**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**

Designs and specifications are subject to change without notice.

---

**IMPORTANT MANUAL INFORMATION**

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

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Safety Alert Symbol]</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>![Warning]</td>
<td>A WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.</td>
</tr>
<tr>
<td>![Notice]</td>
<td>A NOTICE indicates special precautions that must be taken to avoid damage to the vehicle or other property.</td>
</tr>
<tr>
<td>![Tip]</td>
<td>A TIP provides key information to make procedures easier or clearer.</td>
</tr>
</tbody>
</table>
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. This step explains removal and disassembly procedure only. For installation and assembly procedure, reverse the steps.
- Jobs “7” requiring more information (such as special tools and technical data) are described sequentially.

---

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER HEAD**

1. Check:
   - Cylinder head
   - Camshaft holder
   - Spark plugs
   - Intake and exhaust ports
   - Valve springs

2. Wash:
   - Cylinder head
   - Camshaft holder
   - Spark plugs

3. Check:
   - Wear
   - Camshaft holder
   - Spark plug

4. Measure:
   - Cylinder head wear
   - Spark plug wear

5. Replace:
   - Wear is excessive
   - Spark plug wear

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER AND PISTON**

1. To ensure an even surface, rotate the cylinder head several times.

---

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER AND PISTON**

1. Check:
   - Cylinder head
   - Camshaft holder
   - Spark plugs

2. Measure:
   - Cylinder head wear
   - Spark plug wear

3. Replace:
   - Cylinder head
   - Spark plug

---

**NOTES**

- All dimensions are in millimeters (mm).
- Refer to the symbol definitions in the Symbols section.

---

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER AND PISTON**

1. Check:
   - Cylinder head
   - Camshaft holder
   - Spark plugs

2. Measure:
   - Cylinder head wear
   - Spark plug wear

3. Replace:
   - Cylinder head
   - Spark plug

---

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER AND PISTON**

1. Check:
   - Cylinder head
   - Camshaft holder
   - Spark plugs

2. Measure:
   - Cylinder head wear
   - Spark plug wear

3. Replace:
   - Cylinder head
   - Spark plug

---

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER AND PISTON**

1. Check:
   - Cylinder head
   - Camshaft holder
   - Spark plugs

2. Measure:
   - Cylinder head wear
   - Spark plug wear

3. Replace:
   - Cylinder head
   - Spark plug

---

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER AND PISTON**

1. Check:
   - Cylinder head
   - Camshaft holder
   - Spark plugs

2. Measure:
   - Cylinder head wear
   - Spark plug wear

3. Replace:
   - Cylinder head
   - Spark plug

---

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER AND PISTON**

1. Check:
   - Cylinder head
   - Camshaft holder
   - Spark plugs

2. Measure:
   - Cylinder head wear
   - Spark plug wear

3. Replace:
   - Cylinder head
   - Spark plug

---

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER AND PISTON**

1. Check:
   - Cylinder head
   - Camshaft holder
   - Spark plugs

2. Measure:
   - Cylinder head wear
   - Spark plug wear

3. Replace:
   - Cylinder head
   - Spark plug

---

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER AND PISTON**

1. Check:
   - Cylinder head
   - Camshaft holder
   - Spark plugs

2. Measure:
   - Cylinder head wear
   - Spark plug wear

3. Replace:
   - Cylinder head
   - Spark plug

---

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER AND PISTON**

1. Check:
   - Cylinder head
   - Camshaft holder
   - Spark plugs

2. Measure:
   - Cylinder head wear
   - Spark plug wear

3. Replace:
   - Cylinder head
   - Spark plug

---

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER AND PISTON**

1. Check:
   - Cylinder head
   - Camshaft holder
   - Spark plugs

2. Measure:
   - Cylinder head wear
   - Spark plug wear

3. Replace:
   - Cylinder head
   - Spark plug

---

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER AND PISTON**

1. Check:
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   - Camshaft holder
   - Spark plugs

2. Measure:
   - Cylinder head wear
   - Spark plug wear

3. Replace:
   - Cylinder head
   - Spark plug

---

**CYLINDER HEAD, CYLINDER, AND PISTON**

**CHECKING THE CYLINDER AND PISTON**

1. Check:
   - Cylinder head
   - Camshaft holder
   - Spark plugs

2. Measure:
   - Cylinder head wear
   - Spark plug wear

3. Replace:
   - Cylinder head
   - Spark plug
The following symbols are used in this manual for easier understanding.

**TIP**

The following symbols are not relevant to every vehicle.

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>DEFINITION</th>
<th>SYMBOL</th>
<th>DEFINITION</th>
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<tr>
<td>![Serviceable with engine mounted]</td>
<td>Serviceable with engine mounted</td>
<td>![Gear oil]</td>
<td>Gear oil</td>
</tr>
<tr>
<td>![Lubricant]</td>
<td>Lubricant</td>
<td>![Brake fluid]</td>
<td>Brake fluid</td>
</tr>
<tr>
<td>![Special tool]</td>
<td>Special tool</td>
<td>![Wheel bearing grease]</td>
<td>Wheel bearing grease</td>
</tr>
<tr>
<td>![Tightening torque]</td>
<td>Tightening torque</td>
<td>![Lithium-soap-based grease]</td>
<td>Lithium-soap-based grease</td>
</tr>
<tr>
<td>![Wear limit, clearance]</td>
<td>Wear limit, clearance</td>
<td>![Molybdenum disulfide grease]</td>
<td>Molybdenum disulfide grease</td>
</tr>
<tr>
<td>![Engine speed]</td>
<td>Engine speed</td>
<td>![Silicone grease]</td>
<td>Silicone grease</td>
</tr>
<tr>
<td>![Electrical data]</td>
<td>Electrical data</td>
<td>![Apply locking agent (LOCTITE®)]</td>
<td>Apply locking agent (LOCTITE®).</td>
</tr>
<tr>
<td>![Engine oil]</td>
<td>Engine oil</td>
<td>![Replace the part with a new one]</td>
<td>Replace the part with a new one.</td>
</tr>
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<td>SECTION</td>
<td>PAGE</td>
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<td>TROUBLESHOOTING</td>
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VEHICLE IDENTIFICATION NUMBER
The vehicle identification number “1” is stamped into the frame.

MODEL LABEL
The model label “1” is affixed at the location in the illustration. This information will be needed to order spare parts.
OUTLINE OF THE EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)
FEATURES

1. Speed information from speed sensor
2. Engine RPM information from ECU
3. Battery
4. EPS control unit
5. EPS motor
6. Torque sensor
7. EPS unit
   a. Operates steering
   b. Twists torsion bar
   c. Sends the torque sensor signal
   d. EPS control unit calculates assist power
   e. Electricity output switched by EPS control unit
   f. Activates EPS motor

**NOTICE**

To prevent accidental damage to the EPS unit, it must not be disassembled.
Multi-function display

1. “SELECT” button
2. “RESET” button
3. “CLOCK” button
4. Speedometer
5. Fuel meter
6. Clock/Hour meter
7. Odometer/Tripmeter A/Tripmeter B

The multi-function display is equipped with the following:
- a speedometer
- an odometer
- two tripometers (which show the distance traveled since they were last set to zero)
- a clock
- an hour meter (which shows the total time the engine has been running)
- a fuel meter
- a self-diagnosis device

Odometer and tripmeter modes
Pushing the “SELECT” button switches the display between the odometer mode “ODO” and the tripmeter modes “TRIP A” and “TRIP B” in the following order:
ODO → TRIP A → TRIP B → ODO
To reset a tripmeter, select it by pushing the “SELECT” button, and then push the “RESET” button for at least three seconds. The tripmeters can be used to estimate the distance that can be traveled with a full tank of fuel. This information will enable you to plan future fuel stops.

TIP
Pushing and holding in the “SELECT” button, and turning the key to “I” (on) while the button is pushed, switches the display between “mph” and “km/h.”

Clock mode
Pushing the “CLOCK” button switches the display between the clock mode “CLOCK” and the hour meter mode “HOUR” in the following order:
CLOCK → HOUR → CLOCK

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

Fuel meter
The fuel meter indicates the amount of fuel in the fuel tank. The display segments of the fuel meter disappear from “F” (full) towards “E” (empty) as the fuel level decreases. When the “E” segment disappears and the fuel level warning indicator flashes, refuel as soon as possible.

TIP
This fuel meter is equipped with a self-diagnosis system. If the electrical circuit is not working correctly, all the display segments and fuel level warning indicator will start flashing. If this occurs, check the electrical circuit.
Refer to “SIGNALING SYSTEM” on page 9-19.
Self-diagnosis device

1. Fault code display
2. Engine trouble warning light

This model is equipped with a self-diagnosis device for various electrical circuits.
If a problem is detected in any of those circuits, the engine trouble warning light will come on or flash and the multi-function display will indicate an fault code.
If the multi-function display indicates an fault code, note the code number, and check the vehicle.

**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 1-14.

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.

**RUBBER PARTS**

Check rubber parts for deterioration during inspection. Some of the rubber parts are sensitive to gasoline, flammable oil, grease, etc. Do not allow any items other than the specified one to contact the parts.
QUICK FASTENERS

Rivet type
1. Remove:
   • Quick fastener

TIP
To remove the quick fastener, push its pin with a screwdriver, then pull the fastener out.

2. Install:
   • Quick fastener

TIP
To install the quick fastener, push its pin so that it protrudes from the fastener head, then insert the fastener into the part to be secured and push the pin in with a screwdriver. Make sure that the pin is flush with the fastener’s head.

Screw type
1. Remove:
   • Quick fastener

TIP
To remove the quick fastener, loosen the screw with a screwdriver, then pull the fastener out.

2. Install:
   • Quick fastener

TIP
To install the quick fastener, insert the fastener into the part to be secured and tighten the screw.
EBS30017

ELECTRICAL SYSTEM

Electrical parts handling

ECB01460

NOTICE

Never disconnect a battery lead while the engine is running; otherwise, the electrical components could be damaged.

TIP

If a battery lead is difficult to disconnect due to rust on the battery terminal, remove the rust using hot water.

ECB01510

NOTICE

When disconnecting the battery leads from the battery, be sure to disconnect the negative battery lead first, then the positive battery lead. If the positive battery lead is disconnected first and a tool or similar item contacts the vehicle, a spark could be generated, which is extremely dangerous.

ECB01520

NOTICE

Be sure to connect the battery leads to the correct battery terminals. Reversing the battery lead connections could damage the electrical components.

ECB01530

NOTICE

When connecting the battery leads to the battery, be sure to connect the positive battery lead first, then the negative battery lead. If the negative battery lead is connected first and a tool or similar item contacts the vehicle while the positive battery lead is being connected, a spark could be generated, which is extremely dangerous.

ECB01470

NOTICE

Turn the main switch to “OFF” before disconnecting or connecting an electrical component.
**NOTICE**

ECB01480

Handle electrical components with special care, and do not subject them to strong shocks.

ECB01490

Electrical components are very sensitive to and can be damaged by static electricity. Therefore, never touch the terminals and be sure to keep the contacts clean.

Checking the electrical system

**TIP**

Before checking the electrical system, make sure that the battery voltage is at least 12 V.

**NOTICE**

ECB01440

Never insert the tester probes into the coupler terminal slots. Always insert the probes from the opposite end “a” of the coupler, taking care not to loosen or damage the leads.

**NOTICE**

ECB01500

For waterproof couplers, never insert the tester probes directly into the coupler. When performing any checks using a waterproof coupler, use the specified test harness or a suitable commercially available test harness.

**TIP**

When resetting the ECU by turning the main switch to “OFF”, be sure to wait approximately 5 seconds before turning the main switch back to “ON”.

1-11
Checking the connections
Check the leads, couplers, and connectors for
stains, rust, moisture, etc.

1. Disconnect:
   • Lead
   • Coupler
   • Connector

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
</table>
| When disconnecting a coupler, release the
coupler lock, hold both sections of the cou-
pler securely, and then disconnect the cou-
pler. |
| There are many types of coupler locks;
therefore, be sure to check the type of cou-
pler lock before disconnecting the coupler. |

2. Check:
   • Lead
   • Coupler
   • Connector
   Moisture $\rightarrow$ Dry with an air blower.
   Rust/stains $\rightarrow$ Connect and disconnect sev-
   eral times.

<table>
<thead>
<tr>
<th>TIP</th>
</tr>
</thead>
</table>
| When connecting a coupler or connector, push
both sections of the coupler or connector to-
gether until they are connected securely. |
| Make sure all connections are tight. |

3. Connect:
   • Lead
   • Coupler
   • Connector

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
</table>
| When disconnecting a connector, do not pull
the leads. Hold both sections of the connec-
tor securely, and then disconnect the connec-
tor. |

4. Check:
   • Continuity
     (with the pocket tester)

   **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.

   **Pocket tester**
   90890-03112
   Analog pocket tester
   YU-03112-C

   **TIP**
   The resistance values shown were obtained at
   the standard measuring temperature of 20 °C
   (68 °F). If the measuring temperature is not 20
   °C (68 °F), the specified measuring conditions
   will be shown.

   **Intake air temperature sensor resistance**
   5.40–6.60 kΩ at 0 °C (32 °F)
   290–390 Ω at 80 °C (176 °F)

5. Check:
   • Resistance

   **Pocket tester**
   90890-03112
   Analog pocket tester
   YU-03112-C
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 number starting with “YM-”, “YU-”, “YS-”, “YK-”, or “ACC-”.
- For others, use part number starting with “90890-”.

<table>
<thead>
<tr>
<th>Tool name/Tool No.</th>
<th>Illustration</th>
<th>Reference pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness gauge</td>
<td><img src="image" alt="Thickness gauge" /></td>
<td>3-5</td>
</tr>
<tr>
<td>Feelor gauge set</td>
<td><img src="image" alt="Feelor gauge set" /></td>
<td>3-5</td>
</tr>
<tr>
<td>Valve lapper</td>
<td><img src="image" alt="Valve lapper" /></td>
<td>3-6</td>
</tr>
<tr>
<td>Valve lapping tool</td>
<td><img src="image" alt="Valve lapping tool" /></td>
<td>3-6</td>
</tr>
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<td>Yamaha diagnostic tool</td>
<td><img src="image" alt="Yamaha diagnostic tool" /></td>
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<td>Ring nut wrench</td>
<td><img src="image" alt="Ring nut wrench" /></td>
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<tr>
<td>Spanner wrench</td>
<td><img src="image" alt="Spanner wrench" /></td>
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</tr>
<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>Belt tension gauge 90890-03170</td>
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<td>3-21</td>
</tr>
<tr>
<td>Rear drive belt tension gauge YM-03170</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil filter wrench 90890-01426</td>
<td></td>
<td>3-24</td>
</tr>
<tr>
<td>Oil filter wrench YM-38411</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure gauge 90890-03153</td>
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</tr>
<tr>
<td>Pressure gauge YM-03153</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil pressure adapter H 90890-03139</td>
<td></td>
<td>3-25</td>
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<tr>
<td>Damper rod holder (30 mm) 90890-01327</td>
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<tr>
<td>Damper rod holder (30 mm) YM-01327</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ball joint remover 90890-01474</td>
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<tr>
<td>Ball joint remover YM-01474</td>
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<td>Ball joint remover attachment set 90890-01480</td>
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<td>Ball joint adapter set YM-01480</td>
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<td>Middle drive gear lash tool</td>
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<td>Pressure tester adapter</td>
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<tr>
<td>Mechanical seal installer</td>
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<tr>
<td>YM-01581</td>
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<td>Middle driven shaft bearing driver</td>
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<td>Middle drive bearing installer 40 &amp; 50 mm</td>
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<td>YM-04058</td>
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<td>Fuel pressure adapter</td>
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<td>YM-03176</td>
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<th>Illustration</th>
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90890-03204
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Boots band installation tool
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90890-01527
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90890-01475
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<td>2UD2 (YF70GPG)</td>
<td>(for CDN)</td>
</tr>
<tr>
<td>2UD3 (YFM70GPXG)</td>
<td>(for Europe)</td>
</tr>
<tr>
<td>2UD4 (YFM70GPXG)</td>
<td>(for Oceania)</td>
</tr>
<tr>
<td>2UD5 (YFM700FWAD)</td>
<td>(for Russia)</td>
</tr>
<tr>
<td>2UD7 (YF70GPG)</td>
<td>(for CDN)</td>
</tr>
<tr>
<td>2UD8 (YFM70GPHG)</td>
<td>(for Europe)</td>
</tr>
<tr>
<td>2UD9 (YFM70GPHG)</td>
<td>(for Oceania)</td>
</tr>
<tr>
<td>2UDA (YFM700FWAD)</td>
<td>(for Russia)</td>
</tr>
<tr>
<td>B302 (YF70GG)</td>
<td>(for CDN)</td>
</tr>
<tr>
<td>B303 (YFM70GDXG)</td>
<td>(for Europe)</td>
</tr>
<tr>
<td>B305 (YFM70GDHG)</td>
<td>(for Europe)</td>
</tr>
<tr>
<td>B312 (YF70GPSG)</td>
<td>(for CDN)</td>
</tr>
<tr>
<td>B313 (YFM70GPSG)</td>
<td>(for Europe)</td>
</tr>
<tr>
<td>B314 (YFM70GPSG)</td>
<td>(for Oceania)</td>
</tr>
<tr>
<td>B316 (YF70GPLG)</td>
<td>(for CDN)</td>
</tr>
<tr>
<td>B317 (YFM70GPLG)</td>
<td>(for Europe)</td>
</tr>
<tr>
<td>B318 (YFM70GPLG)</td>
<td>(for Russia)</td>
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### Dimensions

<table>
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<tr>
<th>Dimension</th>
<th>Value</th>
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<tbody>
<tr>
<td>Overall length</td>
<td>2070 mm (81.5 in)</td>
</tr>
<tr>
<td>Overall width</td>
<td>1230 mm (48.4 in)</td>
</tr>
<tr>
<td>Overall height</td>
<td>1253 mm (49.3 in)</td>
</tr>
<tr>
<td>Seat height</td>
<td>918 mm (36.1 in)</td>
</tr>
<tr>
<td>Wheelbase</td>
<td>1250 mm (49.2 in)</td>
</tr>
<tr>
<td>Ground clearance</td>
<td>288 mm (11.3 in)</td>
</tr>
<tr>
<td>Minimum turning radius</td>
<td>3500 mm (138 in)</td>
</tr>
<tr>
<td>Maximum water depth</td>
<td>35 cm (14 in)</td>
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</table>

### Weight

<table>
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<tr>
<th>Type</th>
<th>Value</th>
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<tbody>
<tr>
<td>Curb weight</td>
<td>308.0 kg (679 lb)</td>
</tr>
<tr>
<td></td>
<td>(YF70GG, YFM70GDHG,</td>
</tr>
<tr>
<td></td>
<td>YFM70GDXG)</td>
</tr>
<tr>
<td></td>
<td>314.0 kg (692 lb)</td>
</tr>
<tr>
<td></td>
<td>(YF70GPG, YFM700FWAD,</td>
</tr>
<tr>
<td></td>
<td>YFM70GPHG, YFM70GPXG)</td>
</tr>
<tr>
<td></td>
<td>320.0 kg (705 lb)</td>
</tr>
<tr>
<td></td>
<td>(YF70GPLG, YF70GPSG,</td>
</tr>
<tr>
<td></td>
<td>YFM70GPLG, YFM70GPSG)</td>
</tr>
<tr>
<td>Maximum loading limit</td>
<td>240.0 kg (530 lb)</td>
</tr>
<tr>
<td></td>
<td>(Total weight of rider,</td>
</tr>
<tr>
<td></td>
<td>cargo, accessories,</td>
</tr>
<tr>
<td></td>
<td>and tongue)</td>
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### Loading

