Wire harness ECU (engine control unit) coupler</td>
<td>• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Open or short circuit in wire harness.</td>
<td>• Repair or replace if there is an open or short circuit. • Between the crankshaft position sensor coupler and ECU (engine control unit) coupler. (black/yellow–black/yellow) (black/blue–black/blue)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Defective crankshaft position sensor.</td>
<td>• Replace if defective. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 8-72.</td>
<td></td>
</tr>
<tr>
<td>Order</td>
<td>Item/components and probable cause</td>
<td>Check or maintenance job</td>
<td>Reinstatement method</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------------------------</td>
<td>--------------------------</td>
<td>----------------------</td>
</tr>
</tbody>
</table>
| 1     | Connections                       | • Check the coupler for any pins that may have pulled out.  
• Check the locking condition of the coupler.  
• If there is a malfunction, repair it and connect the coupler securely. | Cranking the engine. |
| 2     | Open or short circuit in wire harness. | • Repair or replace if there is an open or short circuit.  
• Between intake air pressure sensor coupler and ECU (engine control unit) coupler. (black/blue–black/blue) (pink/white–pink/white) (blue–blue) | |
| 3     | Defective intake air pressure sensor. | • Execute the diagnostic mode.  
(Code No. 03)  
• Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-77. | |
### Fault code No. 14: Intake air pressure sensor: hose system malfunction (clogged or detached hose).

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>03</th>
<th>Intake air pressure sensor</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
</table>
| 1     | Intake air pressure sensor hose     | • Check the intake air pressure sensor hose condition.  
      |                                     | • Repair or replace the sensor hose.            | Starting the engine and operating it at idle. |
| 2     | Intake air pressure sensor malfunction at intermediate electrical potential. | • Check and repair the connection.  
      |                                     | • Replace it if there is a malfunction.           |                                                     |
| 3     | Connections  
      | • Intake air pressure sensor coupler  
      | • Wire harness ECU (engine control unit) coupler | • Check the coupler for any pins that may have pulled out.  
      |                                     | • Check the locking condition of the coupler.  
      |                                     | • If there is a malfunction, repair it and connect the coupler securely. |                                                     |
| 4     | Defective intake air pressure sensor. | • Execute the diagnostic mode.  
      |                                     | (Code No. 03)  
      |                                     | • Replace if defective.  
      |                                     | Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-77. |                                                     |
### Fault code No. 15
Symptom: Throttle position sensor: open or short circuit detected.

### Diagnostic code No. 01
Symptom: Throttle position sensor

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
</table>
| 1     | Installed condition of throttle position sensor. | • Check for looseness or pinching.  
• Check that the sensor is installed in the specified position. | Turning the main switch to “ON”. |
| 2     | Connections  
• Throttle position sensor coupler  
• Wire harness ECU (engine control unit) coupler | • Check the coupler for any pins that may have pulled out.  
• Check the locking condition of the coupler.  
• If there is a malfunction, repair it and connect the coupler securely. | |
| 3     | Open or short circuit in wire harness. | • Repair or replace if there is an open or short circuit.  
• Between throttle position sensor coupler and ECU (engine control unit) coupler.  
(black/blue–black/blue)  
(yellow–yellow)  
(blue–blue) | |
| 4     | Throttle position sensor lead wire open circuit output voltage check. | • Check for open circuit and replace the throttle position sensor.  
(black/blue–yellow) | |
|       | Open circuit item | Output voltage |
|       | Ground wire open circuit | 5 V |
|       | Output wire open circuit | 0 V |
|       | Power supply wire open circuit | 0 V |
| 5     | Defective throttle position sensor. | • Execute the diagnostic mode.  
(Code No. 01)  
• Replace if defective.  
Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 8-77. | |
## FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>16</th>
<th>Symptom</th>
<th>Stuck throttle position sensor detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>01</td>
<td>Throttle position sensor</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
</table>
| 1     | Installed condition of throttle position sensor. | • Check for looseness or pinching.  
• Check that the sensor is installed in the specified position. | Reinstated by starting the engine, operating it at idle, and then racing it. |
| 2     | Defective throttle position sensor. | • Execute the diagnostic mode.  
(Code No. 01)  
• Replace if defective.  
Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 8-77. |                                        |

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>19</th>
<th>Symptom</th>
<th>A break or disconnection of the blue/black lead of the ECU (engine control unit) is detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>20</td>
<td>Sidestand switch</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
</table>
| 1     | Connection  
• Wire harness ECU (engine control unit) coupler | • Check the coupler for any pins that may have pulled out.  
• Check the locking condition of the coupler.  
• If there is a malfunction, repair it and connect the coupler securely. | Reinstated by retracting the sidestand.  
Reinstated by reconnecting the wiring. |
| 2     | Open or short circuit in wire harness. | • Repair or replace if there is an open or short circuit.  
• Between ECU (engine control unit) and main switch.  
(blue/black–blue/black) |                                        |
| 3     | Defective sidestand switch. | • Execute the diagnostic mode.  
(Code No. 20)  
• Replace if defective.  
Refer to “CHECKING THE SWITCHES” on page 8-61. |                                        |
## Coolant temperature sensor: open or short circuit detected.

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Installed condition of coolant temperature sensor.</td>
<td>Check for looseness or pinching.</td>
<td>Turning the main switch to “ON”.</td>
</tr>
<tr>
<td>2</td>
<td>Connections • Coolant temperature sensor coupler • Wire harness ECU (engine control unit) coupler</td>
<td>• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Open or short circuit in wire harness.</td>
<td>• Repair or replace if there is an open or short circuit. • Between coolant temperature sensor coupler and ECU (engine control unit) coupler. (black/blue–black/blue) (green/red–green/red)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Defective coolant temperature sensor.</td>
<td>• Execute the diagnostic mode. (Code No. 06) • Replace if defective. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 8-76.</td>
<td></td>
</tr>
</tbody>
</table>
### Fault code No. 22
Intake air temperature sensor: open or short circuit detected.