<table>
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<tr>
<th>Type</th>
<th>Value</th>
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<tr>
<td>Front carrier load limit</td>
<td>50.0 kg (110 lb)</td>
</tr>
<tr>
<td>Rear carrier load limit</td>
<td>90.0 kg (198 lb)</td>
</tr>
<tr>
<td>Storage compartment load limit</td>
<td>4.0 kg (9 lb)</td>
</tr>
<tr>
<td>Front storage compartment load limit</td>
<td>0.5 kg (1 lb)</td>
</tr>
<tr>
<td>Rear storage compartment load limit</td>
<td>2.0 kg (4 lb)</td>
</tr>
<tr>
<td>Trailer hitch pulling load limit</td>
<td>5880 N (600 kgf, 1322 lbf)</td>
</tr>
<tr>
<td>Trailer hitch vertical load limit</td>
<td>147 N (15 kgf, 33 lbf)</td>
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### Engine

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<th>Specification</th>
<th>Specification Details</th>
</tr>
</thead>
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<tr>
<td>Engine type</td>
<td>Liquid cooled 4-stroke, DOHC</td>
</tr>
<tr>
<td>Cylinder arrangement</td>
<td>Single cylinder</td>
</tr>
<tr>
<td>Displacement</td>
<td>708 cm³</td>
</tr>
<tr>
<td>Bore × stroke</td>
<td>103.0 × 85.0 mm (4.06 × 3.35 in)</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>10.1 : 1</td>
</tr>
<tr>
<td>Standard compression pressure (at sea level)</td>
<td>650–1000 kPa (6.5–10.0 kgf/cm², 92.4–142.2 psi)</td>
</tr>
<tr>
<td>Starting system</td>
<td>Electric starter</td>
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### Fuel

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<th>Specification</th>
<th>Specification Details</th>
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</thead>
<tbody>
<tr>
<td>Recommended fuel</td>
<td>Regular unleaded gasoline only (for CDN and Oceania)</td>
</tr>
<tr>
<td></td>
<td>Regular unleaded gasoline only with a research octane number of 95 or higher (for Europe)</td>
</tr>
<tr>
<td></td>
<td>Unleaded gasoline only. Minimum research octane number 91 (for Russia)</td>
</tr>
<tr>
<td>Fuel tank capacity</td>
<td>18.0 L (4.75 US gal, 3.96 Imp.gal)</td>
</tr>
<tr>
<td>Fuel reserve amount</td>
<td>4.0 L (1.06 US gal, 0.88 Imp.gal)</td>
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### Engine oil

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<th>Specification</th>
<th>Specification Details</th>
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<tr>
<td>Lubrication system</td>
<td>Wet sump</td>
</tr>
<tr>
<td>Recommended brand</td>
<td>YAMALUBE</td>
</tr>
<tr>
<td>Type</td>
<td>SAE 0W-30, 10W-30, 10W-40, 15W-40, 20W-40 or 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>
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</tr>
<tr>
<td>Without oil filter cartridge replacement</td>
<td>2.00 L (2.11 US qt, 1.76 Imp.qt)</td>
</tr>
<tr>
<td>With oil filter cartridge replacement</td>
<td>2.10 L (2.22 US qt, 1.85 Imp.qt)</td>
</tr>
<tr>
<td>Quantity (disassembled)</td>
<td>2.60 L (2.75 US qt, 2.29 Imp.qt)</td>
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### Differential gear oil

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification Details</th>
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<tbody>
<tr>
<td>Type</td>
<td>Yamaha Friction Modified Plus Shaft Drive Oil (Part No.: ACC-SHFTL-PL-32) or SAE 80 API GL-4 Hypoid gear oil</td>
</tr>
<tr>
<td>Quantity</td>
<td>0.22 L (0.23 US qt, 0.19 Imp.qt)</td>
</tr>
<tr>
<td>Quantity (disassembled)</td>
<td>0.23 L (0.24 US qt, 0.20 Imp.qt)</td>
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### Final gear oil

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<thead>
<tr>
<th>Specification</th>
<th>Specification Details</th>
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<tbody>
<tr>
<td>Type</td>
<td>Yamaha Friction Modified Plus Shaft Drive Oil (Part No.: ACC-SHFTL-PL-32) or SAE 80 API GL-4 Hypoid gear oil</td>
</tr>
<tr>
<td>Quantity</td>
<td>0.20 L (0.21 US qt, 0.18 Imp.qt)</td>
</tr>
<tr>
<td>Quantity (disassembled)</td>
<td>0.25 L (0.26 US qt, 0.22 Imp.qt)</td>
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### Oil filter

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<tbody>
<tr>
<td>Oil filter type</td>
<td>Cartridge</td>
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## ENGINE SPECIFICATIONS

### Oil pump
- **Inner-rotor-to-outer-rotor-tip clearance limit**: 0.20 mm (0.0079 in)
- **Outer-rotor-to-oil-pump-housing clearance limit**: 0.240 mm (0.0094 in)
- **Oil pressure (hot)**: 50.0 kPa/1600 r/min (0.50 kgf/cm²/1600 r/min, 7.3 psi/1600 r/min)

### Cooling system
- **Coolant quantity**
  - Radiator (including all routes): 1.76 L (1.86 US qt, 1.55 Imp.qt)
  - Coolant reservoir (up to the maximum level mark): 0.25 L (0.26 US qt, 0.22 Imp.qt)
- **Radiator core**
  - Width: 340.0 mm (13.39 in)
  - Height: 258.0 mm (10.16 in)
  - Depth: 24.0 mm (0.94 in)
- **Radiator cap opening pressure**: 107.9–137.3 kPa (1.1–1.4 kgf/cm², 15.6–19.9 psi)
- **Thermostat**
  - Valve opening temperature: 69–73 °C (156–163 °F)
  - Valve full open temperature: 84 °C (183 °F)
  - Valve lift (full open): 8.0 mm (0.31 in)
- **Water pump**
  - Water pump type: Single suction centrifugal pump
  - Impeller shaft tilt limit: 0.15 mm (0.006 in)

### Spark plug (s)
- **Manufacturer/model**: NGK/CPR7EA-9
- **Spark plug gap**: 0.8–0.9 mm (0.031–0.035 in)

### Cylinder head
- **Warpage limit**: 0.03 mm (0.0012 in)

### Camshaft
- **Drive system**: Chain drive (left)
- **Camshaft journal diameter**: 21.946–21.963 mm (0.8640–0.8647 in)
- **Camshaft lobe dimensions**
  - Lobe height (Intake) limit: 33.800 mm (1.3307 in)
  - Base circle diameter (Intake) limit: 24.850 mm (0.9783 in)
  - Lobe height (Exhaust) limit: 30.750 mm (1.2106 in)
  - Base circle diameter (Exhaust) limit: 22.350 mm (0.8799 in)
  - Camshaft-journal-to-camshaft-cap clearance: 0.037–0.075 mm (0.0015–0.0030 in)

### Valve, valve seat, valve guide
- **Valve clearance (cold)**
  - Intake: 0.10–0.20 mm (0.0039–0.0079 in)
  - Exhaust: 0.22–0.32 mm (0.0087–0.0126 in)
- **Valve dimensions**
  - Valve head diameter (intake): 38.90–39.10 mm (1.5315–1.5394 in)
  - Valve head diameter (exhaust): 31.90–32.10 mm (1.2559–1.2638 in)
  - Valve seat contact width (intake): 1.34–1.48 mm (0.0528–0.0583 in)
  - Valve seat contact width (intake) limit: 1.9 mm (0.07 in)
  - Valve seat contact width (exhaust): 1.34–1.48 mm (0.0528–0.0583 in)
### Valve Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve seat contact width (exhaust)</td>
<td>1.9 mm (0.07 in)</td>
</tr>
<tr>
<td>Valve stem diameter (intake)</td>
<td>5.420 mm (0.2134 in)</td>
</tr>
<tr>
<td>Valve stem diameter (exhaust)</td>
<td>5.415 mm (0.2132 in)</td>
</tr>
<tr>
<td>Valve guide inside diameter (intake)</td>
<td>5.550 mm (0.2185 in)</td>
</tr>
<tr>
<td>Valve guide inside diameter (exhaust)</td>
<td>5.550 mm (0.2185 in)</td>
</tr>
<tr>
<td>Valve-stem-to-valve-guide clearance (intake)</td>
<td>0.080 mm (0.0032 in)</td>
</tr>
<tr>
<td>Valve-stem-to-valve-guide clearance (exhaust)</td>
<td>0.100 mm (0.0039 in)</td>
</tr>
<tr>
<td>Valve stem runout</td>
<td>0.040 mm (0.0016 in)</td>
</tr>
</tbody>
</table>

#### Valve Spring

<table>
<thead>
<tr>
<th>Specification</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring tilt (intake)</td>
<td>1.7 mm (0.07 in)</td>
</tr>
<tr>
<td>Spring tilt (exhaust)</td>
<td>1.7 mm (0.07 in)</td>
</tr>
<tr>
<td>Winding direction (intake)</td>
<td>Clockwise</td>
</tr>
<tr>
<td>Winding direction (exhaust)</td>
<td>Clockwise</td>
</tr>
</tbody>
</table>

#### Cylinder

<table>
<thead>
<tr>
<th>Specification</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bore</td>
<td>103.000–103.020 mm (4.0551–4.0559 in)</td>
</tr>
<tr>
<td>Wear limit</td>
<td>103.080 mm (4.0583 in)</td>
</tr>
<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>

#### Piston

<table>
<thead>
<tr>
<th>Specification</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piston-to-cylinder clearance</td>
<td>0.040–0.075 mm (0.0016–0.0030 in)</td>
</tr>
<tr>
<td>Diameter</td>
<td>102.960–102.975 mm (4.0535–4.0541 in)</td>
</tr>
<tr>
<td>Measuring point (from piston skirt bottom)</td>
<td>11.0 mm (0.43 in)</td>
</tr>
<tr>
<td>Piston pin bore inside diameter limit</td>
<td>23.035 mm (0.9069 in)</td>
</tr>
<tr>
<td>Piston pin outside diameter limit</td>
<td>22.974 mm (0.9045 in)</td>
</tr>
</tbody>
</table>

#### Piston Ring

<table>
<thead>
<tr>
<th>Specification</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top ring</td>
<td>Barrel</td>
</tr>
<tr>
<td>Ring type</td>
<td></td>
</tr>
<tr>
<td>End gap (installed) limit</td>
<td>0.50 mm (0.0197 in)</td>
</tr>
<tr>
<td>Ring side clearance limit</td>
<td>0.12 mm (0.0047 in)</td>
</tr>
<tr>
<td>2nd ring</td>
<td>Taper</td>
</tr>
<tr>
<td>Ring type</td>
<td></td>
</tr>
<tr>
<td>End gap (installed) limit</td>
<td>0.70 mm (0.0276 in)</td>
</tr>
<tr>
<td>Ring side clearance limit</td>
<td>0.12 mm (0.0047 in)</td>
</tr>
<tr>
<td>Oil ring</td>
<td></td>
</tr>
<tr>
<td>End gap (installed) limit</td>
<td>1.0 mm (0.04 in)</td>
</tr>
</tbody>
</table>

#### Crankshaft

<table>
<thead>
<tr>
<th>Specification</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crank assembly width</td>
<td>65.68–65.76 mm (2.586–2.589 in)</td>
</tr>
<tr>
<td>Runout limit</td>
<td>0.030 mm (0.0012 in)</td>
</tr>
<tr>
<td>Big end side clearance</td>
<td>0.090–0.500 mm (0.0035–0.197 in)</td>
</tr>
</tbody>
</table>

#### Clutch

<table>
<thead>
<tr>
<th>Specification</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clutch type</td>
<td>Wet, centrifugal automatic</td>
</tr>
<tr>
<td>Clutch shoe thickness limit</td>
<td>1.0 mm (0.04 in)</td>
</tr>
<tr>
<td>Clutch housing inside diameter</td>
<td>150.0 mm (5.91 in)</td>
</tr>
<tr>
<td>Clutch-in revolution</td>
<td>2000–2100 r/min</td>
</tr>
<tr>
<td>Clutch-stall revolution</td>
<td>3800–3900 r/min</td>
</tr>
</tbody>
</table>
### ENGINE SPECIFICATIONS

#### V-belt
- V-belt width limit: 31.3 mm (1.23 in)
- Transmission type: V-belt automatic
- Operation: Left hand operation
- Low range: 31/16 (1.938)
- High range: 27/25 (1.080)
- Reverse gear: 23/14 × 28/23 (2.000)
- Gear ratio: 2.380–0.700 : 1
- Drive axle runout limit: 0.06 mm (0.0024 in)
- Secondary reduction ratio: 43/21 × 24/18 × 33/9 (10.011)
- Secondary reduction system: Shaft drive

#### Shaft drive
- Middle gear backlash: 0.10–0.30 mm (0.004–0.012 in)
- Final gear backlash: 0.10–0.20 mm (0.004–0.008 in)
- Differential gear backlash: 0.05–0.25 mm (0.002–0.010 in)

#### Shifting mechanism
- Shift fork thickness: 5.76–5.89 mm (0.2268–0.2319 in)

#### Decompression device
- Device type: Auto decomp

#### Air filter
- Air filter element: Wet element
- Air filter oil grade: Foam air-filter oil

#### Fuel pump
- Pump type: Electrical

#### Throttle body
- Type/quantity: 44EIS/1
- ID mark: B161 00
- Throttle valve size: #100

#### Fuel injector
- Model/quantity: E270103/1
- Resistance: 12.0 Ω

#### Throttle position sensor
- Resistance: 2.64–6.16 kΩ

#### Idling condition
- Engine idling speed: 1550–1650 r/min
- CO (%): 2.8 %
- Intake vacuum: 26.7 kPa (200 mmHg, 7.9 inHg)
- Water temperature: 85 °C (185 °F)
- Oil temperature: 55–65 °C (131–149 °F)
- Throttle lever free play: 3.0–5.0 mm (0.12–0.20 in)
- Speed limiter length: 12 mm (0.5 in)
<table>
<thead>
<tr>
<th>Air induction system</th>
<th>Solenoid resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18–22 Ω</td>
</tr>
</tbody>
</table>
# CHASSIS SPECIFICATIONS

## Chassis

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame type</td>
<td>Steel tube frame</td>
</tr>
<tr>
<td>Caster angle</td>
<td>4.53°</td>
</tr>
<tr>
<td>Camber angle</td>
<td>0.3°</td>
</tr>
<tr>
<td>Kingpin angle</td>
<td>11.3°</td>
</tr>
<tr>
<td>Kingpin offset</td>
<td>0.0 mm (0.00 in)</td>
</tr>
<tr>
<td>Trail</td>
<td>26.0 mm (1.02 in)</td>
</tr>
<tr>
<td>Toe-in (with tires touching the ground)</td>
<td>0.0–10.0 mm (0.00–0.39 in)</td>
</tr>
<tr>
<td>Tread rear (STD)</td>
<td>975.0 mm (38.39 in)</td>
</tr>
<tr>
<td>Tread front (STD)</td>
<td>1000.0 mm (39.37 in)</td>
</tr>
</tbody>
</table>

## Front wheel

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel type</td>
<td>Cast wheel (YF70GPLG, YF70GPSG, YFM70GPLG, YFM70GPSG) Panel wheel (YF70GG, YF70GPG, YFM700FWAD, YFM70GDHG, YFM70GDXG, YFM70GPHG, YFM70GPXG)</td>
</tr>
<tr>
<td>Rim size</td>
<td>12 × 6.0AT</td>
</tr>
<tr>
<td>Wheel material</td>
<td>Steel</td>
</tr>
<tr>
<td>Radial wheel runout limit</td>
<td>1.2 mm (0.05 in)</td>
</tr>
<tr>
<td>Lateral wheel runout limit</td>
<td>1.2 mm (0.05 in)</td>
</tr>
</tbody>
</table>

## Rear wheel

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel type</td>
<td>Cast wheel (YF70GPLG, YF70GPSG, YFM70GPLG, YFM70GPSG) Panel wheel (YF70GG, YF70GPG, YFM700FWAD, YFM70GDHG, YFM70GDXG, YFM70GPHG, YFM70GPXG)</td>
</tr>
<tr>
<td>Rim size</td>
<td>12 × 7.5AT</td>
</tr>
<tr>
<td>Wheel material</td>
<td>Steel</td>
</tr>
<tr>
<td>Radial wheel runout limit</td>
<td>1.2 mm (0.05 in)</td>
</tr>
<tr>
<td>Lateral wheel runout limit</td>
<td>1.2 mm (0.05 in)</td>
</tr>
</tbody>
</table>

## Front tire

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Tubeless</td>
</tr>
<tr>
<td>Size</td>
<td>AT26 × 8–12</td>
</tr>
<tr>
<td>Manufacturer/model</td>
<td>MAXXIS/MU05Y</td>
</tr>
<tr>
<td>Wear limit (front)</td>
<td>3.0 mm (0.12 in)</td>
</tr>
</tbody>
</table>

## Rear tire

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Tubeless</td>
</tr>
<tr>
<td>Size</td>
<td>AT26 × 10–12</td>
</tr>
<tr>
<td>Manufacturer/model</td>
<td>MAXXIS/MU06Y</td>
</tr>
<tr>
<td>Wear limit (rear)</td>
<td>3.0 mm (0.12 in)</td>
</tr>
</tbody>
</table>

## Tire air pressure (measured on cold tires)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle load</td>
<td>0 - maximum</td>
</tr>
<tr>
<td>Front</td>
<td>35.0 kPa (0.350 kgf/cm², 5.0 psi)</td>
</tr>
<tr>
<td>Rear</td>
<td>30.0 kPa (0.300 kgf/cm², 4.4 psi)</td>
</tr>
</tbody>
</table>
### Minimum Vehicle load
- Front: 32.0 kPa (0.320 kgf/cm², 4.6 psi)
- Rear: 27.0 kPa (0.270 kgf/cm², 4.0 psi)

### Front brake
- **Type**: Hydraulic disc brake
- **Operation**: Right hand operation
- **Disc outside diameter × thickness**: 220.0 × 3.5 mm (8.66 × 0.14 in)
- **Brake disc thickness limit**: 3.0 mm (0.12 in)
- **Brake disc deflection limit**: 0.10 mm (0.0039 in)
- **Master cylinder inside diameter**: 12.70 mm (0.50 in)
- **Caliper cylinder inside diameter**: 33.96 mm (1.34 in)
- **Brake pad lining thickness limit**: 3.0 mm (0.12 in)
- **Brake disc thickness limit**: 3.0 mm (0.12 in)
- **Brake disc deflection limit**: 0.10 mm (0.0039 in)
- **Master cylinder inside diameter**: 12.70 mm (0.50 in)
- **Caliper cylinder inside diameter**: 33.96 mm (1.34 in)
- **Specified brake fluid**: DOT 4
- **Brake pedal free play**: 1.0–6.0 mm (0.04–0.24 in)

### Rear brake
- **Type**: Hydraulic disc brake
- **Operation**: Left hand and right foot operation
- **Disc outside diameter × thickness**: 205.0 × 3.5 mm (8.07 × 0.14 in)
- **Brake disc thickness limit**: 3.0 mm (0.12 in)
- **Brake disc deflection limit**: 0.10 mm (0.0039 in)
- **Master cylinder inside diameter**: 12.70 mm (0.50 in)
- **Caliper cylinder inside diameter**: 33.96 mm (1.34 in)
- **Specified brake fluid**: DOT 4

### Front suspension
- **Type**: Double wishbone
- **Spring/shock absorber type**: Coil spring/gas-oil damper
- **Shock absorber travel**: 111.7 mm (4.40 in)
- **Installed length**: 259.8 mm (10.23 in)
- **Wheel travel**: 193 mm (7.6 in)

### Rear suspension
- **Type**: Double wishbone
- **Spring/shock absorber type**: Coil spring/gas-oil damper
- **Wheel travel**: 232 mm (9.1 in)
- **Rear shock absorber assembly travel**: 120.3 mm (4.74 in)
- **Installed length**: 284.6 mm (11.20 in)

### Front and rear suspension spring preload adjusting positions
- **Minimum**: 1
- **Standard**: 2
- **Maximum**: 5
## ELECTRICAL SPECIFICATIONS

### Voltage
- System voltage: 12 V

### Engine control unit
- Model/manufacturer:
  - F8T85873/MITSUBISHI (YF70GPLG, YF70GPSG, YFM70GPLG, YFM70GPSG)
  - F8T85875/MITSUBISHI (YF70GPG, YFM70FWAD, YFM70GPHG, YFM70GPXG)
  - F8T85876/MITSUBISHI (YF70GG, YFM70GDHG, YFM70GDXG)

### Ignition system
- Ignition system: TCI
- Advancer type: Digital
- Ignition timing (B.T.D.C.): 7.0°/1600 r/min
- Pickup coil resistance: 152.0–228.0 Ω

### Ignition coil
- Primary coil resistance: 2.16–2.64 Ω
- Secondary coil resistance: 8.64–12.96 kΩ

### Spark plug cap
- Resistance: 10.0 kΩ

### Charging system
- Charging system: AC magneto
- Standard output: 14.0 V, 35.0 A at 5000 r/min
- Stator coil resistance: 0.15–0.22 Ω

### Rectifier/regulator
- Regulator type: Semi conductor-short circuit
- Regulated voltage (DC): 14.3–14.7 V
- Rectifier capacity (DC): 50.0 A

### Battery
- Model: YTX20L-BS
- Voltage, capacity: 12 V, 18.0 Ah

### Handle mounted light
- Handle mounted light bulb type: Halogen bulb

### Bulb voltage, wattage × quantity
- **Headlight**
  - LED
- **Handle mounted light**
  - 12 V, 35.0/36.5 W × 1
- **Tail/brake light**
  - LED
- **Meter lighting**
  - EL (Electroluminescent)

### Indicator light
- Neutral indicator light: LED
- Reverse indicator light: LED

---

2-9
### ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Component</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coolant temperature warning light</td>
<td>LED</td>
</tr>
<tr>
<td>Park indicator light</td>
<td>LED</td>
</tr>
<tr>
<td>Engine trouble warning light</td>
<td>LED</td>
</tr>
<tr>
<td>High-range indicator light</td>
<td>LED</td>
</tr>
<tr>
<td>Low-range indicator light</td>
<td>LED</td>
</tr>
<tr>
<td>Differential gear lock indicator light</td>
<td>LED</td>
</tr>
<tr>
<td>EPS warning light</td>
<td>LED (YF70GPG, YF70GPLG, YF70GPSG, YFM700FWAD, YFM70GPHG, YFM70GPLG, YFM70GPSG, YFM70GPXG)</td>
</tr>
<tr>
<td><strong>Starter motor</strong></td>
<td></td>
</tr>
<tr>
<td>Power output</td>
<td>0.80 kW</td>
</tr>
<tr>
<td>Armature coil resistance</td>
<td>0.005–0.015 Ω</td>
</tr>
<tr>
<td>Brush overall length limit</td>
<td>6.50 mm (0.26 in)</td>
</tr>
<tr>
<td>Mica undercut (depth)</td>
<td>0.70 mm (0.03 in)</td>
</tr>
<tr>
<td><strong>Starter relay</strong></td>
<td></td>
</tr>
<tr>
<td>Amperage</td>
<td>180.0 A</td>
</tr>
<tr>
<td>Coil resistance</td>
<td>4.18–4.62 Ω</td>
</tr>
<tr>
<td><strong>Horn (except for CDN)</strong></td>
<td></td>
</tr>
<tr>
<td>Horn type</td>
<td>Plane (YF700FWAD, YFM70GDXG, YFM70GPHG, YFM70GPLG, YFM70GPSG, YFM70GPXG)</td>
</tr>
<tr>
<td>Quantity</td>
<td>1 pcs (YF700FWAD, YFM70GDXG, YFM70GPHG, YFM70GPLG, YFM70GPSG, YFM70GPXG)</td>
</tr>
<tr>
<td>Maximum amperage</td>
<td>1.0 A (YF700FWAD, YFM70GDXG, YFM70GPHG, YFM70GPLG, YFM70GPSG, YFM70GPXG)</td>
</tr>
<tr>
<td><strong>Fuel sender unit</strong></td>
<td></td>
</tr>
<tr>
<td>Sender unit resistance (full)</td>
<td>19.00–21.00 Ω</td>
</tr>
<tr>
<td>Sender unit resistance (empty)</td>
<td>138.50–141.50 Ω</td>
</tr>
<tr>
<td><strong>EPS torque sensor</strong></td>
<td></td>
</tr>
<tr>
<td>Coil resistance</td>
<td>1.00–1.50 kΩ (YF70GPG, YF70GPLG, YFM70GPSG, YFM700FWAD, YFM70GPHG, YFM70GPLG, YFM70GPSG, YFM70GPXG)</td>
</tr>
<tr>
<td><strong>Auxiliary DC output</strong></td>
<td></td>
</tr>
<tr>
<td>Jack capacity</td>
<td>12 V, 10.0 A (120 W)</td>
</tr>
<tr>
<td><strong>Fuel injection sensor</strong></td>
<td></td>
</tr>
<tr>
<td>Crankshaft position sensor resistance</td>
<td>152–228 Ω</td>
</tr>
<tr>
<td>Intake air pressure sensor output voltage</td>
<td>3.75–4.25 V</td>
</tr>
<tr>
<td>Intake air temperature sensor resistance</td>
<td>5.40–6.60 kΩ at 0 °C (32 °F)</td>
</tr>
<tr>
<td></td>
<td>290–390 Ω at 80 °C (176 °F)</td>
</tr>
<tr>
<td>Coolant temperature sensor resistance</td>
<td>2.32–2.59 kΩ at 20 °C (68 °F)</td>
</tr>
<tr>
<td></td>
<td>310–326 Ω at 80 °C (176 °F)</td>
</tr>
<tr>
<td><strong>Fuses</strong></td>
<td></td>
</tr>
<tr>
<td>Main fuse</td>
<td>40.0 A</td>
</tr>
</tbody>
</table>
### ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Component</th>
<th>Amps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headlight fuse</td>
<td>10.0 A</td>
</tr>
<tr>
<td>Signaling system fuse</td>
<td>10.0 A</td>
</tr>
<tr>
<td>Ignition fuse</td>
<td>10.0 A</td>
</tr>
<tr>
<td>Radiator fan motor fuse</td>
<td>20.0 A</td>
</tr>
<tr>
<td>Auxiliary DC jack fuse</td>
<td>10.0 A</td>
</tr>
<tr>
<td>Fuel injection system fuse</td>
<td>15.0 A</td>
</tr>
<tr>
<td>Four-wheel-drive motor fuse</td>
<td>10.0 A</td>
</tr>
<tr>
<td>EPS fuse (YF70GPG, YF70GPG, YF70GPSG, YFM700FWAD, YFM70GPG, YFM70GPG, YFM70GPSG, YFM70GPGXG)</td>
<td>40.0 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.

<table>
<thead>
<tr>
<th>A (nut)</th>
<th>B (bolt)</th>
<th>General tightening torques</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nm</td>
</tr>
<tr>
<td>10 mm</td>
<td>6 mm</td>
<td>6</td>
</tr>
<tr>
<td>12 mm</td>
<td>8 mm</td>
<td>15</td>
</tr>
<tr>
<td>14 mm</td>
<td>10 mm</td>
<td>30</td>
</tr>
<tr>
<td>17 mm</td>
<td>12 mm</td>
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<tr>
<td>V-belt cooling exhaust duct joint clamp screw</td>
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<td>V-belt cooling intake duct joint clamp screw</td>
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<td>Exhaust pipe nut</td>
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<td>Exhaust pipe protector bolt</td>
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<td>Spark arrester bolt</td>
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<td>Cylinder head cover bolt</td>
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<td>Breather plate cover bolt</td>
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<td>Camshaft cap bolt</td>
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<tr>
<td>Cylinder head stud bolt (exhaust pipe)</td>
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<td>Timing chain tensioner bolt</td>
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<td>Thermostat cover bolt</td>
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<td>Thermostat cover air bleed bolt</td>
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<td>Water pump housing bolt</td>
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<td>Water pump outlet pipe bolt</td>
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<td>Oil filter cartridge</td>
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<td>Item</td>
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<td>Oil filter cartridge union bolt</td>
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<tr>
<td>Oil hose union bolt (crankcase to cylinder)</td>
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<td>Oil pipe bolt (crankcase)</td>
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<tr>
<td>Oil pipe bolt (AC magneto cover)</td>
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<td>Shift lever 2 bolt</td>
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<td>Fuel rail screw</td>
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<td>Throttle cable lock nut (throttle body side)</td>
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<td>Drive belt case bolt</td>
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<tr>
<td>Bearing housing bolt (primary sheave assembly)</td>
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<tr>
<td>Bearing retainer bolt (bearing housing)</td>
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<td>Primary sheave assembly nut</td>
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<td>Primary sheave cap screw</td>
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<td>Secondary sheave spring retaining nut</td>
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<td>Clutch housing assembly bolt</td>
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<td>Clutch carrier assembly bolt</td>
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<td>Crankcase bolt (M8)</td>
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<td>Stopper lever stopper bolt</td>
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<td>Relief plug</td>
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<td>Engine oil drain bolt</td>
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<td>Shift drum stopper bolt</td>
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<td>Dipstick guide bolt</td>
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<tr>
<td>Bearing retainer bolt (crankcase)</td>
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<tr>
<td>Middle drive pinion gear nut</td>
<td>M22</td>
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<tr>
<td>Middle drive shaft bearing housing bolt</td>
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## Tightening Torques

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<th>Thread size</th>
<th>Q’ty</th>
<th>Tightening torque</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>Middle drive shaft bearing retainer bolt</td>
<td>M8</td>
<td>4</td>
<td>29 Nm (2.9 m-kgf, 21 ft-lbf)</td>
<td>Stake.</td>
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<tr>
<td>Rear drive shaft coupling gear nut (middle gear side)</td>
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<td>1</td>
<td>150 Nm (15 m-kgf, 108 ft-lbf)</td>
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<tr>
<td>Middle driven shaft bearing retainer</td>
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<td>80 Nm (8.0 m-kgf, 58 ft-lbf)</td>
<td>Left-hand thread</td>
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<tr>
<td>Middle driven pinion gear bearing housing bolt</td>
<td>M8</td>
<td>4</td>
<td>25 Nm (2.5 m-kgf, 18 ft-lbf)</td>
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<tr>
<td>Middle driven pinion gear bearing retainer</td>
<td>M60</td>
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<td>130 Nm (13 m-kgf, 94 ft-lbf)</td>
<td>Left-hand thread</td>
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<tr>
<td>Front drive shaft coupling gear nut (middle gear side)</td>
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<td>115 Nm (11.5 m-kgf, 83 ft-lbf)</td>
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<tr>
<td>Starter motor bolt</td>
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<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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<tr>
<td>Starter motor cover bolt</td>
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<td>5 Nm (0.5 m-kgf, 3.6 ft-lbf)</td>
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<tr>
<td>Starter motor lead nut</td>
<td>M6</td>
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<td>11 Nm (1.1 m-kgf, 8.0 ft-lbf)</td>
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<tr>
<td>Starter motor lead terminal nut</td>
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<td>11 Nm (1.1 m-kgf, 8.0 ft-lbf)</td>
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<tr>
<td>Spark plug (new)</td>
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<td>11 Nm (1.1 m-kgf, 8.0 ft-lbf)</td>
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<tr>
<td>Stator coil assembly bolt</td>
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<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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<tr>
<td>Throttle position sensor screw</td>
<td>M5</td>
<td>2</td>
<td>3.5 Nm (0.35 m-kgf, 2.5 ft-lbf)</td>
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<tr>
<td>Intake air pressure sensor screw</td>
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<td>Crankshaft position sensor bolt</td>
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<td>Coolant temperature sensor</td>
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<td>Speed sensor bolt</td>
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<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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### Tip

**Breather plate cover bolt**

Tighten the breather plate cover bolts to 10 Nm (1.0 m-kgf, 7.2 ft-lbf) in the proper tightening sequence.

### Tip

**Camshaft cap bolt**

Tighten the camshaft cap bolts to 10 Nm (1.0 m-kgf, 7.2 ft-lbf) in the proper tightening sequence.
**TIP**

**Cylinder head bolt and cylinder bolt**
1. Temporarily tighten the cylinder head bolts (M6) and cylinder bolts (M6).
2. Tighten the cylinder head bolts (M11) to 30 Nm (3.0 m·kgf, 22 ft·lbf) in the proper tightening sequence.
3. Tighten the cylinder head bolts (M11) to 70 Nm (7.0 m·kgf, 51 ft·lbf) in the proper tightening sequence.
4. Loosen the cylinder head bolts (M11) 360°.
5. Tighten the cylinder head bolts (M11) to 30 Nm (3.0 m·kgf, 22 ft·lbf) in the proper tightening sequence.
6. Tighten the cylinder head bolts (M11) to the specified angle 85–90° in the proper tightening sequence.
7. Tighten the cylinder head bolts (M11) to the specified angle 85–90° in the proper tightening sequence again.
8. Tighten the cylinder head bolts (M6) and cylinder bolts (M6) to 10 Nm (1.0 m·kgf, 7.2 ft·lbf) in the proper tightening sequence.

**TIP**

**AC magneto cover bolt**
Tighten the AC magneto cover bolts to 10 Nm (1.0 m·kgf, 7.2 ft·lbf) in the proper tightening sequence.
TIP

Oil pump bolt
Tighten the oil pump bolts to 10 Nm (1.0 m-kgf, 7.2 ft-lbf) in the proper 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>
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<tbody>
<tr>
<td>Engine mounting bolt (front) (M6)</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
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<tr>
<td>Engine mounting bolt (front) (M10)</td>
<td>M10</td>
<td>2</td>
<td>42 Nm (4.2 m·kgf, 30 ft·lbf)</td>
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<tr>
<td>Engine mounting bolt (rear) (M6)</td>
<td>M6</td>
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<td>10 Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
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<tr>
<td>Engine mounting bolt (rear) (M10)</td>
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<td>42 Nm (4.2 m·kgf, 30 ft·lbf)</td>
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<tr>
<td>Rubber damper nut (front side)</td>
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<td>42 Nm (4.2 m·kgf, 30 ft·lbf)</td>
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<tr>
<td>Rubber damper nut (rear side)</td>
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<td>42 Nm (4.2 m·kgf, 30 ft·lbf)</td>
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<tr>
<td>Trailer hitch bolt (for panel wheel models)</td>
<td>M10</td>
<td>2</td>
<td>55 Nm (5.5 m·kgf, 40 ft·lbf)</td>
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<td>Trailer hitch bolt (for cast wheel models)</td>
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<td>55 Nm (5.5 m·kgf, 40 ft·lbf)</td>
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<td>Drive select lever unit bolt</td>
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<td>Drive select lever guide bolt</td>
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<td>Shift arm bolt</td>
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<td>Drive select lever shift rod locknut (select lever unit side)</td>
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<td>8 Nm (0.8 m·kgf, 5.8 ft·lbf)</td>
<td>Left-hand thread</td>
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<tr>
<td>Drive select lever shift rod locknut (shift arm side)</td>
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<td>8 Nm (0.8 m·kgf, 5.8 ft·lbf)</td>
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<tr>
<td>Brake pedal free play adjusting nut</td>
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<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
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<td>Brake pedal height adjuster locknut</td>
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<td>Radiator bolt</td>
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<td>Coolant reservoir bolt</td>
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<td>Fuel tank bolt</td>
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<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
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<td>Fuel pump nut</td>
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<td>Fuel tank breather hose joint bolt</td>
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<td>3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)</td>
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<td>Throttle body joint clamp screw (throttle body side)</td>
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<td>Skid plate bolt</td>
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<td>Footrest bracket bolt</td>
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<td>16 Nm (1.6 m·kgf, 12 ft·lbf)</td>
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<td>Footrest board bolt</td>
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<td>8 Nm (0.8 m·kgf, 5.8 ft·lbf)</td>
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<td>Footrest board bolt (left)</td>
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<td>Footrest board nut</td>
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<td>Top cover bolt</td>
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<td>Top cover screw</td>
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<td>0.4 Nm (0.04 m·kgf, 0.29 ft·lbf)</td>
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<td>Side panel bolt</td>
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<td>2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)</td>
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<td>Air filter case bolt</td>
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<td>10 Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
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<tr>
<td>Air filter case joint clamp screw (throttle body side)</td>
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<td>Air filter case joint clamp screw (air filter case side)</td>
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<tr>
<td>Item</td>
<td>Thread size</td>
<td>Q’ty</td>
<td>Tightening torque</td>
<td>Remarks</td>
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<tr>
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<tr>
<td>Air intake duct clamp screw</td>
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<td>Storage compartment bolt</td>
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<tr>
<td>Front carrier bolt</td>
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<td>34 Nm (3.4 m-kgf, 25 ft-lbf)</td>
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<tr>
<td>Front carrier bolt</td>
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<td>2</td>
<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Front guard bolt</td>
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<td>34 Nm (3.4 m-kgf, 25 ft-lbf)</td>
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<tr>
<td>Front carrier bracket bolt</td>
<td>M8</td>
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<td>34 Nm (3.4 m-kgf, 25 ft-lbf)</td>
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<tr>
<td>Front guard cover bolt</td>
<td>M6</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Front guard cover bolt</td>
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<td>4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)</td>
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<tr>
<td>Front grill bolt</td>
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<td>8 Nm (0.8 m-kgf, 5.8 ft-lbf)</td>
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<td>Front grill bolt</td>
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<td>4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)</td>
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<td>Main switch locknut</td>
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<td>Headlight unit screw</td>
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<tr>
<td>Rear carrier bolt</td>
<td>M10</td>
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<tr>
<td>Rear carrier bolt</td>
<td>M8</td>
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<td>34 Nm (3.4 m-kgf, 25 ft-lbf)</td>
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<tr>
<td>Rear carrier bolt</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Rear carrier bracket bolt</td>
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<td>60 Nm (6.0 m-kgf, 43 ft-lbf)</td>
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<tr>
<td>License plate bracket nut (for CDN)</td>
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<td>Rear fender bolt</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Rear fender bolt</td>
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<tr>
<td>Rear fender bracket bolt</td>
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<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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<tr>
<td>Rear storage compartment bracket screw</td>
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<td>4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)</td>
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<tr>
<td>Tail/brake light unit nut</td>
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<td>2.8 Nm (0.28 m-kgf, 2.0 ft-lbf)</td>
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<td>Front wheel nut</td>
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<td>55 Nm (5.5 m-kgf, 40 ft-lbf)</td>
<td>Stake.</td>
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<tr>
<td>Front wheel axle nut</td>
<td>M20</td>
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<td>260 Nm (26 m-kgf, 188 ft-lbf)</td>
<td>Stake.</td>
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<tr>
<td>Rear wheel nut</td>
<td>M10</td>
<td>8</td>
<td>55 Nm (5.5 m-kgf, 40 ft-lbf)</td>
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<tr>
<td>Rear wheel axle nut</td>
<td>M20</td>
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<td>260 Nm (26 m-kgf, 188 ft-lbf)</td>
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<tr>
<td>Brake hose joint bolt</td>
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<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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<tr>
<td>Brake pipe locknut</td>
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<td>19 Nm (1.9 m-kgf, 14 ft-lbf)</td>
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<tr>
<td>Front brake caliper bolt</td>
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<td>30 Nm (3.0 m-kgf, 22 ft-lbf)</td>
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<tr>
<td>Front brake disc bolt</td>
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<td>8</td>
<td>30 Nm (3.0 m-kgf, 22 ft-lbf)</td>
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<tr>
<td>Rear brake caliper bolt</td>
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<td>30 Nm (3.0 m-kgf, 22 ft-lbf)</td>
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<tr>
<td>Rear brake disc bolt</td>
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<td>Brake hose union bolt</td>
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<td>6</td>
<td>27 Nm (2.7 m-kgf, 20 ft-lbf)</td>
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<tr>
<td>Brake pad holding bolt</td>
<td>M6</td>
<td>4</td>
<td>17 Nm (1.7 m-kgf, 12 ft-lbf)</td>
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<tr>
<td>Brake pad holding bolt plug</td>
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<td>4</td>
<td>2.5 Nm (0.25 m-kgf, 1.8 ft-lbf)</td>
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<tr>
<td>Brake caliper guide pin</td>
<td>M8</td>
<td>4</td>
<td>17 Nm (1.7 m-kgf, 12 ft-lbf)</td>
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</table>
### TIGHTENING TORQUES