### Diagnostic code No. 05
Intake air temperature sensor

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Installed condition of intake air temperature sensor.</td>
<td>Check for looseness or pinching.</td>
<td>Turning the main switch to “ON”.</td>
</tr>
<tr>
<td>2</td>
<td>Connections • Intake air temperature sensor coupler • Wire harness ECU (engine control unit) coupler</td>
<td>• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Open or short circuit in wire harness.</td>
<td>• Repair or replace if there is an open or short circuit. • Between intake air temperature sensor coupler and ECU coupler. (black/blue–black/blue) (brown/white–brown/white)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Defective intake air temperature sensor.</td>
<td>• Execute the diagnostic mode. (Code No. 05) • Replace if defective. Refer to “CHECKING THE INTAKE AIR TEMPERATURE SENSOR” on page 8-78.</td>
<td></td>
</tr>
</tbody>
</table>
### Fault code No. 24

**Symptom:** No normal signal is received from the O₂ sensor.

**Diagnostic code No.:** —

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Installed condition of O₂ sensor.</td>
<td>Check for looseness or pinching.</td>
<td>Starting and warming up the engine until the coolant temperature rises over 60 °C (140 °F). Then, maintaining the engine speed at 2000 r/min to 3000 r/min until the warning light goes off. When the warning light goes off, the reset operation is finished.</td>
</tr>
<tr>
<td>2</td>
<td>Connections • O₂ sensor coupler • Wire harness ECU (engine control unit) coupler</td>
<td>• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Open or short circuit in wire harness.</td>
<td>• Repair or replace if there is an open or short circuit. • Between O₂ sensor coupler and ECU (engine control unit) coupler. (black/blue–black/blue) (gray/green–gray/green) (red/blue–red/blue) (black–black)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Check fuel pressure.</td>
<td>Refer to “CHECKING THE FUEL PRESSURE” on page 7-3.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Defective O₂ sensor.</td>
<td>Replace if defective.</td>
<td></td>
</tr>
</tbody>
</table>

### Fault code No. 30

**Symptom:** Latch up detected. No normal signal is received from the lean angle sensor.

**Diagnostic code No.:** 08 Lean angle sensor

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The vehicle has overturned.</td>
<td>Raise the vehicle upright.</td>
<td>Turning the main switch to “ON” (however, the engine cannot be restarted unless the main switch is first turned “OFF”).</td>
</tr>
<tr>
<td>2</td>
<td>Installed condition of the lean angle sensor.</td>
<td>Check for looseness or pinching.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective lean angle sensor.</td>
<td>• Execute the diagnostic mode. (Code No. 08) • Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-73.</td>
<td></td>
</tr>
</tbody>
</table>
## FUEL INJECTION SYSTEM

### Fault code No. 33
**Symptom**: Malfunction detected in the primary wire of the ignition coil.

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Ignition coil</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connections</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ignition coil primary side connector (orange)</td>
<td>• Check the coupler for any pins that may have pulled out.</td>
<td>Starting the engine and operating it at idle.</td>
</tr>
<tr>
<td></td>
<td>• Wire harness ECU (engine control unit) coupler</td>
<td>• Check the locking condition of the connector and coupler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If there is a malfunction, repair it and connect the coupler securely.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness.</td>
<td>• Repair or replace if there is an open or short circuit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Between ignition coil connector and ECU (engine control unit) coupler. (orange–orange)</td>
<td>• Between ignition coil connector and right handlebar switch coupler. (red/black–red/black)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective ignition coil.</td>
<td>• Execute the diagnostic mode. (Code No. 30)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace if defective. Refer to “CHECKING THE IGINITION COIL” on page 8-71.</td>
<td></td>
</tr>
</tbody>
</table>

### Fault code No. 37
**Symptom**: Engine speed is high when the engine is idling.

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Throttle position sensor</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stuck fast idle plunger detected.</td>
<td>• Check the throttle body. Refer to “THROTTLE BODY” on page 7-5.</td>
<td>Reinstated by starting the engine and operating it at idle for about 5 minutes. Do not turn the throttle grip.</td>
</tr>
<tr>
<td>2</td>
<td>Throttle valve does not fully close.</td>
<td>• Check the throttle body. Refer to “THROTTLE BODY” on page 7-5.</td>
<td></td>
</tr>
<tr>
<td>Fault code No.</td>
<td>41</td>
<td>Symptom</td>
<td>Lean angle sensor: open or short circuit detected.</td>
</tr>
<tr>
<td>---------------</td>
<td>----</td>
<td>---------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>08</td>
<td>Lean angle sensor</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connections</td>
<td>• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.</td>
<td>Reinstated immediately when it becomes normal.</td>
</tr>
<tr>
<td></td>
<td>• Lean angle sensor coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wire harness ECU (engine control unit) coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness.</td>
<td>• Repair or replace if there is an open or short circuit. • Between lean angle sensor coupler and ECU (engine control unit) coupler. (black/blue–black/blue) (yellow/green–yellow/green) (blue–blue)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective lean angle sensor.</td>
<td>• Execute the diagnostic mode. (Code No. 08) • Replace if defective.</td>
<td></td>
</tr>
</tbody>
</table>
### FUEL INJECTION SYSTEM

**Fault code No.** 43  
**Symptom** The ECU (engine control unit) is unable to monitor the battery voltage (an open or short circuit in the line to the ECU).

**Diagnostic code No.** 50  
**Fuel injection system relay**

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
</table>
| 1     | Connections  
• Fuel injection system relay coupler  
• Wire harness ECU (engine control unit) coupler  
| • Check the coupler for any pins that may have pulled out.  
• Check the locking condition of the coupler.  
• If there is a malfunction, repair it and connect the coupler securely.  | Starting the engine and operating it at idle. |
| 2     | Defective fuel injection system relay.  
| Replace if defective. |
| 3     | Open or short circuit in the wire harness.  
| • Repair or replace if there is an open or short circuit.  
• Between the fuel injection system relay coupler and ECU (engine control unit) coupler. (red/blue–red/blue)  
• Between the fuse box coupler and fuel injection system relay coupler. (red/blue–red/blue)  
• Between the fuse box coupler and battery terminal. (red–red)  | |
| 4     | Malfunction or open circuit in fuel injection system relay.  
| • Execute the diagnostic mode. (Code No. 50)  
• Replace if defective.  
• If there is no malfunction with the fuel injection system relay, replace the ECU (engine control unit). |