<table>
<thead>
<tr>
<th>Item</th>
<th>Thread size</th>
<th>Q’ty</th>
<th>Tightening torque</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>Brake caliper retaining pin nut</td>
<td>M8</td>
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<td>22 Nm (2.2 m-kgf, 16 ft-lbf)</td>
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<tr>
<td>Brake caliper bleed screw</td>
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<td>5 Nm (0.5 m-kgf, 3.6 ft-lbf)</td>
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<tr>
<td>Steering knuckle and front upper arm nut</td>
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<td>30 Nm (3.0 m-kgf, 22 ft-lbf)</td>
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<tr>
<td>Steering knuckle and front lower arm nut</td>
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<tr>
<td>Steering knuckle and tie-rod nut</td>
<td>M10</td>
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<td>25 Nm (2.5 m-kgf, 18 ft-lbf)</td>
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<tr>
<td>Front upper arm nut</td>
<td>M10</td>
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<td>55 Nm (5.5 m-kgf, 40 ft-lbf)</td>
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<tr>
<td>Front lower arm nut</td>
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<td>55 Nm (5.5 m-kgf, 40 ft-lbf)</td>
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<tr>
<td>Front shock absorber assembly nut</td>
<td>M10</td>
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<td>45 Nm (4.5 m-kgf, 33 ft-lbf)</td>
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<tr>
<td>Front brake disc guard bolt</td>
<td>M6</td>
<td>6</td>
<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Front brake hose holder bolt</td>
<td>M6</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Front arm protector bolt</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Rear knuckle nut</td>
<td>M10</td>
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<td>45 Nm (4.5 m-kgf, 33 ft-lbf)</td>
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<tr>
<td>Rear upper arm nut</td>
<td>M10</td>
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<td>55 Nm (5.5 m-kgf, 40 ft-lbf)</td>
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<tr>
<td>Rear lower arm nut</td>
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<tr>
<td>Rear shock absorber assembly nut</td>
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<td>45 Nm (4.5 m-kgf, 33 ft-lbf)</td>
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<tr>
<td>Rear brake disc guard bolt</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Rear brake hose guide bolt</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Rear brake disc cleaning plate bolt</td>
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<tr>
<td>Rear arm protector bolt</td>
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<tr>
<td>Rear arm protector nut</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Stabilizer joint nut</td>
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<td>56 Nm (5.6 m-kgf, 41 ft-lbf)</td>
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<tr>
<td>Stabilizer holder bolt</td>
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<td>30 Nm (3.0 m-kgf, 22 ft-lbf)</td>
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<tr>
<td>Handlebar cover bolt</td>
<td>M6</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Meter cover nut</td>
<td>M5</td>
<td>3</td>
<td>4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)</td>
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<tr>
<td>Handle mounted light screw</td>
<td>M5</td>
<td>2</td>
<td>1.3 Nm (0.13 m-kgf, 0.94 ft-lbf)</td>
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<tr>
<td>Handlebar holder bolt</td>
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<td>20 Nm (2.0 m-kgf, 14 ft-lbf)</td>
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<tr>
<td>Shift control cable adjuster locknut</td>
<td>M6</td>
<td>1</td>
<td>3.0 Nm (0.30 m-kgf, 2.2 ft-lbf)</td>
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<tr>
<td>Front brake master cylinder holder bolt</td>
<td>M6</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Rear brake master cylinder holder bolt</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Brake fluid reservoir cap screw</td>
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<td>4</td>
<td>1.5 Nm (0.15 m-kgf, 1.1 ft-lbf)</td>
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<tr>
<td>Throttle lever assembly screw</td>
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<td>4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)</td>
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<tr>
<td>Throttle lever assembly cover bolt</td>
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<tr>
<td>Front brake light switch screw</td>
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<td>1.2 Nm (0.12 m-kgf, 0.87 ft-lbf)</td>
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<tr>
<td>Rear brake light switch screw</td>
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<td>Handlebar switch screw (left)</td>
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<td>3.5 Nm (0.35 m-kgf, 2.5 ft-lbf)</td>
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<tr>
<td>Horn switch holder screw (except for CDN)</td>
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<tr>
<td>Front brake lever pivot bolt</td>
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<tr>
<td>Item</td>
<td>Thread size (size)</td>
<td>Q’ty</td>
<td>Tightening torque</td>
<td>Remarks</td>
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<td>Front brake lever pivot nut</td>
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<tr>
<td>Rear brake lever pivot bolt</td>
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<tr>
<td>Rear brake lever pivot nut</td>
<td>M6 (6)</td>
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<td>6 Nm (0.6 m·kgf, 4.3 ft·lbf)</td>
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<tr>
<td>Steering stem bolt</td>
<td>M8 (8)</td>
<td>2</td>
<td>23 Nm (2.3 m·kgf, 17 ft·lbf)</td>
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</tr>
<tr>
<td>Steering stem bracket bolt</td>
<td>M10 (10)</td>
<td>2</td>
<td>51 Nm (5.1 m·kgf, 37 ft·lbf)</td>
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<tr>
<td>Bearing retainer (steering stem)</td>
<td>M42 (42)</td>
<td>1</td>
<td>40 Nm (4.0 m·kgf, 29 ft·lbf)</td>
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<tr>
<td>Steering stem support bolt (except for EPS models)</td>
<td>M8 (8)</td>
<td>4</td>
<td>34 Nm (3.4 m·kgf, 25 ft·lbf)</td>
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<tr>
<td>EPS unit bolt (for EPS models)</td>
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<td>35 Nm (3.5 m·kgf, 25 ft·lbf)</td>
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<tr>
<td>Pitman arm nut (except for EPS models)</td>
<td>M16 (16)</td>
<td>4</td>
<td>30 Nm (3.0 m·kgf, 22 ft·lbf)</td>
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<tr>
<td>Pitman arm nut (for EPS models)</td>
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<td>Pitman arm nut (for EPS models)</td>
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<td>EPS motor cover bolt (for EPS models)</td>
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<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
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<tr>
<td>Pitman arm and tie-rod nut</td>
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<td>25 Nm (2.5 m·kgf, 18 ft·lbf)</td>
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<tr>
<td>Tie-rod end locknut (pitman arm side)</td>
<td>M10 (10)</td>
<td>2</td>
<td>15 Nm (1.5 m·kgf, 11 ft·lbf)</td>
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<tr>
<td>Tie-rod end locknut (front wheel side)</td>
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<td>15 Nm (1.5 m·kgf, 11 ft·lbf)</td>
<td>Left-hand thread</td>
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<tr>
<td>Differential assembly nut</td>
<td>M10 (10)</td>
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<tr>
<td>Differential assembly bolt</td>
<td>M10 (10)</td>
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<td>55 Nm (5.5 m·kgf, 40 ft·lbf)</td>
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<tr>
<td>Differential gear oil filler bolt</td>
<td>M14 (14)</td>
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<td>23 Nm (2.3 m·kgf, 17 ft·lbf)</td>
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<tr>
<td>Differential gear oil drain bolt</td>
<td>M10 (10)</td>
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<td>10 Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
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<tr>
<td>Differential case cover bolt</td>
<td>M8 (8)</td>
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<td>24 Nm (2.4 m·kgf, 17 ft·lbf)</td>
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<tr>
<td>Differential motor bolt</td>
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<td>11 Nm (1.1 m·kgf, 8.0 ft·lbf)</td>
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<tr>
<td>Front drive shaft yoke nut (differential case side)</td>
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<tr>
<td>Final drive assembly nut</td>
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<td>66 Nm (6.6 m·kgf, 48 ft·lbf)</td>
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<tr>
<td>Final gear oil filler bolt</td>
<td>M14 (14)</td>
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<td>23 Nm (2.3 m·kgf, 17 ft·lbf)</td>
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<tr>
<td>Final gear oil drain bolt</td>
<td>M14 (14)</td>
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<td>23 Nm (2.3 m·kgf, 17 ft·lbf)</td>
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<tr>
<td>Final gear oil level check bolt</td>
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<tr>
<td>Final drive case cover bolt</td>
<td>M8 (8)</td>
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<tr>
<td>Final drive pinion gear bearing housing bolt</td>
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<tr>
<td>Electrical components tray bolt</td>
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<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
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<td>Positive battery lead bolt</td>
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<td>Lean angle sensor bolt</td>
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<td>EPS control unit screw (for EPS models)</td>
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<td>Thread size</td>
<td>Q’ty</td>
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<tr>
<td>ECU (engine control unit) screw</td>
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<tr>
<td>Intake air temperature sensor screw</td>
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<td>Rectifier/regulator bolt</td>
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<td>Horn bracket bolt (except for CDN)</td>
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<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
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<td>Frame ground bolt</td>
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<tr>
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<td>Valve stem seals (intake and exhaust)</td>
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<tr>
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<td>Transmission collars</td>
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<tr>
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<td>Yamaha bond No.1215 (Three Bond No.1215®)</td>
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1. Oil pan
2. Oil strainer
3. Oil pump
4. Relief valve
5. Oil filter cartridge
6. Drive axle
7. Reverse idle gear shaft
8. Oil pipe (crankcase)
9. Oil hose (crankcase to cylinder)
10. Crankshaft
11. Cylinder head
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<thead>
<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Oil hose (crankcase to cylinder)</td>
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<tr>
<td>2</td>
<td>Oil pipe (crankcase)</td>
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<tr>
<td>3</td>
<td>Oil filter cartridge</td>
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<tr>
<td>4</td>
<td>Oil strainer</td>
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<tr>
<td>5</td>
<td>Oil pump</td>
</tr>
<tr>
<td>6</td>
<td>Oil pipe (AC magneto cover)</td>
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<tr>
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<tr>
<td>8</td>
<td>Drive axle</td>
</tr>
<tr>
<td>9</td>
<td>Relief valve</td>
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</table>
1. Camshaft
2. Crankshaft
3. Oil strainer
4. Oil pump
5. Oil pump driven sprocket
COOLING SYSTEM DIAGRAMS

1. Coolant reservoir hose
2. Radiator inlet hose
3. Coolant reservoir
4. Water pump
5. Water pump inlet hose
6. Water pump outlet pipe
7. Oil cooler inlet hose
8. Water pump outlet hose
9. Radiator outlet hose
10. Radiator
CABLE ROUTING

Handlebar (front view 1)
CABLE ROUTING

1. Front brake hose
2. Throttle cable
3. Rear brake cable
4. Shift control cable
5. Rear brake hose
6. Front brake light switch lead
7. On-Command four-wheel-drive motor switch and differential gear lock switch lead
8. Meter assembly lead
9. Rear brake light switch lead
10. Handlebar switch lead (left)
11. Horn switch lead (except for CDN)
   A. Adjust the front brake hose, throttle cable and rear brake hose so that the slack in the hoses and cable is positioned below the handle mounted light cover and to the front of the steering stem.
   B. Pass the rear brake hose through the guide.
   C. Pass the rear brake cable and shift control cable through the guide.
   D. Pass the front brake hose and throttle cable through the guide.
   E. Route the leads on top of where the cables cross.
   F. Pass the leads through the holder.
   G. Do not fasten the throttle cable or rear brake cable. Make sure that the throttle cable and rear brake cable are not twisted around the other leads.
   H. To meter assembly
   I. To handle mounted light
1. Front brake light switch lead
2. On-Command four-wheel-drive motor switch and differential gear lock switch lead
3. Rear brake light switch lead
4. Handlebar switch lead (left)
5. Differential case breather hose
6. Radiator fan motor breather hose
7. Radiator fan motor lead
8. Final drive case breather hose
9. Throttle body breather hose
10. Meter assembly lead
11. Horn switch lead (except for CDN)
12. Horn lead (except for CDN)

A. Fasten the front brake light switch lead and On-Command four-wheel-drive motor switch and differential gear lock switch lead with the plastic band, making sure to route the lead under the handlebar and to face the end of the band forward. Align the plastic band with the portion of the handlebar where the handlebar begins to bend.

B. Fasten the rear brake light switch lead, handlebar switch lead (left), and horn switch lead (except for CDN) with the plastic band, making sure to route the lead under the handlebar and to face the end of the band forward. Align the plastic band with the portion of the handlebar where the handlebar begins to bend.

C. Pass the differential case breather hose through the hole on the battery cover.
D. Pass the radiator fan motor breather hose through the hole on the battery cover.
E. Route the radiator fan motor breather hose, differential case breather hose, and horn lead (except for CDN) in front of the frame.
F. Fasten the differential case breather hose to the frame with the plastic band, making sure to face the end of the band inward.
G. Route the differential case breather hose to the inside of the frame.
H. To differential assembly
I. Pass the final drive case breather hose through the hole on the battery cover.
J. Pass the throttle body breather hose through the hole on the battery cover.
K. Fasten the front brake light switch lead, rear brake light switch lead, On-Command four-wheel-drive motor switch and differential gear lock switch lead, handlebar switch lead (left), and horn switch lead (except for CDN) with the clamp in front of the steering stem. Be sure to fasten the clamp above the couplers and fasten it around the protective sleeves of the leads, not the leads themselves.
L. Install the horn L-shaped connectors so that the leads are routed to the left (except for CDN).
1. Coolant reservoir hose
2. Radiator fan motor breather hose
3. Differential case breather hose
4. Ground lead
5. Coolant reservoir breather hose
6. Throttle body breather hose
7. TPS lead
8. Intake air pressure sensor lead
9. Final drive case breather hose
10. Speed sensor lead
11. AC magneto/crankshaft position sensor lead
12. Water pump breather hose
13. Radiator outlet hose
14. Differential motor lead
15. EPS torque sensor lead (for EPS models)
16. Air induction system solenoid lead
17. Shift control cable
18. Gear position switch lead
19. Reverse switch lead
20. Negative battery lead
21. Starter motor lead
22. Wire harness
23. Horn lead (except for CDN)
   A. Face the end of the coolant reservoir breather hose downward.
   B. Pass the AC magneto/crankshaft position sensor lead through the holder.
   C. Fasten the radiator outlet hose to the frame with the plastic band, making sure to face the end of the band inward.
   D. Place the differential motor lead and EPS torque sensor lead (for EPS models) in the holder, and then insert the ends of the holder into the hole in the stay on the frame.
   E. Route the differential case breather hose to the inside of the frame.
   F. Fasten the differential case breather hose to the frame with the plastic band, making sure to face the end of the band inward.
   G. Connect the air induction system solenoid coupler to the air cut-off valve assembly.
   H. Attach the ground lead terminal to the frame using the bolt.
   I. Route the radiator fan motor breather hose, differential case breather hose, and horn lead (except for CDN) to the inside of the radiator outlet hose.
   J. Face the end of the plastic band inward.
   K. For EPS models
   L. Except for EPS models
   M. Pass the hose and leads through the guide in the order listed.
   N. Route the final drive case breather hose above the reverse switch lead and negative battery lead.
   O. Route the speed sensor lead and AC magneto/crankshaft position sensor lead above the reverse switch lead.
   P. Route the shift control cable below the gear position switch lead, speed sensor lead, AC magneto/crankshaft position sensor lead, and final drive case breather hose.
Engine (right side view 1)
1. AC magneto/crankshaft position sensor lead
2. ISC unit lead
3. Final drive case breather hose
4. Negative battery lead
5. Starter motor lead
6. Throttle body breather hose
7. Coolant temperature sensor lead
8. Throttle cable
9. Wire harness
10. Main switch lead
11. Auxiliary DC jack lead
12. Ignition coil lead
13. EPS motor coupler (for EPS models)
14. Differential motor lead
15. EPS torque sensor coupler (for EPS models)
16. Radiator inlet hose
17. Radiator fan motor lead
18. Spark plug lead
19. Brake pedal cable
20. Shift control cable
21. Gear position switch lead
22. Speed sensor lead
23. Reverse switch lead

A. Route the ISC unit lead to the inside of the fuel hose and AC magneto/crankshaft position sensor lead.
B. Route the throttle body breather hose under the throttle cable.
C. Pass the final drive case breather hose and throttle body breather hose through the hole on the battery cover.
D. Route the radiator fan motor lead between the electrical components tray and the radiator inlet hose.
E. Fasten the radiator fan motor lead and radiator fan motor breather hose to the frame with the plastic band, making sure to face the end of the band inward. Be sure to fasten the plastic band around the protective sleeve of the lead, not the lead itself.
F. Route the spark plug lead to the inside of the rear brake cable and shift control cable.
G. Fasten the hose, leads, and wire harness with the plastic band, making sure to position the band near the split in the wire harness.
H. Face the end of the plastic band inward.
I. 45°
J. Insert the projection on each coupler into the hole in the frame from the inside of the frame.
K. For EPS models
L. Except for EPS models
M. Fasten the spark plug leads with the larger diameter section of each holder.
Engine (right side view 2)
1. Tail/brake light lead
2. Fuel tank breather hose
3. Circuit breaker
4. Rectifier/regulator lead
5. AC magneto/crankshaft position sensor lead
6. Wire harness
7. Speed sensor lead
8. Final drive case breather hose
9. Fuel hose
10. Fuel pump lead
A. To tail/brake light
B. Fasten the tail/brake light lead to the frame with a plastic locking tie, making sure to face the end of the tie downward.
C. Route the tail/brake light lead to the outside of the frame.
D. Install the plastic band near the split in the wire harness.
E. Face the end of the plastic band downward.
Electrical components tray (top view)
1. Headlight lead (left)
2. Four-wheel-drive motor relay 1
3. Four-wheel-drive motor relay 2
4. Headlight relay
5. Battery
6. ECU (Engine Control Unit)
7. Negative battery lead
8. Headlight lead (right)
9. Radiator fan motor lead
10. EPS (electric power steering) control unit (for EPS models)
11. Auxiliary DC jack lead
12. Main switch lead
13. EPS control unit lead (for EPS models)
14. Radiator fan motor relay
15. Fuel injection system relay
16. Headlight relay 2
17. Final drive case breather hose
18. Differential motor lead
19. EPS motor lead (for EPS models)
20. EPS torque sensor lead (for EPS models)
21. Starter motor lead
22. Meter assembly lead
23. Wire harness
24. Lean angle sensor lead
25. Coolant reservoir breather hose
26. Fuse box
27. Main fuse
28. EPS fuse (for EPS models)
29. Starter relay
30. Positive battery lead
31. Ground lead
32. Coolant reservoir hose
33. Differential case breather hose
34. Radiator fan motor breather hose
35. Horn lead (except for CDN)