**Fault code No.** 44  
**Symptom** Error is detected while reading or writing on EEPROM (CO adjustment value).

**Diagnostic code No.** 60  
**EEPROM improper cylinder indication**

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
</table>
| 1     | Malfunction in ECU (engine control unit).  
| • Execute the diagnostic mode. (Code No. 60)  
• Check the faulty cylinder. (If multiple cylinders are defective, the number of the faulty cylinders appears alternately at 2-second intervals.)  
• Replace ECU (engine control unit) if defective.  | Turning the main switch to “ON”. |
## FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>46</th>
<th>Symptom</th>
<th>Power supply to the fuel injection system is not normal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connection. • Wire harness ECU (engine control unit) coupler</td>
<td>• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.</td>
<td>Starting the engine and operating it at idle.</td>
</tr>
<tr>
<td>2</td>
<td>Faulty battery.</td>
<td>• Replace or charge the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.</td>
<td>—</td>
</tr>
<tr>
<td>3</td>
<td>Malfunction in rectifier/regulator.</td>
<td>• Replace if defective. Refer to “CHARGING SYSTEM” on page 8-11.</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>Open or short circuit in wire harness.</td>
<td>• Repair or replace if there is an open or short circuit. • Between battery terminal and main switch coupler. (red–red) • Between main switch coupler and fuse box coupler. (brown/blue–brown/blue) • Between fuse box coupler and ECU (engine control unit) coupler. (red/white–red/white)</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>50</th>
<th>Symptom</th>
<th>Faulty ECU (engine control unit) memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Malfunction in ECU (engine control unit)</td>
<td>Replace the ECU (engine control unit).</td>
<td>Turning the main switch to “ON”</td>
</tr>
</tbody>
</table>
4. Main switch
7. Fuel injection system fuse
11. Ignition fuse
14. Battery
15. Main fuse
20. Engine stop switch
25. Fuel injection system relay
26. Fuel pump
29. ECU (engine control unit)
TROUBLESHOOTING
If the fuel pump fails to operate.

**TIP**

- Before troubleshooting, remove the following part(s):
  1. Front cowling assembly
  2. Storage box

<table>
<thead>
<tr>
<th>Step</th>
<th>Status</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check the fuses. (Main, ignition and fuel injection system)</td>
<td>NG</td>
<td>Replace the fuse(s).</td>
</tr>
<tr>
<td>Refer to “CHECKING THE FUSES” on page 8-65.</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>2. Check the battery.</td>
<td>NG</td>
<td>• Clean the battery terminals.</td>
</tr>
<tr>
<td>Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-66.</td>
<td>OK</td>
<td>• Recharge or replace the battery.</td>
</tr>
<tr>
<td>3. Check the main switch.</td>
<td>NG</td>
<td>Replace the main switch.</td>
</tr>
<tr>
<td>Refer to “CHECKING THE SWITCHES” on page 8-61.</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>4. Check the engine stop switch.</td>
<td>NG</td>
<td>The engine stop switch is faulty. Replace the right handlebar switch.</td>
</tr>
<tr>
<td>Refer to “CHECKING THE SWITCHES” on page 8-61.</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>5. Check the fuel injection system relay.</td>
<td>NG</td>
<td>Replace the fuel injection system relay.</td>
</tr>
<tr>
<td>Refer to “CHECKING THE RELAYS” on page 8-69.</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>6. Check the fuel pump.</td>
<td>NG</td>
<td>Replace the fuel pump assembly.</td>
</tr>
<tr>
<td>Refer to “CHECKING THE FUEL PRESSURE” on page 7-3.</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>7. Check the entire fuel pump system wiring.</td>
<td>NG</td>
<td>Properly connect or repair the fuel pump system wiring.</td>
</tr>
<tr>
<td>Refer to “CIRCUIT DIAGRAM” on page 8-53.</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>Replace the ECU (engine control unit).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Front brake light switch
2. Rear brake light switch
3. Battery
4. Main fuse
5. Starter relay
6. Diode 2
7. Diode 1
8. Rectifier/regulator
9. Ignition coil
10. Speed sensor
11. Turn signal relay
12. Horn
13. ECU (electronic control unit)
14. Lean angle sensor
15. Starting circuit cut-off relay
16. Headlight relay
17. Fuse box
18. Radiator fan motor relay
19. Fuel injection system relay
1. Main switch
2. Intake air temperature sensor
3. Throttle position sensor
4. Intake air pressure sensor
5. Coolant temperature sensor
6. Fuel pump
7. $O_2$ sensor
8. Crankshaft position sensor
9. Stator coil
10. Sidestand switch
11. Radiator fan
1. Dimmer switch
2. Horn switch
3. Turn signal switch
4. Rear brake light switch
5. Engine stop switch
6. Start switch
7. Front brake light switch
8. Main switch
9. Sidestand switch
10. Storage box light switch
Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

**NOTICE**

Never insert the tester probes into the coupler terminal slots “a”. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.

**Pocket tester**

90890-03112
Analog pocket tester
YU-03112-C

**TIP**

- Before checking for continuity, set the pocket tester to “0” and to the “Ω x 1” range.
- When checking for continuity, switch back and forth between the switch positions a few times.

The switches and their terminal connections are illustrated as in the following example of the main switch.

The switch positions “a” are shown in the far left column and the switch lead colors “b” are shown in the top row.

The continuity (i.e., a closed circuit) between switch terminals at a given switch position is indicated by “ — — ”. There is continuity between red, brown/blue and brown/red when the switch is set to “ON” and between red and brown/red when the switch is set to “P”.

---

**Pocket tester**

90890-03112
Analog pocket tester
YU-03112-C

**TIP**

- Before checking for continuity, set the pocket tester to “0” and to the “Ω x 1” range.
- When checking for continuity, switch back and forth between the switch positions a few times.

The switches and their terminal connections are illustrated as in the following example of the main switch.

The switch positions “a” are shown in the far left column and the switch lead colors “b” are shown in the top row.

The continuity (i.e., a closed circuit) between switch terminals at a given switch position is indicated by “ — — ”. There is continuity between red, brown/blue and brown/red when the switch is set to “ON” and between red and brown/red when the switch is set to “P”.

---
CHECKING THE BULBS AND BULB SOCKETS

TIP
Do not check any of the lights that use LEDs.

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

Damage/wear → Repair or replace the bulb, bulb socket or both.
Improperly connected → Properly connect.
No continuity → Repair or replace the bulb, bulb socket or both.

Types of bulbs
The bulbs used on this vehicle are shown in the illustration.

• Bulbs “a” and “b” are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.

• Bulbs “c” are used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.

• Bulbs “d” and “e” are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.

1. Remove:
   • Bulb

   **WARNING**
   Since the headlight bulbs get extremely hot, keep flammable products and your hands away from them until they have cooled down.