A. To headlight (left)
B. Connect the headlight coupler, and then fasten the coupler with the holder on the electrical components tray.
C. To headlight (right)
D. Route the negative battery lead along the guide on the electrical components tray.
E. Place the couplers on the inside of the electrical components tray.
F. To main switch and auxiliary DC jack
G. Route the final drive case breather hose above the leads in the electrical components tray.
H. Route the starter motor lead above the leads in the electrical components tray.
I. Fasten the EPS control unit leads with the holder. (for EPS models)
J. Fasten the meter assembly lead and EPS control unit lead with the twist tie. (for EPS models)
K. Fasten the handlebar switch lead (left), On-Command four-wheel-drive motor switch and differential gear lock switch lead, front brake light switch lead, rear brake light switch lead, and horn switch lead (except for CDN) with the holder.
L. Pass the coolant reservoir breather hose through the guides on the electrical components tray and route it under the positive battery lead and starter motor lead.
M. Route the hoses under the positive battery lead, and then route them upward, to the inside of the coolant reservoir breather hose and horn lead (except for CDN).
N. Fasten the coolant reservoir breather hose with the holder on the electrical components tray.
O. Route the hoses under the positive battery lead, and then route them upward, to the inside of the coolant reservoir breather hose.
P. Pass the hoses and ground lead, and horn lead (except for CDN) through the opening in the electrical components tray.
Q. Route the coolant reservoir breather hose above the other hoses.
R. Route the hoses to the inside of the screw.
S. Except for EPS models
T. Fasten the meter assembly lead with the holder.
1. Throttle cable
2. Rear brake cable
3. Rear brake hose
4. Shift control cable
5. Front brake hose
6. Negative battery lead
7. Final drive case breather hose
8. Starter motor lead
9. Throttle body breather hose
10. Coolant temperature sensor lead
11. Wire harness
12. ISC unit lead
13. Rectifier/regulator lead
14. AC magneto lead
15. Fuel hose
16. Circuit breaker
17. Tail/brake light lead
18. Fuel pump lead
19. Intake air temperature sensor lead
20. TPS lead
21. Intake air pressure sensor lead
22. Fuel injector lead

A. Route the throttle cable between the air duct and the frame.
B. Fasten the throttle body breather hose with the holder.
C. Make sure that the fuel hose and fuel pump lead are not pinched between the frame and the rear fender.
Front and rear brake hoses
1. Front brake pipe
2. Front brake hose
3. Rear brake pipe
4. Rear brake hose
   A. Face the mark on the front brake pipe upward.
   B. Route the front brake hose above the frame.
   C. Pass the front brake hose through the holder.
   D. Fasten the front brake hose with the holder.
   E. Connect the end of the front brake hose that is identified by the green paint mark to the left front brake caliper.
   F. Pass the rear brake pipe through the holder.
   G. Fasten the rear brake hose with the holder.
   H. Route the rear brake hose above the frame.
   I. Connect the end of the rear brake hose that is identified by the green paint mark to the left rear brake caliper.
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**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**

**TIP**
- For vehicles not equipped with an odometer or an hour meter, follow the month maintenance intervals.
- For vehicles equipped with an odometer or an hour meter, follow the km (mi) or hours maintenance intervals. However, keep in mind that if the vehicle isn’t used for a long period of time, the month maintenance intervals should be followed.
- Items marked with an asterisk should be performed by a Yamaha dealer as they require special tools, data and technical skills.

<table>
<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
<th>CHECK OR MAINTENANCE JOB</th>
<th>INITIAL</th>
<th>EVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Whichever comes first</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>month 1 3 6 6 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>km (mi) 320 1300 2500 2500 5000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>hours 20 80 160 160 320</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>* Fuel line</td>
<td>Check fuel hoses for cracks or other damage, and replace if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>Spark plug</td>
<td>Check condition and clean, regap, or replace if necessary.</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>3</td>
<td>* Valves</td>
<td>Check valve clearance and adjust if necessary.</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>4</td>
<td>* Crankcase breather system</td>
<td>Check breather hose for cracks or other damage, and replace if necessary.</td>
<td>✓</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>5</td>
<td>* Exhaust system</td>
<td>Check for leakage and replace gasket(s) if necessary.</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>6</td>
<td>Spark arrester</td>
<td>Clean.</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>7</td>
<td>* Air induction system</td>
<td>Check the air cut-off valve, reed valve, and hose for damage.</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace any damaged parts if necessary.</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓</td>
</tr>
</tbody>
</table>

**GENERAL MAINTENANCE AND LUBRICATION CHART**

**TIP**
- For vehicles not equipped with an odometer or an hour meter, follow the month maintenance intervals.
- For vehicles equipped with an odometer or an hour meter, follow the km (mi) or hours maintenance intervals. However, keep in mind that if the vehicle isn’t used for a long period of time, the month maintenance intervals should be followed.
- Items marked with an asterisk should be performed by a Yamaha dealer as they require special tools, data and technical skills.
<table>
<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
<th>CHECK OR MAINTENANCE JOB</th>
<th>INITIAL</th>
<th>EVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Whichever comes first</td>
<td>September</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>km (mi)</td>
<td>320 (200)</td>
<td>1300 (800)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hours</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>1</td>
<td>Air filter element</td>
<td>• Clean and replace if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Every 20–40 hours (more often in wet or dusty areas)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Front brake</td>
<td>• Check operation and correct if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check fluid level and ATV for fluid leakage, and correct if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace brake pads.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Whenever worn to the limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear brake</td>
<td>• Check operation and correct if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check brake pedal free play and adjust if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check fluid level and ATV for fluid leakage, and correct if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace brake pads.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Whenever worn to the limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake hoses</td>
<td>• Check for cracks or other damage, and replace if necessary.</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>5</td>
<td>Brake fluid</td>
<td>• Change.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Every 2 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Wheels</td>
<td>• Check runout and for damage, and replace if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>7</td>
<td>Tires</td>
<td>• Check tread depth and for damage, and replace if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check air pressure and balance, and correct if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Wheel hub bearings</td>
<td>• Check for looseness or damage, and replace if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>9</td>
<td>V-belt</td>
<td>• Check for wear, cracks or other damage, and replace if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>10</td>
<td>Chassis fasteners</td>
<td>• Make sure that all nuts, bolts, and screws are properly tightened.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>11</td>
<td>Shock absorber assem-</td>
<td>• Check operation and correct if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>blyes</td>
<td>• Check for oil leakage and replace if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Stabilizer bushes</td>
<td>• Check for cracks or other damage, and replace if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>13</td>
<td>Rear knuckle pivots</td>
<td>• Lubricate with lithium-soap-based grease.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>14</td>
<td>Steering shaft</td>
<td>• Lubricate with lithium-soap-based grease.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>15</td>
<td>Steering system</td>
<td>• Check operation and repair or replace if damaged.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check toe-in and adjust if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Engine mount</td>
<td>• Check for cracks or other damage, and replace if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>17</td>
<td>Axle boots</td>
<td>• Check for cracks or other damage, and replace if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>18</td>
<td>Engine oil</td>
<td>• Change.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check ATV for oil leakage, and correct if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Engine oil filter car-</td>
<td>• Replace.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>tridge</td>
<td>• Change.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Differential gear oil</td>
<td>• Change.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check ATV for oil leakage, and correct if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Final gear oil</td>
<td>• Change.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check ATV for oil leakage, and correct if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Cooling system</td>
<td>• Check coolant level and ATV for coolant leakage, and correct if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace coolant.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Every 2 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Moving parts and ca-</td>
<td>• Lubricate.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>bles</td>
<td>• Change.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Drive select lever</td>
<td>• Check operation and adjust or replace if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>safety system cable</td>
<td>• Change.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3-2


### PERIODIC MAINTENANCE

<table>
<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
<th>CHECK OR MAINTENANCE JOB</th>
<th>INITIAL</th>
<th>EVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Whichever comes first</td>
<td>month</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>km (mi)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>hours</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Throttle lever</td>
<td>• Check operation.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check throttle lever free play, and adjust if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lubricate cable and lever housing.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>26</td>
<td>Front and rear brake switches</td>
<td>• Check operation and correct if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>27</td>
<td>Lights and switches</td>
<td>• Check operation and correct if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adjust headlight beams.</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

### TIP

- Some maintenance items need more frequent service if you are riding in unusually wet, dusty, sandy or muddy areas, or at full throttle.
- Hydraulic brake service
  - Regularly check and, if necessary, correct the brake fluid level.
  - 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.
PERIODIC MAINTENANCE

CHECKING THE FUEL LINE
1. Remove:
   • Side panel (right)
     Refer to “GENERAL CHASSIS (1)” on page 4-1.
   • Rear fender
     Refer to “GENERAL CHASSIS (3)” on page 4-8.
   • V-belt cooling exhaust duct
     Refer to “ENGINE REMOVAL (1)” on page 5-3.
2. Check:
   • Fuel hose “1”
     Cracks/damage → Replace.
     Loose connection → Connect properly.
3. Install:
   • V-belt cooling exhaust duct
     Refer to “ENGINE REMOVAL (1)” on page 5-3.
   • Rear fender
     Refer to “GENERAL CHASSIS (3)” on page 4-8.
   • Side panel (right)
     Refer to “GENERAL CHASSIS (1)” on page 4-1.

CHECKING THE SPARK PLUG
1. Remove:
   • Side panel (right)
     Refer to “GENERAL CHASSIS (1)” on page 4-1.
2. Disconnect:
   • Spark plug cap
3. Remove:
   • Spark plug

   NOTICE
   Before removing the spark plug, blow away any dirt accumulated in the spark plug well with compressed air to prevent it from falling into the cylinder.

4. Check:
   • Spark plug type
     Incorrect → Change.

   Manufacturer/model
   NGK/CPR7EA-9

5. Check:
   • Electrodes “1”
     Damage/wear → Replace the spark plug.
   • Insulator “2”
     Abnormal color → Replace the spark plug.
     Normal color is medium-to-light tan.

6. Clean:
   • Spark plug
     (with a spark plug cleaner or wire brush)

7. Measure:
   • Spark plug gap “a”
     (with a wire thickness gauge)
     Out of specification → Regap.

   Spark plug gap
   0.8–0.9 mm (0.031–0.035 in)

8. Install:
   • Spark plug

   TIP
   Before installing the spark plug, clean the spark plug and gasket surface.

9. Connect:
   • Spark plug cap

10. Install:
    • Side panel (right)
      Refer to “GENERAL CHASSIS (1)” on page 4-1.

   Spark plug (new)
   11 Nm (1.1 m·kgf, 8.0 ft·lbf)
   Spark plug (reused)
   Specified angle 30–45°
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:
   - Side panel (left)
   - Side panel (right)
     Refer to “GENERAL CHASSIS (1)” on page 4-1.
   - Footrest board (left)
     Refer to “GENERAL CHASSIS (4)” on page 4-11.
   - Storage compartment
     Refer to “GENERAL CHASSIS (5)” on page 4-17.

2. Disconnect:
   - Cylinder head breather hose “1”
     Refer to “ENGINE REMOVAL (3)” on page 5-8.
   - Spark plug cap “2”
     Refer to “CAMSHAFTS” on page 5-12.

3. Remove:
   - Spark plug
   - Cylinder head cover “3”
     Refer to “CAMSHAFTS” on page 5-12.

4. Remove:
   - Crankshaft end accessing screw “1”

5. Measure:
   - Valve clearance
     Out of specification → Adjust.

![Diagram of valve clearance measurement](image_url)

**NOTICE**

Before removing the spark plug, blow away any dirt accumulated in the spark plug well with compressed air to prevent it from falling into the cylinder.

![Thickness gauge and feeler gauge set](image_url)

**Valve clearance (cold)**

<table>
<thead>
<tr>
<th></th>
<th>Intake</th>
<th>Exhaust</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.10–0.20 mm (0.0039–0.0079 in)</td>
<td>0.22–0.32 mm (0.0087–0.0126 in)</td>
</tr>
</tbody>
</table>

a. Turn the crankshaft counterclockwise.
b. Position the holes “a” in the intake camshaft sprocket and exhaust camshaft sprocket above the cylinder head mating surface “b” as shown in the illustration, and align the marks “c” on the sprockets with the cylinder head mating surface “b”.
c. Measure the valve clearance with a thickness gauge “1”.

**Thickness gauge**

- 90890-03180
- Feeler gauge set YU-26900-9
6. Remove:
   • Camshafts
     Refer to “CAMSHAFTS” on page 5-12.

7. Adjust:
   • Valve clearance

a. Remove the valve lifter “1” and the valve pad “2” with a valve lapper “3”.

   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.

b. Calculate the difference between the specified valve clearance and the measured valve clearance.
   Example:
   Specified valve clearance = 0.10–0.20 mm (0.0039–0.0079 in)
   Measured valve clearance = 0.27 mm (0.0106 in)
   0.27 mm (0.0106 in) – 0.20 mm (0.0079 in) = 0.07 mm (0.0028 in)

c. Check the thickness of the current valve pad, and then calculate the sum of the values obtained to determine the required valve pad thickness and the valve pad number.

   TIP
   • The number “a” marked on the valve pad indicate the valve pad thickness.
   • Refer to the following table for the available valve pads.
   • If there are no available valve pads with the same thickness as the calculated valve pad thickness, select the next thickest valve pad.

<table>
<thead>
<tr>
<th>Number “a”</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>145</td>
<td>1.450 mm (0.05709 in)</td>
</tr>
<tr>
<td>150</td>
<td>1.500 mm (0.05906 in)</td>
</tr>
<tr>
<td>155</td>
<td>1.550 mm (0.06102 in)</td>
</tr>
<tr>
<td>160</td>
<td>1.600 mm (0.06299 in)</td>
</tr>
<tr>
<td>162</td>
<td>1.625 mm (0.06398 in)</td>
</tr>
<tr>
<td>165</td>
<td>1.650 mm (0.06496 in)</td>
</tr>
<tr>
<td>167</td>
<td>1.675 mm (0.06594 in)</td>
</tr>
<tr>
<td>170</td>
<td>1.700 mm (0.06693 in)</td>
</tr>
<tr>
<td>172</td>
<td>1.725 mm (0.06791 in)</td>
</tr>
<tr>
<td>175</td>
<td>1.750 mm (0.06890 in)</td>
</tr>
<tr>
<td>177</td>
<td>1.775 mm (0.06988 in)</td>
</tr>
<tr>
<td>180</td>
<td>1.800 mm (0.07087 in)</td>
</tr>
<tr>
<td>182</td>
<td>1.825 mm (0.07185 in)</td>
</tr>
<tr>
<td>185</td>
<td>1.850 mm (0.07283 in)</td>
</tr>
<tr>
<td>187</td>
<td>1.875 mm (0.07382 in)</td>
</tr>
</tbody>
</table>
PERIODIC MAINTENANCE

Example:
1.775 mm (0.06988 in) + 0.07 mm (0.0028 in) = 1.845 mm (0.07264 in)
The valve pad number is 185.
d. Install a new valve pad “1” and the valve lifter “2”.

TIP
• Lubricate the valve lifter with engine oil.
• Install the valve lifter and the valve pad in the correct place.
• The valve lifter must turn smoothly when rotated by hand.

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

Camshaft cap bolt
10 Nm (1.0 m-kgf, 7.2 ft-lbf)

TIP
• Refer to “CAMSHAFTS” on page 5-12.
• Lubricate the camshaft lobes and camshaft journals with engine oil.

• Position the holes “a” in the intake camshaft sprocket and exhaust camshaft sprocket above the cylinder head mating surface “b” as shown in the illustration, and align the marks “c” on the sprockets with the cylinder head mating surface “b”.
• Turn the crankshaft counterclockwise several full turns to seat the parts.

f. Measure the valve clearance again.
g. If the valve clearance is still out of specification, repeat all of the valve clearance adjustment steps until the specified clearance is obtained.

8. Install:
• O-ring
• Crankshaft end accessing screw

Crankshaft end accessing screw
11 Nm (1.1 m-kgf, 8.0 ft-lbf)

9. Install:
• Cylinder head cover gasket
• Cylinder head cover
  Refer to “CAMSHAFTS” on page 5-12.
• Spark plug

TIP
Before installing the spark plug, clean the spark plug and gasket surface.

Cylinder head cover bolt
10 Nm (1.0 m-kgf, 7.2 ft-lbf)
Spark plug (new)
11 Nm (1.1 m-kgf, 8.0 ft-lbf)
Spark plug (reused)
Specified angle 30–45°

10. Connect:
• Spark plug cap
  Refer to “CAMSHAFTS” on page 5-12.
PERIODIC MAINTENANCE

11. Connect:
- Cylinder head breather hose
  Refer to “ENGINE REMOVAL (3)” on page 5-8.
12. Install:
- Storage compartment
  Refer to “GENERAL CHASSIS (5)” on page 4-17.
- Footrest board (left)
  Refer to “GENERAL CHASSIS (4)” on page 4-11.
- Side panel (right)
- Side panel (left)
  Refer to “GENERAL CHASSIS (1)” on page 4-1.

CHECKING THE BREATHER HOSES
1. Remove:
- Side panel (left)
  Refer to “GENERAL CHASSIS (1)” on page 4-1.
- Air filter case
  Refer to “GENERAL CHASSIS (5)” on page 4-17.
2. Check:
- Cylinder head breather hose “1”
- Throttle body breather hose “2”
  Cracks/damage → Replace.
  Loose connection → Connect properly.

NOTICE
Make sure the cylinder head breather hose is routed correctly.

3. Install:
- Air filter case
  Refer to “GENERAL CHASSIS (5)” on page 4-17.
- Side panel (left)
  Refer to “GENERAL CHASSIS (1)” on page 4-1.

CHECKING THE EXHAUST SYSTEM
1. Check:
- Exhaust pipe “1”
- Muffler “2”
- Exhaust pipe protector “3”
- Muffler bracket “4”
- Springs “5”
  Cracks/damage → Replace.
- Gaskets “6”
  Exhaust gas leaks → Replace.
2. Check:
- Tightening torque

Exhaust pipe nut “7”
20 Nm (2.0 m·kgf, 14 ft·lbf)
Muffler bracket bolt “8”
20 Nm (2.0 m·kgf, 14 ft·lbf)
Muffler bolt “9”
33 Nm (3.3 m·kgf, 24 ft·lbf)
Exhaust pipe protector bolt “10”
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

ADJUSTING THE EXHAUST GAS VOLUME
TIP
- Be sure to set the CO density level to standard, and then adjust the exhaust gas volume.
- To adjust the exhaust gas volume, use the CO adjustment mode of the Yamaha diagnostic tool. For more information, refer to the operation manual of the Yamaha diagnostic tool.
PERIODIC MAINTENANCE

1. Connect the Yamaha diagnostic tool to the coupler. For information about connecting the Yamaha diagnostic tool, refer to “YAMAHA DIAGNOSTIC TOOL” on page 9-32.

Yamaha diagnostic tool
90890-03231

CLEANING THE SPARK ARRESTER
1. Clean:
   - Spark arrester

WARNING

- Select a well-ventilated area free of combustible materials.
- Always let the exhaust system cool before performing this operation.
- Do not start the engine when removing the tailpipe from the muffler.

a. Remove the bolts “1”.
b. Remove the tailpipe “2” by pulling it out of the muffler and gasket “3”.
c. Tap the tailpipe lightly with a soft-face hammer or suitable tool, then use a wire brush to remove any carbon deposits from the spark arrester portion of the tailpipe and the inner contact surfaces of the muffler.
d. Install a new gasket, and then insert the tailpipe into the muffler and align the bolt holes.
e. Install the bolts “1” and tighten them.

Spark arrester bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

CHECKING THE AIR INDUCTION SYSTEM
Refer to “CHECKING THE AIR INDUCTION SYSTEM” on page 7-13.

CLEANING THE AIR FILTER ELEMENT
1. Check:
   - Air filter check hose “1”

TIP

There is an air filter check hose “1” at the bottom of the air filter case. If dust and/or water collects in this hose, empty the hose and clean the air filter element, filter frame, and air filter case.

2. Remove:
   - Seat
   Refer to “GENERAL CHASSIS (1)” on page 4-1.
3. Remove:
   - Air filter case cover “1”
4. Remove:
   - Air filter element assembly “1”
5. Disassemble:
   • Air filter element holder “1”
   • Air filter element “2”
   • Air filter element frame “3”

**NOTICE**
The engine should never be run without the air filter; excessive piston and/or cylinder wear may result.

6. Check:
   • Air filter element
   • Air filter element frame
   • Air filter element holder
   Damage → Replace.

7. Clean:
   • Air filter element

▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼
   a. Carefully wash the air filter element in solvent.

**WARNING**
Never use low flash point solvents, such as gasoline, to clean the air filter element. Such solvents may cause a fire or an explosion.

b. After cleaning, squeeze the air filter element to remove the excess solvent.

**NOTICE**
Do not twist the air filter element when squeezing it.

c. Properly dispose of the used solvent.

d. Carefully wash the air filter element in soap water.

e. Thoroughly rinse the air filter element with water, and then let it dry.

**WARNING**
Do not twist the air filter element when squeezing it.

f. Pour the recommended oil into a storage bag large enough for the air filter element.

Air filter oil grade
Foam air-filter oil
g. Place the air filter element into the storage bag and repeatedly squeeze the element until the air filter element is saturated with oil.

**TIP**
The air filter element should be wet but not dripping.

8. Assemble:
- Air filter element frame
- Air filter element
- Air filter element holder

9. Install:
- Air filter element assembly

10. Install:
- Air filter case cover

11. Install:
- Seat
  Refer to “GENERAL CHASSIS (1)” on page 4-1.

---

### CHECKING THE FRONT BRAKE PADS

The following procedure applies to all of the front brake pads.

1. Remove:
   - Front wheels
   Refer to “FRONT WHEELS” on page 4-20.

2. Operate the brake.

3. Check:
   - Front brake pads
     Wear indicator grooves “a” have almost disappeared → Replace the brake pads and brake pad spring as a set.
     Refer to “FRONT BRAKE” on page 4-26.

---

### CHECKING THE REAR BRAKE PADS

The following procedure applies to all of the rear brake pads.

1. Remove:
   - Rear wheels
   Refer to “REAR WHEELS” on page 4-23.

2. Operate the brake.

3. Check:
   - Rear brake pads
     Wear indicator grooves “a” have almost disappeared → Replace the brake pads and brake pad spring as a set.
     Refer to “REAR BRAKE” on page 4-37.

---

### ADJUSTING THE FRONT DISC BRAKE

1. Check:
   - Front brake lever free play “a”
     Out of specification → Bleed the front brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.

---

<table>
<thead>
<tr>
<th>Front brake lever free play (lever end)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 mm (0 in)</td>
</tr>
</tbody>
</table>
**WARNING**

Always adjust both the brake pedal and the rear brake lever whenever adjusting the rear brake.

1. Check:
   - Rear brake lever free play “a”
     Out of specification → Bleed the rear brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.

2. Check:
   - Brake pedal free play “a”
     Out of specification → Adjust.

3. Adjust:
   - Brake pedal free play


\[ \text{Rear brake lever free play (lever end)} \]
\[ 0 \text{ mm (0 in)} \]

\[ \text{Brake pedal free play} \]
\[ 1.0–6.0 \text{ mm (0.04–0.24 in)} \]

\[ \text{Brake pedal free play adjusting nut} \]
\[ 7 \text{ Nm (0.7 m·kgf, 5.1 ft·lbf)} \]

f. Check that there is a gap between the rear brake cable joint (rear brake master cylinder side) “4” and the pin “5”.

g. Check that the brake pedal free play is within the specified limits.

**TIP**

When checking the brake pedal free play, make sure that the brake lever bracket “6” does not move.
h. Adjust the drive select lever control cable. Refer to “ADJUSTING THE DRIVE SELECT LEVER CONTROL CABLE AND SHIFT ROD” on page 3-32.

**WARNING**

After this adjustment is performed, lift the front and rear wheels off the ground by placing a block under the engine, and spin the rear wheels to ensure there is no brake drag. If any brake drag is noticed perform the above steps again.

i. Install the front fender inner panel (right). Refer to “GENERAL CHASSIS (3)” on page 4-8.

---

**CHECKING THE FRONT BRAKE HOSES**

The following procedure applies to all of the brake hoses and brake hose clamps.

1. Check:
   - Front brake hoses “1”
     Cracks/damage/wear → Replace.

2. Check:
   - Brake hose holders
     Loose → Tighten the holder bolt.

3. Apply the brake several times.

4. Check:
   - Brake hoses
     Brake fluid leakage → Replace the damaged hose.

Refer to “FRONT BRAKE” on page 4-26.

---

**CHECKING THE REAR BRAKE HOSES**

The following procedure applies to all of the brake hoses and brake hose clamps.

1. Check:
   - Rear brake hoses “1”
     Cracks/damage/wear → Replace.
PERIODIC MAINTENANCE

2. Check:
   • Brake hose holders
     Loose → Tighten the holder bolt.
3. Apply the brake several times.
4. Check:
   • Brake hoses
     Brake fluid leakage → Replace the damaged hose.
     Refer to “REAR BRAKE” on page 4-37.

CHECKING THE BRAKE FLUID LEVEL
1. Place the vehicle on a level surface.

   TIP
   When checking the brake fluid level, make sure that the top of the brake fluid reservoir is horizontal.

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

   Specified brake 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.

   TIP
   In order to ensure a correct reading of the brake fluid level, make sure the top of the brake fluid reservoir is horizontal.

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 fluid reservoir to overflow.
When bleeding the hydraulic brake system, make sure there is always enough brake fluid before applying the brake. Ignoring this precaution 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:
   a. Fill the brake fluid reservoir to the proper level with the specified brake fluid.
   b. Install the diaphragm (brake fluid reservoir).
   c. Connect a clear plastic hose “1” tightly to the bleed screw “2”.
   d. Place the other end of the hose into a container.
   e. Slowly apply the brake several times.
   f. Fully pull the brake lever and hold it in position.
   g. Loosen the bleed screw.
   h. Tighten the bleed screw, and then release the brake 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 fluid reservoir to the proper level with the specified brake fluid. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-14.

**WARNING**

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

---

CHECKING THE WHEELS

The following procedure applies to all of the wheels.

1. Check:
   a. Wheel “1”
      - Damage/bends → Replace.

**WARNING**

- Never attempt even small repairs to the wheel.
- Ride conservatively after installing a tire to allow it to seat itself properly on the rim.

2. Measure:
   a. Radial wheel runout
   b. Lateral wheel runout

Refer to “CHECKING THE FRONT WHEELS” on page 4-21 and “CHECKING THE REAR WHEELS” on page 4-24.

---

Loosening the bleed screw will release the pressure and cause the brake lever to touch the throttle grip.
PERIODIC MAINTENANCE

3. Check:
   • Wheel bearings
     Refer to “CHECKING THE STEERING KNUCKLES AND FRONT WHEEL BEARINGS” on page 4-62 and “CHECKING THE REAR KNUCKLES AND REAR WHEEL BEARINGS” on page 4-71.

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

WARNING
This model is equipped with low-pressure tires. It is important that they be inflated correctly and maintained at the proper pressures.

Tire characteristics

WARNING
Tire characteristics influence the handling of vehicles. The tires listed below have been approved by Yamaha Motor Co., Ltd. for this model. If other tire combinations are used, they can adversely affect your vehicle’s handling characteristics and are therefore not recommended.

Front tire
Type
Tubeless
Size
AT26 × 8–12
Manufacturer/model
MAXXIS/MU05Y

Rear tire
Type
Tubeless
Size
AT26 × 10–12
Manufacturer/model
MAXXIS/MU06Y

Tire pressure

WARNING
• Tire pressure below the minimum specification could cause the tire to dislodge from the rim under severe riding conditions.
• Use no more than the following pressures when seating the tire beads.

Front
250 kPa (2.5 kgf/cm²) (36 psi)
Rear
250 kPa (2.5 kgf/cm²) (36 psi)
Higher pressures and fast inflation may cause a tire to burst. Inflate the tires very slowly and carefully.

Tire air pressure (measured on cold tires)
Recommended
Vehicle load
0 - maximum
Front
35.0 kPa (0.350 kgf/cm², 5.0 psi)
Rear
30.0 kPa (0.300 kgf/cm², 4.4 psi)
Minimum
Vehicle load
0 - maximum
Front
32.0 kPa (0.320 kgf/cm², 4.6 psi)
Rear
27.0 kPa (0.270 kgf/cm², 4.0 psi)

Maximum loading limit

WARNING
Be extra careful of the vehicle balance and stability when towing a trailer.

Maximum loading limit
240.0 kg (530 lb) (Total weight of rider, cargo, accessories, and tongue)
Loading
Front carrier load limit
50.0 kg (110 lb)
Rear carrier load limit
90.0 kg (198 lb)
Storage compartment load limit
4.0 kg (9 lb)
Trailer hitch pulling load limit
5880 N (600 kgf, 1322 lbf)
Trailer hitch vertical load limit
147 N (15 kgf, 33 lbf)

1. Measure:
   • Tire pressure
     Out of specification → Adjust.
TIP
- The tire pressure gauge “1” is included as standard equipment.
- In order to insure an accurate reading, make sure that the gauge is clean before use.

WARNING
Uneven or improper tire pressure may adversely affect the handling of this vehicle and may cause loss of control.
- Maintain proper tire pressures.
- Set tire pressures when the tires are cold.
- Tire pressures must be equal in both front tires and equal in both rear tires.

2. Check:
- Tire surfaces
  Wear/damage → Replace.

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

CHECKING THE V-BELT
1. Remove:
   • Drive belt cover
   Refer to “PRIMARY AND SECONDARY SHEAVES” on page 5-49.
2. Check:
   • V-belt “1”
     Cracks/damage/wear → Replace.
     Grease/oil → Clean the primary and secondary sheaves.
     Refer to “REPLACING THE V-BELT” on page 3-18.
3. Measure:
   • V-belt width “a”
     Out of specification → Replace.
     Refer to “REPLACING THE V-BELT” on page 3-18.
4. Install:
   • Drive belt cover
   Refer to “PRIMARY AND SECONDARY SHEAVES” on page 5-49.

### Foresight

<table>
<thead>
<tr>
<th>Wear limit (front)</th>
<th>3.0 mm (0.12 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wear limit (rear)</td>
<td>3.0 mm (0.12 in)</td>
</tr>
</tbody>
</table>

### V-belt width limit

| 31.3 mm (1.23 in) |
REPLACING THE V-BELT

1. Remove:
   - Drive belt cover
     Refer to “PRIMARY AND SECONDARY SHEAVES” on page 5-49.

2. Replace:
   - V-belt

   a. Install the bolts “1” (90101-06016) into the secondary fixed sheave holes.

   **TIP**

   Tightening the bolts “1” will push the secondary sliding sheave away, causing the gap between the secondary fixed and sliding sheaves to widen.

   ![Image of sheave holes and bolts]

   b. Remove the V-belt “2” from the primary sheave and secondary sheave.

   ![Image of V-belt removal]

   c. Install a new V-belt.

   **TIP**

   Install the new V-belt so that its arrow faces the direction shown in the illustration.

   ![Image of V-belt installation]

d. Remove the bolts.

CHECKING THE FASTENER

1. Check:
   - Fasteners
     Damage/pitting → Replace.
     Refer to “GENERAL CHASSIS (1)” on page 4-1.

CHECKING THE FRONT SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the front shock absorber assemblies.

1. Place the vehicle on a level place.

2. Check:
   - Front shock absorber assembly
     Refer to “CHECKING THE FRONT SHOCK ABSORBER ASSEMBLIES” on page 4-67.

3. Check:
   - Operation
     Pump the front shock absorber assembly up and down several times.
     Unsmooth operation → Replace front shock absorber assembly.
     Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” on page 4-65.

ADJUSTING THE FRONT SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the front shock absorber assemblies.

**WARNING**

Always adjust the spring preload for both front shock absorber assemblies to the same setting. Uneven adjustment can cause poor handling and loss of stability.

1. Adjust:
   - Spring preload
     Turn the adjuster “1” in direction “a” or “b”.

   ![Image of shock absorber adjustment](attachment:image.png)
PERIODIC MAINTENANCE

CHECKING THE REAR SHOCK ABSORBER ASSEMBLIES
The following procedure applies to both of the rear shock absorber assemblies.
1. Place the vehicle on a level place.
2. Check:
   • Rear shock absorber assembly
     Refer to "CHECKING THE REAR SHOCK ABSORBER ASSEMBLIES" on page 4-73.
3. Check:
   • Operation
     Pump the rear shock absorber assembly up and down several times.
     Unsmooth operation → Replace rear shock absorber assembly.
     Refer to "REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES" on page 4-72.

ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY
The following procedure applies to both of the rear shock absorber assemblies.

Always adjust the spring preload for both rear shock absorber assemblies to the same setting. Uneven adjustment can cause poor handling and loss of stability.
1. Adjust:
   • Spring preload
     Turn the adjuster “1” in direction “a” or “b”.

CHECKING THE STABILIZER BUSHING
1. Check:
   • Stabilizer bushings
     Damage/wear → Replace.
     Refer to “REAR KNUCKLES AND STABILIZER" on page 4-70.

LUBRICATING THE REAR KNUCKLE PIVOTS
1. Lubricate:
   • Rear knuckle pivots
LUBRICATING THE STEERING SHAFT
Lubricate the pivoting point and metal-to-metal moving parts of the shaft.

CHECKING THE STEERING SYSTEM
1. Place the vehicle on a level surface.
2. Check:
   • Steering assembly bushings
     Move the handlebar up and down, and back and forth.
     Excessive play → Replace the steering stem bushings.

3. Check:
   • Tie-rod ends
     Free play → Replace the tie-rod end.

   a. Turn the handlebar left until it stops.
   b. Move the handlebar slightly to the right and left.
   c. Check for play in the tie-rod ends.
   d. Turn the handlebar right until it stops.
   e. Move the handlebar slightly to the left and right.
   f. Check for play in the tie-rod ends.

4. Raise the front end of the vehicle so that there is no weight on the front wheels.
5. Check:
   • Ball joints and wheel bearings
     Move the wheels laterally back and forth.
     Excessive free play → Replace the front arms (upper and lower) and/or wheel bearings.
PERIODIC MAINTENANCE
6. Measure: (for EPS models)
• Steering tension
Above specification → Adjust.
Steering tension
50 N (5.0 kgf)
▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Set the main switch to “ ” (off).
b. Place the vehicle on a suitable stand so that
the front wheels are elevated.
c. Point the front wheels straight ahead.
d. Hold the belt tension gauge “1” at a 90° angle
to the handlebar, push the gauge against the
handlebar, and then record the measurement
when the handlebar starts to turn.

1

Belt tension gauge
90890-03170
Rear drive belt tension gauge
YM-03170

2
c. Tighten the steering stem bracket bolts to
specification.

T.

R.

1

Steering stem bracket bolt
51 Nm (5.1 m·kgf, 37 ft·lbf)
LOCTITE®

d. Tighten the steering stem pinch bolt to specification.

T.

R.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

7. Adjust: (for EPS models)
• Steering tension
▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

Steering stem pinch bolt (for EPS
models)
35 Nm (3.5 m·kgf, 25 ft·lbf)
LOCTITE®

e. Measure the steering tension again.
f. Repeat the above procedure until the steering tension is below specification.

a. Remove the electrical components tray.
Refer to “GENERAL CHASSIS (4)” on page
4-11.
b. Loosen the steering stem bracket bolts “1”
and steering stem pinch bolt “2” completely.

Steering tension
50 N (5.0 kgf)

TIP

g. Install the electrical components tray. Refer
to “GENERAL CHASSIS (4)” on page 4-11.

After loosening the bolts, be sure to check that
the steering stem moves smoothly on the serrations of the shaft of the EPS unit.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲
EBS30062

ADJUSTING THE TOE-IN
1. Place the vehicle on a level surface.
2. Measure:
• Toe-in
Out of specification → Adjust.

3-21


Before measuring the toe-in, make sure that the tire pressure is correct.

---

a. Mark both front tire tread centers.
b. Face the handlebar straight ahead.
c. Measure the width “A” between the marks.
d. Rotate the front tires 180° until the marks are exactly opposite one another.
e. Measure the width “B” between the marks.
f. Calculate the toe-in using the formula given below.

\[ \text{Toe-in} = \text{“B”} - \text{“A”} \]

g. If the toe-in is incorrect, adjust it.

---

- **After setting the toe-in to specification, run the vehicle slowly for some distance with both hands lightly holding the handlebar and check that the handlebar responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.**

a. Mark both tie-rods ends.
   - This reference point will be needed during adjustment.
b. Loosen the tie-rod end locknuts “1” of both tie-rods.
c. The same number of turns should be given to both the right and left tie-rods “2” until the specified toe-in is obtained. This is to keep the length of the tie-rods the same.

d. Tighten the tie-rod end locknuts to specification.

---

**TIP**

Adjust the tie-rod ends so that “A” and “B” are equal.

---

**WARNING**

- Be sure that both tie-rods are turned the same amount. If not, the vehicle will drift right or left even though the handlebar is positioned straight. This may lead to mishandling and an accident.
TIP
After adjusting the toe-in, the handlebar should be centered.

Refer to “INSTALLING THE HANDLEBAR” on page 4-50.

CHECKING THE ENGINE MOUNT
1. Check:
   • Rubber damper
     Cracks/damage → Replace.
   • Engine mounting bolts
   • Rubber damper nuts
     Loosen → Tighten.
     Refer to “ENGINE REMOVAL (3)” on page 5-8.

CHECKING THE CONSTANT VELOCITY SHAFT ASSEMBLY DUST BOOTS
1. Check:
   • Dust boots “1”
     Damage → Replace.
     Refer to “FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT” on page 8-4 and “REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT” on page 8-15.

TIP
If the engine was started before the oil level was checked, be sure to warm up the engine sufficiently, and then wait at least 10 minutes until the oil settles for an accurate reading.

3. Remove:
   • Dipstick accessing cover
     Refer to “GENERAL CHASSIS (4)” on page 4-11.

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
Do not allow foreign materials to enter the crankcase.

TIP
Insert the dipstick completely into the oil filler hole, and then remove it again to check the oil level.

Recommended brand
YAMALUBE
Type
SAE 0W-30, 10W-30, 10W-40, 15W-40, 20W-40 or 20W-50
Recommended engine oil grade
API service SG type or higher, JASO standard MA
PERIODIC MAINTENANCE

**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” or higher and do not use oils labeled “ENERGY CONSERVING II”.
- Do not allow foreign materials to enter the crankcase.

5. Check the engine oil level again.

**NOTICE**
Be sure the engine oil is at the correct level, otherwise engine damage may result.

6. Install:
   - Dipstick accessing cover
     Refer to “GENERAL CHASSIS (4)” on page 4-11.

**CHANGING THE ENGINE OIL**
1. Start the engine, warm it up for several minutes, and then turn it off.
2. Remove:
   - Dipstick accessing cover
     Refer to “GENERAL CHASSIS (4)” on page 4-11.
3. Place a container under the engine oil drain bolt.
4. Remove:
   - Dipstick “1”
   - Engine oil drain bolt “2” (along with the gasket)

5. Drain:
   - Engine oil (completely from the crankcase)
6. If the oil filter cartridge is also to be replaced, perform the following procedure.
   - Remove the oil filter cartridge “1” with the oil filter wrench “2”.