   **NOTICE**
   Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.

   • Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb, and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

2. Check:
   • Bulb (for continuity) (with the pocket tester)
     No continuity → Replace.

   **TIP**
   Before checking for continuity, set the pocket tester to “0” and to the “Ω × 1” range.

   a. Connect the positive tester probe to terminal “1” and the negative tester probe to terminal “2”, and check the continuity.

   b. Connect the positive tester probe to terminal “1” and the negative tester probe to terminal “3”, and check the continuity.

   c. If either of the readings indicate no continuity, replace the bulb.

Checking the condition of the bulbs
The following procedure applies to all of the bulbs.
ELECTRICAL COMPONENTS

Checking the condition of the bulb sockets
The following procedure applies to all of the bulb sockets.
1. Check:
   • Bulb socket (for continuity)
     (with the pocket tester)
     No continuity → Replace.

   a. Install a good bulb into the bulb socket.
   b. Connect the pocket tester probes to the respective leads of the bulb socket.
   c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

TIP
Check each bulb socket for continuity in the same manner as described in the bulb section, however, note the following.

   a. Install a good bulb into the bulb socket.
   b. Connect the pocket tester probes to the respective leads of the bulb socket.
   c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP
Set the pocket tester selector to “Ω x 1”.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

b. If the pocket tester indicates “∞”, replace the fuse.

Checking the condition of the bulb sockets
The following procedure applies to all of the bulb sockets.
1. Check:
   • Bulb socket (for continuity)
     (with the pocket tester)
     No continuity → Replace.

   a. Install a good bulb into the bulb socket.
   b. Connect the pocket tester probes to the respective leads of the bulb socket.
   c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

TIP
Check each bulb socket for continuity in the same manner as described in the bulb section, however, note the following.

   a. Install a good bulb into the bulb socket.
   b. Connect the pocket tester probes to the respective leads of the bulb socket.
   c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

b. If the pocket tester indicates “∞”, replace the fuse.

CHECKING THE FUSES
The following procedure applies to all of the fuses.

NOTICE
To avoid a short circuit, always set the main switch to “OFF” when checking or replacing a fuse.

1. Remove:
   • Battery cover
     Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
   • Fuse

   a. Connect the pocket tester to the fuse and check the continuity.

Fuses | Amperage rating | Q'ty
--- | --- | ---
Main | 30 A | 1
Headlight | 20 A | 1
Taillight | 10 A | 1
Signaling system | 15 A | 1
Radiator fan | 15 A | 1
Ignition | 10 A | 1
Fuel injection system | 10 A | 1
Backup (odometer and clock) | 10 A | 1
Spare | 30 A | 1
Spare | 20 A | 1
Spare | 15 A | 1
Spare | 10 A | 1

WARNING
Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

b. If the pocket tester indicates “∞”, replace the fuse.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

b. If the pocket tester indicates “∞”, replace the fuse.
ELECTRICAL COMPONENTS

4. Install:
• Battery cover
  Refer to “GENERAL CHASSIS” on page 4-1.

CHECKING AND CHARGING THE BATTERY

WARNING

Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid. Therefore, always follow these preventive measures:
• Wear protective eye gear when handling or working near batteries.
• Charge batteries in a well-ventilated area.
• Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).
• DO NOT SMOKE when charging or handling batteries.
• KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.
• Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.

FIRST AID IN CASE OF BODILY CONTACT:
EXTERNAL
• Skin — Wash with water.
• Eyes — Flush with water for 15 minutes and get immediate medical attention.

INTERNAL
• Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.

NOTICE

This is a VRLA (Valve Regulated Lead Acid) battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.

Charging time, charging amperage and charging voltage for a VRLA (Valve Regulated Lead Acid) battery are different from those of conventional batteries. The VRLA (Valve Regulated Lead Acid) battery should be charged according to the appropriate charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

TIP

Since VRLA (Valve Regulated Lead Acid) batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

1. Remove:
• Battery cover
  Refer to “GENERAL CHASSIS” on page 4-1.
• Battery holder “1”

2. Disconnect:
• Battery leads
  (from the battery terminals)

NOTICE

First, disconnect the negative battery lead “2”, then the positive battery lead “3”.

3. Remove:
• Battery

4. Check:
• Battery charge

TIP

a. Connect a pocket tester to the battery terminals.

• Positive tester probe → positive battery terminal
• Negative tester probe → negative battery terminal

b. Check the charge of the battery, as shown in the charts and the following example.
5. Charge:
   - Battery
     (refer to the appropriate charging method)

   **WARNING**
   Do not quick charge a battery.

   **NOTICE**
   - Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.
   - If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.

   When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the negative battery lead from the battery terminal.)

   To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.

   Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.

   Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.

   If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!

   As shown in the following illustration, the open-circuit voltage of a VRLA (Valve Regulated Lead Acid) battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.

   **Example**
   Open-circuit voltage = 12.0 V
   Charging time = 6.5 hours
   Charge of the battery = 20–30%

<table>
<thead>
<tr>
<th>A. Open-circuit voltage (V)</th>
<th>B. Charging time (hours)</th>
<th>C. Relationship between the open-circuit voltage and the charging time at 20 °C (68 °F)</th>
<th>D. These values vary with the temperature, the condition of the battery plates, and the electrolyte level</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>A. Open-circuit voltage (V)</th>
<th>B. Charging condition of the battery (%)</th>
<th>C. Ambient temperature 20 °C (68 °F)</th>
<th>D. Relationship between the open-circuit voltage and the charging time at 20 °C (68 °F)</th>
<th>E. These values vary with the temperature, the condition of the battery plates, and the electrolyte level</th>
</tr>
</thead>
</table>

---

**Charging method using a variable-current (voltage) charger**

- Measure the open-circuit voltage prior to charging.
ELECTRICAL COMPONENTS

TIP
Voltage should be measured 30 minutes after the engine is turned off.

b. Connect a charger and ammeter to the battery and start charging.

TIP
Set the charging voltage to 16–17 V. If the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.

c. Make sure that the current is higher than the standard charging current written on the battery.

TIP
If the current is lower than the standard charging current written on the battery, the VRLA (Valve Regulated Lead Acid) battery. A variable voltage charger is recommended.

d. Charge the battery until the battery’s charging voltage is 15 V.

e. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

Charging method using a constant voltage charger

a. Measure the open-circuit voltage prior to charging.

TIP
Voltage should be measured 30 minutes after the engine is turned off.

b. Connect a charger and ammeter to the battery and start charging.

c. Make sure that the current is higher than the standard charging current written on the battery.

TIP
If the current is lower than the standard charging current written on the battery, this type of battery charger cannot charge the VRLA (Valve Regulated Lead Acid) battery. A variable voltage charger is recommended.

d. Charge the battery until the battery’s charging voltage is 15 V.

e. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

6. Install:
• Battery

7. Connect:
• Battery leads
  (to the battery terminals)

NOTICE
First, connect the positive battery lead “1”, then the negative battery lead “2”.

8. Check:
• Battery terminals
  Dirt → Clean with a wire brush.
  Loose connection → Connect properly.

9. Lubricate:
• Battery terminals

Recommended lubricant: Dielectric grease

10. Install:
• Battery holder
• Battery cover
  Refer to “GENERAL CHASSIS” on page 4-1.

CHECKING THE RELAYS
Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, replace the relay.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

1. Disconnect the relay from the wire harness.
2. Connect the pocket tester (Ω × 1) and battery (12 V) to the relay terminal as shown. Check the relay operation.
   Out of specification → Replace.

Starting circuit cut-off relay

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity (between “3” and “4”)

Headlight relay

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity (between “3” and “4”)

Radiator fan motor relay

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity (between “3” and “4”)

Starter relay

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity (between “3” and “4”)
Fuel injection system relay

![Fuel injection system relay diagram]

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

---

Grip warmer relay (OPTION)

![Grip warmer relay (OPTION) diagram]

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

---

CHECKING THE TURN SIGNAL RELAY

1. Check:
   - Turn signal relay input voltage
     Out of specification → The wiring circuit from the main switch to the turn signal relay coupler is faulty and must be repaired.

---

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

- Positive tester probe → blue “1”
- Negative tester probe → ground

---

Turn signal relay output voltage
DC 12 V

![Turn signal relay output voltage diagram]

a. Connect the pocket tester (DC 20 V) to the turn signal relay terminal as shown.

---

Turn signal relay input voltage
DC 12 V

---
b. Turn the main switch to “ON”.
c. Measure the turn signal relay output voltage.

CHECKING THE DIODE
1. Check:
   • Diode 1
     Out of specification → Replace.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP
The pocket tester and the analog pocket tester readings are shown in the following table.

Continuity
Positive tester probe → blue/white “1”
Negative tester probe → red/black “2”
No continuity
Positive tester probe → red/black “2”
Negative tester probe → blue/white “1”

a. Disconnect the diode 1 from the wire harness.
b. Connect the pocket tester (Ω × 1) to the diode 1 terminals as shown.

c. Check the diode 1 for continuity.
d. Check the diode 1 for no continuity.

CHECKING THE SPARK PLUG CAPS
The following procedure applies to all of the spark plug caps.
1. Check:
   • Spark plug cap resistance
     Out of specification → Replace.

Resistance
10.0 kΩ

a. Remove the spark plug cap from the spark plug lead.
b. Connect the pocket tester (Ω × 1k) to the spark plug cap as shown.

c. Measure the spark plug cap resistance.

CHECKING THE IGNITION COIL
1. Check:
   • Primary coil resistance
     Out of specification → Replace.

Primary coil resistance
1.87–2.53 Ω

a. Disconnect the ignition coil connectors from the ignition coil terminals.
b. Connect the pocket tester (Ω × 1) to the ignition coil as shown.
ELECTRICAL COMPONENTS

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

• Positive tester probe →
  red/black “1”
• Negative tester probe →
  orange “2”

2. Check:
  • Secondary coil resistance
    Out of specification → Replace.

Secondary coil resistance
12.00–18.00 kΩ

CHECKING THE IGNITION SPARK GAP

1. Check:
   • Ignition spark gap
     Out of specification → Perform the ignition
     system troubleshooting, starting with step 5.
     Refer to “TROUBLESHOOTING” on page 8-3.

Minimum ignition spark gap
6.0 mm (0.24 in)

TIP

If the ignition spark gap is within specification,
the ignition system circuit is operating normally.

• Positive tester probe →
  spark plug lead “1”
• Negative tester probe →
  spark plug lead “2”

If the ignition spark gap is within specification,
the ignition system circuit is operating normally.

CHECKING THE CRANKSHAFT POSITION SENSOR

1. Disconnect:
   • Crankshaft position sensor coupler
     (from the wire harness)
2. Check:
   • Crankshaft position sensor resistance
     Out of specification → Replace the crankshaft position sensor/stator assembly.

<table>
<thead>
<tr>
<th>Crankshaft position sensor resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>189–231 Ω at 20 °C (68 °F)</td>
</tr>
</tbody>
</table>

a. Connect the pocket tester (Ω x 100) to the crankshaft position sensor coupler as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

• Positive tester probe →
  gray “1”
• Negative tester probe →
  black “2”

b. Measure the crankshaft position sensor resistance.

---

CHECKING THE LEAN ANGLE SENSOR

1. Remove:
   • Lean angle sensor

2. Check:
   • Lean angle sensor output voltage
     Out of specification → Replace.

<table>
<thead>
<tr>
<th>Lean angle sensor output voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 45°: 0.4–1.4 V</td>
</tr>
<tr>
<td>More than 45°: 3.7–4.4 V</td>
</tr>
</tbody>
</table>

a. Connect the lean angle sensor coupler to the wire harness.
b. Connect the pocket tester (DC 20 V) to the lean angle sensor coupler as shown.

c. Set the main switch to “ON”.
d. Turn the lean angle sensor 45°.
e. Measure the lean angle sensor output voltage.

---

CHECKING THE STARTER MOTOR OPERATION

1. Check:
   • Starter motor operation
     Does not operate → Perform the electric starting system troubleshooting, starting with step 4.
     Refer to “TROUBLESHOOTING” on page 8-9.

a. Connect the positive battery terminal “1” and starter motor lead “2” with a jumper lead “3”.

**WARNING**

• A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.
• This check is likely to produce sparks, therefore, make sure no flammable gas or fluid is in the vicinity.
b. Check the starter motor operation.

CHECKING THE STATOR COIL
1. Disconnect:
   • Stator coil coupler (from the wire harness)
2. Check:
   • Stator coil resistance
     Out of specification → Replace the crankshaft position sensor/stator assembly.

Stator coil resistance
0.225–0.275 Ω at 20 °C (68 °F)

a. Connect the pocket tester (Ω × 1) to the stator coil coupler as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

• Positive tester probe →
  white “1”
• Negative tester probe →
  white “2”

• Positive tester probe →
  white “1”
• Negative tester probe →
  white “3”

• Positive tester probe →
  white “2”
• Negative tester probe →
  white “3”

b. Measure the stator coil resistance.