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

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

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

7. Install:
   • Engine oil drain bolt
     (along with the gasket New)

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

9. Install:
   • Dipstick
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 3-23.

13. Install:
    • Dipstick accessing cover
      Refer to “GENERAL CHASSIS (4)” on page 4-11.

14. Check:
    • Engine oil pressure
      Refer to “MEASURING THE ENGINE OIL PRESSURE” on page 3-25.

MEASURING THE ENGINE OIL PRESSURE

1. Check:
   • Engine oil level
     Refer to “CHANGING THE ENGINE OIL” on page 3-24.

2. Remove:
   • Side panel (left)
     Refer to “GENERAL CHASSIS (1)” on page 4-1.
   • Footrest board (left)
     Refer to “GENERAL CHASSIS (4)” on page 4-11.

3. 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.

4. Remove:
   • Main gallery bolt “1”

WARNING

The engine, muffler and engine oil are extremely hot.

5. Install:
   • Oil pressure gauge “1”
   • Adapter “2”

Pressure gauge
90890-03153
Pressure gauge YU-03153
Oil pressure adapter H
90890-03139
6. Measure:
- Engine oil pressure (at the following conditions)

<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 strainer</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>

Out of specification → Check.

7. Install:
- Main gallery bolt
- Gasket **New**

8. Install:
- Footrest board (left)
  Refer to “GENERAL CHASSIS (4)” on page 4-11.
- Side panel (left)
  Refer to “GENERAL CHASSIS (1)” on page 4-1.

### CHECKING THE DIFFERENTIAL GEAR OIL LEVEL

1. Place the vehicle on a level surface.
2. Remove:
   - Differential gear oil filler bolt “1” (along with the gasket)
3. Check:
   - Differential gear oil level
     - The differential gear oil level should be up to the brim “2” of the hole.
     - Below the brim → Add the recommended differential gear oil to the proper level.

### DIFFERENTIAL GEAR OIL NUT TORQUE

- **Main gallery bolt**
  - 35 Nm (3.5 m·kgf, 25 ft·lbf)
  - LOCTITE®

- **Differential gear oil drain bolt**
  - 10 Nm (1.0 m·kgf, 7.2 ft·lbf)

### CHANGING THE DIFFERENTIAL GEAR OIL

1. Place the vehicle on a level surface.
2. Place a container under the differential case.
3. Remove:
   - Differential gear oil filler bolt (along with the gasket)
   - Differential gear oil drain bolt “1” (along with the gasket)
   - Completely drain the differential case of its oil.

4. Install:
   - Differential gear oil drain bolt (along with the gasket **New**)

### DIFFERENTIAL GEAR OIL NUT TORQUE

- **Differential gear oil filler bolt**
  - 23 Nm (2.3 m·kgf, 17 ft·lbf)

### NOTICE

Take care not to allow foreign material to enter the differential case.
5. Fill:
   • Differential case
     (with the specified amount of the recommended differential gear oil)

<table>
<thead>
<tr>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yamaha Friction Modified Plus Shaft Drive Oil (Part No.: ACC-SHFTL-PL-32) or SAE 80 API GL-4 Hypoid gear oil</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quantity (disassembled)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.23 L (0.24 US qt, 0.20 Imp.qt)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.22 L (0.23 US qt, 0.19 Imp.qt)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take care not to allow foreign material to enter the differential case.</td>
</tr>
</tbody>
</table>

6. Check:
   • Oil level
     Refer to "CHECKING THE DIFFERENTIAL GEAR OIL LEVEL" on page 3-26.

7. Install:
   • Differential gear oil filler bolt
     (along with the gasket)

<table>
<thead>
<tr>
<th>Differential gear oil filler bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 Nm (2.3 m·kgf, 17 ft·lbf)</td>
</tr>
</tbody>
</table>

CHECKING THE FINAL GEAR OIL LEVEL
1. Place the vehicle on a level surface.
2. Remove:
   • Final gear oil level check bolt “1”
     (along with the gasket)
3. Check:
   • Final gear oil level
     The final gear oil level should be up to the brim “2”
     of the hole.
     Below the brim → Add the recommended final gear oil to the proper level.

<table>
<thead>
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<tbody>
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<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take care not to allow foreign material to enter the final drive case.</td>
</tr>
</tbody>
</table>

4. Check:
   • Final gear oil level check bolt gasket
     Damage → Replace.

5. Install:
   • Final gear oil level check bolt
     (along with the gasket)

<table>
<thead>
<tr>
<th>Final gear oil level check bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
</tr>
</tbody>
</table>

CHANGING THE FINAL GEAR OIL
1. Place the vehicle on a level surface.
2. Place a container under the final drive case.
3. Remove:
   • Final gear oil filler bolt “1”
     (along with the gasket)
   • Final gear oil level check bolt
     (along with the gasket)
   • Final gear oil drain bolt “1”
     (along with the gasket)

4. Remove:
   • Final gear oil level check bolt
     (along with the gasket)
   • Final gear oil drain bolt “1”
     (along with the gasket)

Completely drain the final drive case of its oil.

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</tbody>
</table>
PERIODIC MAINTENANCE

5. Install:
   - Final gear oil drain bolt
     (along with the gasket
   New

Final gear oil drain bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)

6. Fill:
   - Final drive case
     (with the specified amount of the recommended final gear oil)

NOTICE
ECB01690
Take care not to allow foreign material to enter the final drive case.

7. Check:
   - Oil level
     Refer to “CHECKING THE FINAL GEAR OIL LEVEL” on page 3-27.

8. Install:
   - Final gear oil level check bolt
     (along with the gasket)
   - Final gear oil filler bolt
     (along with the gasket)

Final gear oil level check bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)
Final gear oil filler bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)

CHECKING THE COOLING SYSTEM

1. Remove:
   - Front fenders
     Refer to “GENERAL CHASSIS (3)” on page 4-8.
   - Footrest board (left)
     Refer to “GENERAL CHASSIS (4)” on page 4-11.

2. Check:
   - Radiator “1”
   - Radiator inlet hose “2”
   - Coolant reservoir “3”
   - Coolant reservoir hose “4”

   - Radiator outlet hose “5”
   - Water jacket joint “6”
   - Water pump outlet hose “7”
   - Water pump outlet pipe “8”
   - Water pump housing “9”
   - Water pump inlet hose “10”
   - Cooling water hose joint “11”
   - Oil cooler inlet hose “12”
   - Oil cooler outlet hose “13”
   - Oil cooler “14”

   Cracks/damage → Replace.
   Coolant leakage → Replace any damaged hose and pipe

   Refer to “RADIATOR” on page 6-4 and “WATER PUMP” on page 6-10.

   3. Install:
      - Footrest board (left)
        Refer to “GENERAL CHASSIS (4)” on page 4-11.
      - Front fenders
        Refer to “GENERAL CHASSIS (3)” on page 4-8.
CHECKING THE COOLANT LEVEL

1. Place the vehicle on a level surface.

TIP

The coolant level must be checked on a cold engine since the level varies with engine temperature.

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. If the coolant is at or below the minimum level mark, remove the side panel (left).
   Refer to “GENERAL CHASSIS (1)” on page 4-1.

4. Remove the reservoir cap “1”, add coolant or distilled water to the maximum level mark “a”, install the reservoir cap and then install the side panel (left).

CHANGING THE COOLANT

1. Remove:
   • Side panel (left)
   • Side panel (right)
   Refer to “GENERAL CHASSIS (1)” on page 4-1.
   • Upper panel
   Refer to “GENERAL CHASSIS (2)” on page 4-6.
   • Footrest board (left)
   Refer to “GENERAL CHASSIS (4)” on page 4-11.

2. Remove:
   • Coolant reservoir cap “1”

3. Disconnect:
   • Coolant reservoir hose “2”

4. Drain:
   • Coolant
     (from the coolant reservoir)

5. Connect:
   • Coolant reservoir hose

Coolant reservoir (up to the maximum level mark)
0.25 L (0.26 US qt, 0.22 Imp.qt)
6. 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.

7. Remove:
   • Coolant drain bolt “1”
     (along with the copper washer)

   TIP
   Place a container under the engine, and then remove the coolant drain bolt. (Use a trough “2” or a similar object as shown to prevent coolant from spilling on the engine guard.)

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

9. Install:
   • Coolant drain bolt
     (along with the copper washer)

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

    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 dilutes the antifreeze concentration 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.

11. Install:
    • Radiator cap

12. Fill:
    • Coolant reservoir
     (with the recommended coolant to the maximum level mark “a”)
13. Install:
- Coolant reservoir cap “1”

14. Bleed:
- Cooling system

a. Loosen the water pump air bleed bolt “2”, without removing it, to allow all of the air to escape from the air bleed bolt hole.

b. When coolant begins to flow out of the bolt hole, tighten the water pump air bleed bolt to specification.

c. Loosen the thermostat cover air bleed bolt “3”, without removing it, to allow all of the air to escape from the air bleed bolt hole.

d. When coolant begins to flow out of the bolt hole, tighten the thermostat cover air bleed bolt to specification.

15. Start the engine, warm it up for ten minutes, and then rev the engine five times.

16. Pour the recommended coolant into the radiator until it is full.

17. Stop the engine and allow it to cool. If the coolant level has dropped after the engine has cooled, add sufficient coolant until it reaches the top of the radiator, and then install the radiator cap.

18. Check:
- Coolant level
  Refer to “CHECKING THE COOLANT LEVEL” on page 3-29.

19. Start the engine, and then check for coolant leakage.

20. Install:
- Footrest board (left)
  Refer to “GENERAL CHASSIS (4)” on page 4-11.

- Upper panel
  Refer to “GENERAL CHASSIS (2)” on page 4-6.

- Side panel (left)

- Side panel (right)
  Refer to “GENERAL CHASSIS (1)” on page 4-1.

**CHECKING AND LUBRICATING THE CABLES**

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

**WARNING**

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.

**Recommended lubricant**

Engine oil or a suitable cable lubricant
**PERIODIC MAINTENANCE**

**TIP**

Hold the cable end upright and pour a few drops of lubricant into the cable sheath or use a suitable lubricating device.

3. Apply:
   - Lithium-soap-based grease
     (onto end of the cable)

**LUBRICATING THE LEVERS**

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

<table>
<thead>
<tr>
<th>Recommended lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicone grease</td>
</tr>
</tbody>
</table>

**LUBRICATING THE PEDAL**

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

<table>
<thead>
<tr>
<th>Recommended lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium-soap-based grease</td>
</tr>
</tbody>
</table>

**ADJUSTING THE DRIVE SELECT LEVER CONTROL CABLE AND SHIFT ROD**

**NOTICE**

Before moving the drive select lever, bring the vehicle to a complete stop and return the throttle lever to its closed position. Otherwise the transmission may be damaged.

1. “N” (neutral)

2. “H” (high)

3. “L” (low)

4. “R” (reverse)

5. “P” (park)

6. Drive select lever shift control cable

7. Drive select lever shift rod

1. Adjust:
   - Brake pedal free play
     Refer to “ADJUSTING THE REAR DISC BRAKE” on page 3-12.

2. Remove:
   - Handle mounted light cover
     Refer to “REPLACING THE HANDLE MOUNTED LIGHT BULB” on page 3-34.
   - Side panel (left)
     Refer to “GENERAL CHASSIS (1)” on page 4-1.

3. Adjust:
   - Drive select lever shift control cable
   - Drive select lever shift rod

\[\text{Drive select lever shift control cable:}\]

a. Make sure that the drive select lever is in “N” (neutral).

b. Squeeze the brake lever 15–25 mm (0.59–0.98 in) “a”, loosen the locknut “1”, and then adjust the shift control cable “2” with the adjuster “3” so that the drive select lever can be shifted to “R” (reverse) from “N” (neutral), and to “P” (park) from “R” (reverse).
c. Release the brake lever so that “a” is 0 mm (0 in), and then verify that the drive select lever cannot be shifted to “R” (reverse) from “N” (neutral), or to “P” (park) from “R” (reverse).
d. If the operation of the drive select lever is incorrect, repeat steps (a) to (c).
e. Tighten the locknut.

Drive select lever shift rod:

- a. Make sure the drive select lever and transmission are in “N” (neutral).
- b. Loosen both locknuts “1”.
- c. Adjust the length “a” of the shift rod to 410 mm (16.1 in).

d. Tighten the locknuts.

Throttle lever free play:

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

2. Remove:
   - Storage compartment
   - Refer to “GENERAL CHASSIS (5)” on page 4-17.

3. Adjust:
   - Throttle lever free play

- Direction “a”
  - Free play is increased.
- Direction “b”
  - Free play is decreased.

e. Start the engine, and then check that the drive select lever can be shifted to each shift position and that the appropriate indicator light comes on when the lever is in each position.

TIP

If the neutral indicator light does not come on when the drive select lever is in the “N” (neutral) position, stop the engine. Then, with the drive select lever in the “N” (neutral) position and without opening the throttle, start the engine and check that the neutral indicator light comes on.

f. Adjust the shift control cable again if necessary.

d. Tighten the locknut.
e. Slide the rubber cover to its original position.
If the free play cannot be adjusted here, adjust it at the handlebar side of the cable.

### Handlebar side
a. Slide back the rubber cover “1”.
b. Loosen the locknut “2”.
c. Turn the adjusting bolt “3” in direction “a” or “b” until the correct free play is obtained.

d. Tighten the locknut.
e. Slide the rubber cover to its original position.

### WARNING
After adjusting the throttle cable free play, start the engine and turn the handlebar to the right and to the left to ensure that this does not cause the engine idling speed to change.

### ADJUSTING THE SPEED LIMITER
The speed limiter keeps the throttle from becoming fully-opened even when the throttle lever is applied to the maximum position. Screwing in the adjusting screw stops the engine speed from increasing.

1. Measure:
   - Speed limiter length
     Out of specification → Adjust.

### Speed limiter length
12 mm (0.5 in)

2. Adjust:
   - Speed limiter length “a”
     Direction “b” Speed limiter length is decreased.
     Direction “c” Speed limiter length is increased.

   a. Loosen the locknut “1”.
   b. Turn the adjuster “2” in direction “b” or “c” until the specified speed limiter length is obtained.
   c. Tighten the locknut.

### WARNING
- Particularly for a beginner rider, the speed limiter should be screwed in completely. Screw it out little by little as their riding technique improves. Never remove the speed limiter for a beginning rider.
- For proper throttle lever operation, do not turn out the adjuster more than the specified length. Also, always adjust the throttle cable free play to within specification.

### REPLACING THE HANDLE MOUNTED LIGHT BULB
1. Remove:
   - Quick fastener “1”
   - Handle mounted light cover “2”
2. Remove:
   - Handle mounted light bulb cover “1”

3. Remove:
   - Handle mounted light bulb holder “1”
   - Handle mounted light bulb

**WARNING**

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

**TIP**

Remove the handle mounted light bulb holder by pushing it in and turning it counterclockwise, and then remove the defective bulb.

4. Install:
   - Handle mounted light bulb

Secure the new handle mounted light bulb with the handle mounted light bulb holder.

**NOTICE**

Avoid touching the glass part of the handle mounted light 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 handle mounted light bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

5. Install:
   - Handle mounted light bulb holder

**TIP**

Install the handle mounted light bulb holder by pushing it in and turning it clockwise.

6. Install:
   - Cover at the rear of the handle mounted light

7. Install:
   - Handle mounted light cover “1”
   - Quick fastener

---

**ADJUSTING THE HEADLIGHT AND HANDLE MOUNTED LIGHT BEAMS**

1. Adjust:
   - Headlight and handle mounted light beam (vertically)

▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼▼▼

a. Turn the adjusting screw “1” in direction “a” or “b”.

**Direction “a”**
Light beam is raised.

**Direction “b”**
Light beam is lowered.
A. Headlight (left and right)
B. Handle mounted light

▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲
# CHASSIS

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  ASSEMBLIES .............................................................................. 4-73
Removing the skid plates

<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 skid plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Center skid plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear skid plate</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
## Removing the seat and side panels

<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>Battery cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Throttle body breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Final drive case breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Differential case breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Radiator fan motor breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Top cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Storage compartment lid</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Side panel (left)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Side panel (right)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
REMOVING THE BATTERY COVER
1. Remove:
   - Battery cover “1”

   a. Lift the rear of the battery cover to remove the projections “a” on the cover from the grommets “b”.
   b. Slide the battery cover rearward to unhook its projections “c” from the holes “d” in the upper panel.

INSTALLING THE BATTERY COVER
1. Install:
   - Battery cover “1”

   a. Fit the projections “a” on the battery cover into the holes “b” in the upper panel.
   b. Fit the projections “c” on the battery cover into the grommets “d”.

REMOVING THE TOP COVER
1. Remove:
   - Top cover “1”
   - Storage compartment lid “2”

   a. Remove the quick fasteners, screws, and bolts.
   b. Slide the top cover rearward and lift it up to unhook its projections “a” from the holes “b” in the side panels.
   c. Place the top cover upside down.
   d. Remove the storage compartment lid from the left end of the hinge “3”.
   e. Remove the left end of the hinge from the top cover, and then remove the hinge and storage compartment lid from the top cover.
Installing the Top Cover

1. Install:
   - Storage compartment lid “1”
   - Top cover “2”

a. Place the top cover upside down.
b. Fit the right end of the hinge “3” into the storage compartment lid and top cover.
c. Fit the left end of the hinge into the top cover, and then fit the storage compartment lid onto the left end of the hinge.
d. Fit the projections “a” on the top cover into the holes “b” in the side panels and slide the cover forward.
e. Install the bolts, screws, and quick fasteners.

Removing the Side Panels

The following procedure applies to both of the side panels.
The following procedure applies to both of the side panels.
1. Remove:
   - Side panel “1”
INSTALLING THE SIDE PANELS

The following procedure applies to both of the side panels.

1. Install:
   - Side panel “1”

**Side panel bolt**
2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)

---

a. Remove the bolt.
b. Lift the side panel and remove it.

A. Left side
B. Right side

---

a. Fit the projections “a” on the side panel into the holes “b” in the front fender, fit the projections “c” on the panel into the holes “d” in the footrest board, and fit the projection “e” on the panel into the hole “f” in the rear fender.

A. Right side
B. Left side

b. Install the bolt.
Removing the front carrier and front guard

<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 carrier</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Battery holding bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Battery lead</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Battery</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Upper panel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Front carrier bracket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Headlight coupler</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>Headlight unit</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Front guard cover</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Front guard</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

*Refer to "GENERAL CHASSIS (1)" on page 4-1.*
REMOVING THE UPPER PANEL
1. Remove:
   • Upper panel “1”

   a. Remove the quick fasteners.
   b. Slide the upper panel forward and lift it up to remove it.

INSTALLING THE UPPER PANEL
1. Install:
   • Upper panel “1”

   a. Fit the projections “a” on the upper panel into the holes “b” in the front fender, and then slide the panel rearward.

   b. Install the quick fasteners.
Removing the front fenders and front grill

![Diagram showing the removal of front fenders and front grill with torque specifications for bolts and nuts]

<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 fender inner panel</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Main switch coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Auxiliary DC jack coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Front fender</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Front grill</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Refer to "GENERAL CHASSIS (1)" on page 4-1.

Refer to "GENERAL CHASSIS (2)" on page 4-6.
Removing the rear carrier and rear fender

<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 carrier bracket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rear carrier</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear storage compartment cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Tail/brake light coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Fuel tank breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Fuel tank breather hose joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fuel tank cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Rear fender</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Refer to “GENERAL CHASSIS (1)” on page 4-1.
INSTALLING THE REAR FENDER
1. Install:
   • Rear fender

<table>
<thead>
<tr>
<th>Rear fender bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
</tr>
</tbody>
</table>

**TIP**

The bolts may be tightened to the specified torque in any tightening sequence. However, install the front bolts “1” and tighten them temporarily before installing the rear bolts “2”.