CHECKING THE RECTIFIER/REGULATOR
1. Check:
   • Rectifier/regulator output voltage
     Out of specification → Replace the rectifier/regulator.

Rectifier/regulator output voltage
14 V at 5000 r/min

a. Set the engine tachometer to the spark plug lead of cylinder #1.
b. Connect the pocket tester (AC 20 V) to the rectifier/regulator coupler as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

• Positive tester probe →
  red “1”
• Negative tester probe →
  black “2”

c. Start the engine and let it run at approximately 5000 r/min.
d. Measure the rectifier/regulator output voltage.
ELECTRICAL COMPONENTS

CHECKING THE HORN

1. Check:
   • Horn resistance
     Out of specification → Replace.

   | Coils resistance |
   | 1.06–1.11 Ω at 20 °C (68 °F) |

   a. Disconnect the horn leads from the horn terminals.
   b. Connect the pocket tester (Ω x 1) to the horn terminals.

   | Pocket tester |
   | 90890-03112 |
   | Analog pocket tester |
   | YU-03112-C |

   • Positive tester probe → horn terminal “1”
   • Negative tester probe → horn terminal “2”

   c. Measure the horn resistance.

   | | |
   | a | b |

2. Check:
   • Horn sound
     Faulty sound → Adjust or replace.

   a. Connect a battery (12 V) to the horn.
   b. Turn the adjusting screw in direction “a” or “b” until the specified horn sound is obtained.

   b. Move the fuel sender float to empty fuel tank position “3” and full fuel tank position “4” level position.

CHECKING THE FUEL SENDER

1. Disconnect:
   • Fuel pump coupler
   • Fuel hose
     (from the fuel pump)
     Refer to “GENERAL CHASSIS” on page 4-1.

2. Remove:
   • Fuel pump
     (from the fuel tank)
     Refer to “FUEL TANK” on page 7-1.

3. Check:
   • Fuel sender resistance
     Out of specification → Replace the fuel pump assembly.

   | Sender unit resistance (full) |
   | 4.0–10.0 Ω |

   | Sender unit resistance (empty) |
   | 93.0–100.0 Ω |

   a. Connect the pocket tester (Ω x 1) to the fuel pump terminals as shown.

   | Pocket tester |
   | 90890-03112 |
   | Analog pocket tester |
   | YU-03112-C |

   • Positive tester probe → green “1”
   • Negative tester probe → black “2”
c. Measure the fuel sender resistance.

4. Install:
   - Fuel pump
     Refer to “FUEL TANK” on page 7-1.

5. Connect:
   - Fuel hose
   - Fuel pump coupler
     Refer to “GENERAL CHASSIS” on page 4-1.

EAS28240
CHECKING THE SPEED SENSOR
1. Check:
   - Speed sensor output voltage
     Out of specification → Replace.

  ![Output voltage reading cycle]
  0 V to 5.0 V to 0 V to 5.0 V

a. Connect the pocket tester (DC 20 V) to the speed sensor coupler (wire harness side) as shown.

  ![Pocket tester]
  90890-03112
  Analog pocket tester
  YU-03112-C

  • Positive tester probe → white “1”
  • Negative tester probe → black/blue “2”

b. Set the main switch to “ON”.

c. Elevate the front wheel and slowly rotate it.

d. Measure the voltage of white and black/blue. With each full rotation of the front wheel, the voltage reading should cycle from 0 V to 5.0 V to 0 V to 5.0 V.

EAS28250
CHECKING THE RADIATOR FAN MOTOR
1. Check:
   - Radiator fan motor
     Faulty/rough movement → Replace.

  ![Radiator fan motor]

a. Disconnect the radiator fan motor coupler from the wire harness.

b. Connect the battery (DC 12 V) as shown.

  • Positive tester probe → blue “1”
  • Negative tester probe → black “2”

c. Measure the radiator fan motor movement.

EAS28260
CHECKING THE COOLANT TEMPERATURE SENSOR
1. Remove:
   - Coolant temperature sensor
     Refer to “THERMOSTAT” on page 6-7.

![Coolant temperature sensor resistance]

2. Check:
   - Coolant temperature sensor resistance
     Out of specification → Replace.

<table>
<thead>
<tr>
<th>Coolant temperature sensor resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.32–2.59 kΩ at 20 °C (68 °F)</td>
</tr>
<tr>
<td>310–326 Ω at 80 °C (176 °F)</td>
</tr>
</tbody>
</table>
a. Connect the pocket tester (Ω × 100) to the coolant temperature sensor terminals as shown.

Pocket tester 90890-03112
Analog pocket tester YU-03112-C

b. Immerse the coolant temperature sensor “1” in a container filled with coolant “2”.

TIP
Make sure the coolant temperature sensor terminals do not get wet.

c. Place a thermometer “3” in the coolant.

d. Slowly heat the coolant, and then let it cool down to the specified temperature.
e. Measure the coolant temperature sensor resistance.

3. Install:
   • Coolant temperature sensor

Coolant temperature sensor 18 Nm (1.8 m-kg, 13 ft-lb)

CHECKING THE THROTTLE POSITION SENSOR
1. Remove:
   • Throttle position sensor (from the throttle body)
2. Check:
   • Throttle position sensor maximum resistance
   Out of specification → Replace the throttle position sensor.

Resistance 4.0–6.0 kΩ

b. Measure the throttle position sensor maximum resistance.

3. Install:
   • Throttle position sensor

TIP
When installing the throttle position sensor, adjust its angle properly. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-8.

CHECKING THE INTAKE AIR PRESSURE SENSOR
1. Check:
   • Intake air pressure sensor output voltage
   Out of specification → Replace.

Intake air pressure sensor output voltage 3.15–4.15 V

a. Connect the pocket tester (DC 20 V) to the intake air pressure sensor coupler as shown.
b. Turn the main switch to “ON”.
c. Measure the intake air pressure sensor output voltage.

---

### CHECKING THE INTAKE AIR TEMPERATURE SENSOR

1. **Remove:**
   - Intake air temperature sensor (from the air filter case)

**WARNING**
- Handle the intake air temperature sensor with special care.
- Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.

2. **Check:**
   - Intake air temperature sensor resistance
     - Out of specification → Replace.

#### Intake air temperature sensor resistance

2.21–2.69 kΩ at 20 °C (68 °F)

---

a. Connect the pocket tester (Ω × 100) to the intake air temperature sensor terminal as shown.

#### Pocket tester

- **90890-03112**
- Analog pocket tester
  - **YU-03112-C**

- Positive tester probe → black/blue “1”
- Negative tester probe → brown/white “2”
TROUBLESHOOTING

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  GENERAL INFORMATION ........................................................................................................... 9-1
  STARTING FAILURE/HARD STARTING .................................................................................... 9-1
  INCORRECT ENGINE IDLING SPEED ....................................................................................... 9-1
  POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE ................................................................. 9-2
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TROUBLESHOOTING

GENERAL INFORMATION

TIP

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

STARTING FAILURE/HARD STARTING

Engine
1. Cylinder(s) and cylinder head
   • Loose spark plug
   • Loose cylinder head or cylinder
   • Damaged cylinder head gasket
   • Damaged cylinder gasket
   • Worn or damaged cylinder
   • Incorrect valve clearance
   • Improperly sealed valve
   • Incorrect valve-to-valve-seat contact
   • Incorrect valve timing
   • Faulty valve spring
   • Seized valve
2. Piston(s) and piston ring(s)
   • Improperly installed piston ring
   • Damaged, worn or fatigued piston ring
   • Seized piston ring
   • Seized or damaged piston
3. Air filter
   • Improperly installed air filter
   • Clogged air filter element
4. Crankcase and crankshaft
   • Improperly assembled crankcase
   • Seized crankshaft

Fuel system
1. Fuel tank
   • Empty fuel tank
   • Clogged fuel tank cap breather hole
   • Deteriorated or contaminated fuel
   • Clogged or damaged fuel hose
2. Fuel pump
   • Faulty fuel pump
   • Faulty fuel injection system relay
   • Damaged vacuum hose
   • Improperly routed hose
3. Throttle body
   • Deteriorated or contaminated fuel
   • Sucked-in air

Electrical system
1. Battery
   • Discharged battery
   • Faulty battery
2. Fuse(s)
   • Blown, damaged or incorrect fuse
   • Improperly installed fuse
3. Spark plug(s)
   • Incorrect spark plug gap
   • Incorrect spark plug heat range
   • Fouled spark plug
   • Worn or damaged electrode
   • Worn or damaged insulator
   • Faulty spark plug cap
4. Ignition coil
   • Cracked or broken ignition coil body
   • Broken or shorted primary or secondary coils
   • Faulty spark plug lead
5. Ignition system
   • Faulty ECU (engine control unit)
   • Faulty crankshaft position sensor
   • Broken generator rotor woodruff key
6. Switches and wiring
   • Faulty main switch
   • Faulty engine stop switch
   • Broken or shorted wiring
   • Faulty front, rear or both brake light switches
   • Faulty start switch
   • Faulty sidestand switch
   • Improperly grounded circuit
   • Loose connections
7. Starting system
   • Faulty starter motor
   • Faulty starter relay
   • Faulty starting circuit cut-off relay
   • Faulty starter clutch

INCORRECT ENGINE IDLING SPEED

Engine
1. Cylinder(s) and cylinder head
   • Incorrect valve clearance
   • Damaged valve train components
2. Air filter
   • Clogged air filter element

Fuel system
1. Throttle body
   • Damaged or loose throttle body joint
   • Improperly synchronized throttle body
   • Improperly adjusted engine idling speed
• Improper throttle cable free play
• Flooded throttle body

Electrical system
1. Battery
   • Discharged battery
   • Faulty battery
2. Spark plug(s)
   • Incorrect spark plug gap
   • Incorrect spark plug heat range
   • Fouled spark plug
   • Worn or damaged electrode
   • Worn or damaged insulator
   • Faulty spark plug cap
3. Ignition coil
4. Ignition system
   • Faulty ECU (engine control unit)
   • Faulty crankshaft position sensor

EAS28610
POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE
Refer to “STARTING FAILURE/HARD STARTING” on page 9-1.

Engine
1. Air filter
   • Clogged air filter element

Fuel system
1. Fuel pump
   • Faulty fuel pump

EAS28640
FAULTY CLUTCH

Engine operates but scooter will not move
1. V-belt
   • Bent, damaged or worn V-belt
   • Slipping V-belt
2. Primary pulley cam and primary pulley slider
   • Damaged or worn primary pulley cam
   • Damaged or worn primary pulley slider
3. Clutch spring(s)
   • Damaged clutch spring
4. Transmission gear(s)
   • Damaged transmission gear

Clutch slips
1. Clutch
   • Improperly assembled clutch
   • Fatigued clutch spring
   • Worn friction plate
   • Worn clutch plate

2. Engine oil
   • Incorrect oil level
   • Incorrect oil viscosity (low)
   • Deteriorated oil
3. Primary sliding sheave
   • Seized primary sliding sheave

Poor starting performance
1. V-belt
   • V-belt slips
2. Primary sliding sheave
   • Faulty operation
   • Worn pin groove
   • Worn pin
3. Clutch shoe(s)
   • Bent, damaged or worn clutch shoe

Poor speed performance
1. V-belt
   • Oil or grease on the V-belt
2. Primary pulley weight(s)
   • Faulty operation
   • Worn primary pulley weight
3. Primary fixed sheave
   • Worn primary fixed sheave
4. Primary sliding sheave
   • Worn primary sliding sheave
5. Secondary fixed sheave
   • Worn secondary fixed sheave
6. Secondary sliding sheave
   • Worn secondary sliding sheave

EAS29650
OVERHEATING

Engine
1. Clogged coolant passages
   • Cylinder head(s) and piston(s)
   • Heavy carbon buildup
2. Engine oil
   • Incorrect oil level
   • Incorrect oil viscosity
   • Inferior oil quality

Cooling system
1. Coolant
   • Low coolant level
2. Radiator
   • Damaged or leaking radiator
   • Faulty radiator cap
   • Bent or damaged radiator fin
3. Water pump
   • Damaged or faulty water pump
TROUBLESHOOTING

• Thermostat
• Thermostat stays closed
• Oil cooler
• Clogged or damaged oil cooler
• Hose(s) and pipe(s)
• Damaged hose
• Improperly connected hose
• Damaged pipe
• Improperly connected pipe

Fuel system
1. Throttle body
   • Faulty throttle body
   • Damaged or loose throttle body joint
2. Air filter
   • Clogged air filter element

Chassis
1. Brake(s)
   • Dragging brake

Electrical system
1. Spark plug(s)
   • Incorrect spark plug gap
   • Incorrect spark plug heat range
2. Ignition system
   • Faulty ECU (engine control unit)

OVERCOOLING

Cooling system
1. Thermostat
   • Thermostat stays open

POOR BRAKING PERFORMANCE
• Worn brake pad
• Worn brake disc
• Air in hydraulic brake system
• Leaking brake fluid
• Faulty brake caliper kit
• Faulty brake caliper seal
• Loose union bolt
• Damaged brake hose
• Oil or grease on the brake disc
• Oil or grease on the brake pad
• Incorrect brake fluid level

FAULTY FRONT FORK LEGS

Leaking oil
• Bent, damaged or rusty inner tube
• Cracked or damaged outer tube
• Improperly installed oil seal
• Damaged oil seal lip
• Incorrect oil level (high)
• Loose damper rod bolt
• Damaged damper rod bolt copper washer
• Cracked or damaged cap bolt O-ring

Malfunction
• Bent or damaged inner tube
• Bent or damaged outer tube
• Damaged fork spring
• Worn or damaged outer tube bushing
• Bent or damaged damper rod
• Incorrect oil viscosity
• Incorrect oil level

UNSTABLE HANDLING
1. Handlebar
   • Bent or improperly installed handlebar
2. Steering head components
   • Improperly installed upper bracket
   • Improperly installed lower bracket (improperly tightened ring nut)
   • Bent steering stem
   • Damaged ball bearing or bearing race
3. Front fork leg(s)
   • Uneven oil levels (both front fork legs)
   • Unevenly tensioned fork spring (both front fork legs)
   • Broken fork spring
   • Bent or damaged inner tube
   • Bent or damaged outer tube
4. Swingarm
   • Worn bearing or bushing
   • Bent or damaged swingarm
5. Rear shock absorber assembly
   • Faulty rear shock absorber spring
   • Leaking oil or gas
6. Tire(s)
   • Uneven tire pressures (front and rear)
   • Incorrect tire pressure
   • Uneven tire wear
7. Wheel(s)
   • Incorrect wheel balance
   • Deformed cast wheel
   • Damaged wheel bearing
   • Bent or loose wheel axle
   • Excessive wheel runout
8. Frame
   • Bent frame
   • Damaged steering head pipe
   • Improperly installed bearing race
EAS28710

**FAULTY LIGHTING OR SIGNALING SYSTEM**

**Headlight does not come on**
- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Burnt-out headlight bulb

**Headlight bulb burnt out**
- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Faulty light switch
- Headlight bulb life expired

**Tail/brake light does not come on**
- Wrong tail/brake light bulb
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light bulb

**Tail/brake light bulb burnt out**
- Wrong tail/brake light bulb
- Faulty battery
- Incorrectly adjusted rear brake light switch
- Tail/brake light bulb life expired

**Turn signal does not come on**
- Faulty turn signal switch
- Faulty turn signal relay
- Burnt-out turn signal bulb
- Incorrect connection
- Damaged or faulty wire harness
- Improperly grounded circuit
- Faulty battery
- Blown, damaged or incorrect fuse

**Turn signal flashes slowly**
- Faulty turn signal relay
- Faulty main switch
- Faulty turn signal switch
- Incorrect turn signal bulb

**Turn signal remains lit**
- Faulty turn signal relay
- Burnt-out turn signal bulb

**Turn signal flashes quickly**
- Incorrect turn signal bulb
- Faulty turn signal relay
- Burnt-out turn signal bulb

**Horn does not sound**
- Improperly adjusted horn
- Damaged or faulty horn
- Faulty main switch
- Faulty horn switch
- Faulty battery
- Blown, damaged or incorrect fuse
- Faulty wire harness
WIRING DIAGRAM

XP500Y 2009

1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Main switch
5. Storage box light switch
6. Storage box light
7. Fuel injection system fuse
8. Backup fuse (odometer and clock)
9. Signaling system fuse
10. Headlight fuse
11. Ignition fuse
12. Radiator fan fuse
13. Taillight fuse
14. Battery
15. Main fuse
16. Starter relay
17. Starter motor
18. Diode 1
19. Right handlebar switch
20. Engine stop switch
21. Start switch
22. Front brake light switch
23. Diode 2
24. Starting circuit cut-off relay
25. Fuel injection system relay
26. Fuel pump
27. Fuel sender
28. Sidestand switch
29. ECU (engine control unit)
30. Ignition coil
31. Spark plug
32. Fuel injector #1
33. Fuel injector #2
34. Coolant temperature sensor
35. Intake air temperature sensor
36. Intake air pressure sensor
37. O₂ sensor
38. Throttle position sensor
39. Lean angle sensor
40. Speed sensor
41. Grip warmer relay (OPTION)
42. Grip warmer switch (OPTION)
43. Grip warmer (OPTION)
44. Grip warmer (OPTION)
45. Radiator fan motor relay
46. Radiator fan motor
47. License plate light
48. Taillight assembly
49. Rear left turn signal light
50. Rear right turn signal light
51. Tail/brake light
52. Turn signal relay
53. Left handlebar switch
54. Dimmer switch
55. Horn switch
56. Turn signal switch
57. Rear brake light switch
58. Horn
59. Front right turn signal/position light
60. Front left turn signal/position light
61. Headlight relay
62. Headlight (high beam)
63. Headlight (low beam)
64. Meter assembly
65. Multi-function meter
66. Coolant temperature meter
67. Speedometer
68. Fuel meter
69. Engine trouble warning light
70. Meter light
71. High beam indicator light
72. Right turn signal indicator light
73. Left turn signal indicator light

COLOR CODE

B   Black
Br  Brown
Ch  Chocolate
Dg  Dark green
G   Green
Gy  Gray
L   Blue
Lg  Light green
O   Orange
R   Red
W   White
Y   Yellow
B/L Black/Blue
B/W Black/White
B/Y Black/Yellow
Br/L Brown/Blue
Br/R Brown/Red
Br/W Brown/White
G/B Green/Black
G/R Green/Red
G/W Green/White
G/Y Green/Yellow
Gy/G Gray/Green
L/B Blue/Black
L/G Blue/Green
L/W Blue/White
L/Y Blue/Yellow
O/B Orange/Black
P/W Pink/White
R/B Red/Black
R/G Red/Green
R/L Red/Blue
R/W Red/White
R/Y Red/Yellow
W/Y White/Yellow
Y/B Yellow/Black
Y/G Yellow/Green
Y/L Yellow/Blue
Y/R Yellow/Red