![Diagram of rear fender installation](image-url)
### Removing the electrical components tray 1/2

1. **Battery holding bracket 1**
   - Torque: 2.5 N·m (0.25 m·kgf, 1.8 ft·lbf)

2. **Battery lead 2**
   - Torque: 2.5 N·m (0.25 m·kgf, 1.8 ft·lbf)

3. **Battery 1**
   - Torque: 7 N·m (0.7 m·kgf, 5.1 ft·lbf)

4. **Lean angle sensor coupler 1**
   - Torque: 2.5 N·m (0.25 m·kgf, 1.8 ft·lbf)

5. **Lean angle sensor 1**
   - Torque: 2.5 N·m (0.25 m·kgf, 1.8 ft·lbf)

#### Order and Parts to Remove

<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 skid plate/Battery cover/Seat/Top cover/Side panels</td>
<td>Refer to “GENERAL CHASSIS (1)” on page 4-1.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Front carrier/Front guard</td>
<td>Refer to “GENERAL CHASSIS (2)” on page 4-6.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Front fenders/Front grill</td>
<td>Refer to “GENERAL CHASSIS (3)” on page 4-8.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Air intake duct/Storage compartment</td>
<td>Refer to “GENERAL CHASSIS (5)” on page 4-17.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>V-belt cooling exhaust duct/V-belt cooling intake duct</td>
<td>Refer to “ENGINE REMOVAL (1)” on page 5-3.</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Battery holding bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Battery lead</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Battery</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Lean angle sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Lean angle sensor</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
### Removing the electrical components tray 1/2

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Four-wheel-drive motor relay 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Four-wheel-drive motor relay 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Headlight relay 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>EPS control unit coupler</td>
<td>5</td>
<td>Disconnect. For EPS models</td>
</tr>
<tr>
<td>10</td>
<td>EPS (electric power steering) control unit</td>
<td>1</td>
<td>For EPS models</td>
</tr>
<tr>
<td>11</td>
<td>ECU coupler</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>12</td>
<td>ECU (Engine Control Unit)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Radiator fan motor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
</tbody>
</table>
Removing the electrical components tray 2/2

<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 relay coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Starter relay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fuse box</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>EPS fuse</td>
<td>1</td>
<td>For EPS models</td>
</tr>
<tr>
<td>5</td>
<td>Main fuse</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Radiator fan motor relay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fuel injection system relay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Headlight relay 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Frame ground terminal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Air cut-off valve coupler</td>
<td>1</td>
<td>Disconnect.</td>
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</table>
### Removing the electrical components tray 2/2

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Ignition coil connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>12</td>
<td>Differential motor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>13</td>
<td>Horn connector</td>
<td>2</td>
<td>Disconnect. Except for CDN</td>
</tr>
<tr>
<td>14</td>
<td>Horn switch coupler</td>
<td>1</td>
<td>Disconnect. Except for CDN</td>
</tr>
<tr>
<td>15</td>
<td>Coolant reservoir breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>16</td>
<td>Radiator fan motor breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>17</td>
<td>Differential case breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>18</td>
<td>Wire harness</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Electrical components tray</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removal of 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></td>
<td>Seat/Top cover/Side panels</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (1)” on page 4-1.</td>
</tr>
<tr>
<td>1</td>
<td>Dipstick accessing cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Footrest board</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Footrest bracket</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Torque values:

- 4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)
- 8 Nm (0.8 m·kgf, 5.8 ft·lbf)
- 16 Nm (1.6 m·kgf, 12 ft·lbf)
INSTALLING THE FOOTREST BOARDS
The following procedure applies to both of the footrest boards.
1. Install:
   • Footrest board

| Footrest board bolt | 8 Nm (0.8 m-kgf, 5.8 ft-lbf) |

**TIP**
Tighten the footrest board bolts to the specified torque in the proper tightening sequence as shown.

**Footrest board bolt**

8 Nm (0.8 m-kgf, 5.8 ft-lbf)
Removing the air filter case

<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>Seat/Top cover/Side panels</td>
<td></td>
<td>Refer to &quot;GENERAL CHASSIS (1)&quot; on page 4-1.</td>
</tr>
<tr>
<td>1</td>
<td>Air filter case cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Air intake duct clamp screw</td>
<td>1</td>
<td>Loosen.</td>
</tr>
<tr>
<td>3</td>
<td>Air intake duct</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Air filter element</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Air filter element holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Air filter element frame</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>Intake air temperature sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>9</td>
<td>Air induction system hose (air cut-off valve assembly to air filter case)</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
</tbody>
</table>
Removing the air filter case

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Cylinder head breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>11</td>
<td>Air filter case joint clamp screw</td>
<td>2</td>
<td>Loosen.</td>
</tr>
<tr>
<td>12</td>
<td>Rectifier/regulator coupler</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>13</td>
<td>Air filter case</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Air filter case joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Intake air temperature sensor</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- 0.8 Nm (0.08 m-kgf, 0.58 ft-lbf)
- 3.5 Nm (0.35 m-kgf, 2.5 ft-lbf)
- 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
- 1.5 Nm (0.15 m-kgf, 1.1 ft-lbf)
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
INSTALLING THE AIR FILTER CASE

1. Install:
   - Intake air temperature sensor
   - Air filter case
   - Air filter case joint “1”
     (to the air filter case)

   **TIP**
   Fit the projection “a” on the air filter case joint between the projections “b” on the air filter case.

<table>
<thead>
<tr>
<th>Component</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake air temperature sensor screw</td>
<td>1.5 Nm (0.15 m·kgf, 1.1 ft-lbf)</td>
</tr>
<tr>
<td>Air filter case bolt</td>
<td>10 Nm (1.0 m·kgf, 7.2 ft-lbf)</td>
</tr>
<tr>
<td>Air filter case joint clamp screw (throttle body side)</td>
<td>3.5 Nm (0.35 m·kgf, 2.5 ft-lbf)</td>
</tr>
<tr>
<td>Air filter case joint clamp screw (air filter case side)</td>
<td>0.8 Nm (0.08 m·kgf, 0.58 ft-lbf)</td>
</tr>
</tbody>
</table>

2. Connect:
   - Cylinder head breather hose
   - Air induction system hose (air cut-off valve assembly to air filter case)
   - Intake air temperature sensor coupler

3. Install:
   - Air filter element assembly
   - Air intake duct “1”
     (to the air filter case cover)
   - Air filter case cover
   - Storage compartment

   **TIP**
   Fit the projection “a” on the air intake duct between the projections “b” on the air filter case cover “2”.

<table>
<thead>
<tr>
<th>Component</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air intake duct clamp screw</td>
<td>0.8 Nm (0.08 m·kgf, 0.58 ft-lbf)</td>
</tr>
<tr>
<td>Storage compartment bolt</td>
<td>7 Nm (0.7 m·kgf, 5.1 ft-lbf)</td>
</tr>
</tbody>
</table>
Removing the front wheels and brake discs

1. Place the vehicle on a level surface.

<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 wheel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Wheel cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Front wheel axle nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Front brake caliper assembly</td>
<td>1</td>
<td>The following procedure applies to both of the front wheels. Place the vehicle on a level surface.</td>
</tr>
<tr>
<td>5</td>
<td>Front wheel hub</td>
<td>1</td>
<td>TIP</td>
</tr>
<tr>
<td>6</td>
<td>Front brake disc</td>
<td>1</td>
<td>Do not squeeze the front brake lever when the brake caliper is off of the brake disc as the brake pads will be forced shut.</td>
</tr>
</tbody>
</table>

Refer to the table for torque values:
- 30 Nm (3.0 m-kgf, 22 ft-lbf)
- 260 Nm (26 m-kgf, 188 ft-lbf)
- 55 Nm (5.5 m-kgf, 40 ft-lbf)

New
REMOVING THE FRONT WHEELS
1. Place the vehicle on a level surface.
2. Elevate:
   • Front wheels
TIP Place the vehicle on a suitable stand so that the front wheels are elevated.

REMOVING THE FRONT WHEEL HUBS
The following procedure applies to both of the front wheel hubs.
1. Straighten the wheel axle nut rib “a”.

2. Remove:
   • Wheel axle nut
3. Remove:
   • Front brake caliper
TIP Do not operate the brake lever when removing the brake caliper.

CHECKING THE FRONT WHEELS
The following procedure applies to both of the front wheels.
1. Check:
   • Tire
   • Wheel
   Refer to “CHECKING THE TIRES” on page 3-16 and “CHECKING THE WHEELS” on page 3-15.
2. Measure:
   • Radial wheel runout “1”
   • Lateral wheel runout “2”
   Over the specified limit → Replace the wheel or check the wheel bearing play.
   Refer to “CHECKING THE STEERING KNUCKLES AND FRONT WHEEL BEARINGS” on page 4-62.

CHECKING THE FRONT WHEEL HUBS
The following procedure applies to both of the front wheel hubs.
1. Check:
   • Wheel hub “1”
   Cracks/damage → Replace.

Radial wheel runout limit 1.2 mm (0.05 in)
Lateral wheel runout limit 1.2 mm (0.05 in)
• Splines (wheel hub) “2”
  Wear/damage → Replace the wheel hub.

**INSTALLING THE FRONT BRAKE DISCS**
The following procedure applies to both of the front brake discs.

1. Install:
   • Brake disc

   **TIP**
   Install the brake disc so that the recessed portion of the bolt hole faces away from the hub.

2. Check:
   • Brake disc
   Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-31.

**INSTALLING THE FRONT WHEEL HUBS**
The following procedure applies to both of the front wheel hubs.

1. Install:
   • Wheel axle nut

   **TIP**
   • Do not apply oil to the threads of the nut.
   • After tightening the nut, stake the collar of the nut into the notch of the shaft.

   **WARNING**
   Tapered wheel nuts are used for both the front and rear wheels. Install each nut with its tapered side towards the wheel.

2. Tighten:
   • Wheel nuts “1”

   **Front wheel nut**
   55 Nm (5.5 m·kgf, 40 ft·lbf)

**T R.**
Front brake disc bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)

LOCTITE®
**REAR WHEELS**

**Removing the rear wheels and brake discs**

![Diagram of a rear wheel assembly]

The following procedure applies to both of the rear wheels.

Place the vehicle on a level surface.

<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</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Wheel cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear wheel axle nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rear brake caliper assembly</td>
<td>1</td>
<td><strong>TIP</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Do not squeeze the rear brake lever and brake pedal when the brake caliper is off of the brake disc as the brake pads will be forced shut.</td>
</tr>
<tr>
<td>5</td>
<td>Rear wheel hub</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Rear brake disc</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Torque Specifications**

- **Rear wheel axle nut**: 30 Nm (3.0 m·kgf, 22 ft·lbf)
- **Rear brake caliper assembly**: 260 Nm (26 m·kgf, 188 ft·lbf)
- **Rear wheel hub**: 55 Nm (5.5 m·kgf, 40 ft·lbf)
REAR WHEELS

REMOVING THE REAR WHEELS
1. Place the vehicle on a level surface.
2. Elevate:
   • Rear wheels

TIP
Place the vehicle on a suitable stand so that the rear wheels are elevated.

3. Remove:
   • Rear brake calipers

TIP
Do not apply the brake lever and depress the brake pedal when removing the brake calipers.

REMOVING THE REAR WHEEL HUBS
The following procedure applies to both of the rear wheel hubs.
1. Remove:
   • Wheel axle nut
   Refer to “REMOVING THE FRONT WHEEL HUBS” on page 4-21.
2. Remove:
   • Rear brake caliper

TIP
Do not operate the brake lever or brake pedal when removing the brake caliper.

CHECKING THE REAR WHEELS
The following procedure applies to both of the rear wheels.
1. Check:
   • Tire
   • Wheel
   Refer to “CHECKING THE TIRES” on page 3-16 and “CHECKING THE WHEELS” on page 3-15.
2. Measure:
   • Radial wheel runout
   • Lateral wheel runout
   Refer to “CHECKING THE FRONT WHEELS” on page 4-21.
   Over the specified limit → Replace the wheel or check the wheel bearing play.
   Refer to “REAR WHEELS” on page 4-23.

INSTALLING THE REAR BRAKE DISCS
The following procedure applies to both of the rear brake discs.
1. Install:
   Brake disc

   Rear brake disc bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)
LOCTITE®

TIP
Install the brake disc so that the recessed portion of the bolt hole faces away from the hub.

INSTALLING THE REAR WHEEL HUBS
The following procedure applies to both of the rear wheel hubs.

Radial wheel runout limit
1.2 mm (0.05 in)
Lateral wheel runout limit
1.2 mm (0.05 in)
1. Install:
- Wheel axle nut

Rear wheel axle nut
260 Nm (26 m·kgf, 188 ft·lbf)

TIP
- Do not apply oil to the threads of the nut.
- After tightening the nut, stake the collar of the nut into the notch of the shaft.

T R.
Rear wheel axle nut
260 Nm (26 m·kgf, 188 ft·lbf)

2. Tighten:
- Wheel nuts “1”

Rear wheel nut
55 Nm (5.5 m·kgf, 40 ft·lbf)

WARNING
Tapered wheel nuts are used for both the front and rear wheels. Install each nut with its tapered side towards the wheel.
Removing the front brake pads

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

1. Front wheel
2. Front brake caliper bolt
3. Brake pad holding bolt plug
4. Brake pad holding bolt
5. Front brake pad
6. Brake pad spring

<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 wheel</td>
<td></td>
<td>Refer to “FRONT WHEELS” on page 4-20.</td>
</tr>
<tr>
<td>2</td>
<td>Front brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake pad holding bolt plug</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake pad holding bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Front brake pad</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake pad spring</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Torque Specifications:
- 5 Nm (0.5 m-kgf, 3.6 ft-lbf)
- 17 Nm (1.7 m-kgf, 12 ft-lbf)
- 2.5 Nm (0.25 m-kgf, 1.8 ft-lbf)
- 30 Nm (3.0 m-kgf, 22 ft-lbf)
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>Brake fluid</td>
<td></td>
<td>Drain. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.</td>
</tr>
<tr>
<td>1</td>
<td>Brake fluid reservoir cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake fluid reservoir diaphragm holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake fluid reservoir diaphragm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake lever</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Copper washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Front brake hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>Front brake light switch connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>9</td>
<td>Front brake light switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Front brake master cylinder holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Front brake master cylinder</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- 6 Nm (0.6 m-kgf, 4.3 ft-lbf)
- 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
- 1.2 Nm (0.12 m-kgf, 0.87 ft-lbf)
- 1.5 Nm (0.15 m-kgf, 1.1 ft-lbf)
- 27 Nm (2.7 m-kgf, 20 ft-lbf)
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>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake master cylinder kit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake master cylinder body</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the front brake calipers

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

- **Brake fluid**
  - Drain.
  - Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.
- **Front wheel**
  - Refer to “FRONT WHEELS” on page 4-20.

<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>Union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Copper washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Front brake hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Brake pad holding bolt plug</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake pad holding bolt</td>
<td>1</td>
<td>Loosen.</td>
</tr>
<tr>
<td>6</td>
<td>Front brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Front brake caliper assembly</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- **2.5 Nm (0.25 m-kgf, 1.8 ft-lbf)**
- **17 Nm (1.7 m-kgf, 12 ft-lbf)**
- **27 Nm (2.7 m-kgf, 20 ft-lbf)**
- **30 Nm (3.0 m-kgf, 22 ft-lbf)**

FWD
Disassembling 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 holding bolt</td>
<td>1</td>
<td>The following procedure applies to both of</td>
</tr>
<tr>
<td>2</td>
<td>Brake pad</td>
<td>2</td>
<td>the front brake calipers.</td>
</tr>
<tr>
<td>3</td>
<td>Brake pad spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake caliper bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake caliper guide pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake caliper retaining pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Brake caliper piston</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Brake caliper dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Brake caliper piston seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bleed screw</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- **17 Nm (1.7 m-kgf, 12 ft-lbf)**
- **5 Nm (0.5 m-kgf, 3.6 ft-lbf)**
- **22 Nm (2.2 m-kgf, 16 ft-lbf)**

**New**
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 spilt brake fluid immediately.
- Avoid brake fluid coming into contact with the eyes as it can cause serious injury.

FIRST AID FOR BRAKE FLUID ENTERING 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 WHEELS” on page 4-20.

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.

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

5. Adjust:
   - Brake disc deflection
     a. Remove the brake disc.
     b. Rotate the brake disc by one bolt hole.
     c. Install the brake disc.

TIP

Install the brake disc so that the recessed portion of the bolt hole faces away from the hub.

Brake disc deflection limit
0.10 mm (0.0039 in)

Brake disc thickness limit
3.0 mm (0.12 in)

Front brake disc bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)
LOCTITE®
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 wheels
   Refer to “FRONT WHEELS” on page 4-20.

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 and brake pad spring as a set.

2. Install:
   - Brake pad spring
   - Brake pads

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

   Brake pad lining thickness limit
   1.0 mm (0.04 in)

3. Install:
   - Brake pad holding bolt
   - Brake pad holding bolt plug
   - Brake caliper

   Brake caliper bleed screw
   5 Nm (0.5 m·kgf, 3.6 ft·lbf)

4. Check:
   - Brake fluid level
     Below the minimum level mark → Add the specified brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-14.

5. Check:
   - Brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.

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

TIP
Before disassembling the brake caliper, drain the brake fluid from the entire brake system.
1. Remove:
   - Brake caliper piston "1"
   - Brake caliper dust seal "2"
   - Brake caliper piston seal "3"

   ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲
   EBS30380
   CHECKING THE FRONT BRAKE CALIPERS
   The following procedure applies to both of the brake calipers.

<table>
<thead>
<tr>
<th>Recommended brake component replacement schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake pads</td>
</tr>
<tr>
<td>Piston seals, dust seals</td>
</tr>
<tr>
<td>Brake hoses</td>
</tr>
<tr>
<td>Brake fluid</td>
</tr>
</tbody>
</table>

   ▶▶▶▶▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶ ▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶
   EWS20230
   ASSEMBLING THE FRONT BRAKE CALIPERS
   The following procedure applies to both of the brake calipers.

   ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲
   EWS20238
   INSTALLING THE FRONT BRAKE CALIPERS
   The following procedure applies to both of the brake calipers.

   ▶▶▶▶▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶ ▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶
   EWS20277

   ▶▶▶▶▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶ ▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶
   EWS20277

   WARNING
   EWBS02890
   Whenever a brake caliper is disassembled, replace the brake caliper piston dust seals and brake caliper piston seals.

   ▶▶▶▶▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶ ▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶
   EWS203140

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   EWS203140

   WARNING
   EWBS03150
   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 brake caliper piston seals to swell and distort.
   Whenever a brake caliper is disassembled, replace the brake caliper piston dust seals and brake caliper piston seals.

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   EWS20377

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

   ▶▶▶▶▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶ ▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶
   EWS203140

   WARNING
   EWBS03150
   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 brake caliper piston seals to swell and distort.
   Whenever a brake caliper is disassembled, replace the brake caliper piston dust seals and brake caliper piston seals.

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

   ▶▶▶▶▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶ ▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶▶▶▶▶▶▶ ▶ ▶
   EWS203140
1. Install:
- Brake caliper assembly
- Brake caliper bolts “1”
- Brake hose “2”
- Copper washers “3” New
- Brake hose union bolt “4”

WARNING
EWB02870
Proper brake hose routing is essential to insure safe vehicle operation.
Refer to “CABLE ROUTING” on page 2-33.

NOTICE
ECB02330
When installing the brake hose onto the brake caliper, make sure the brake pipe touches the projection “a” on the brake caliper.

Front brake caliper bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)
Brake hose union bolt
27 Nm (2.7 m·kgf, 20 ft·lbf)

2. Fill:
- Brake master cylinder reservoir
  (with the specified amount of the specified brake fluid)

Specified brake fluid
DOT 4

WARNING
EWB02970
• 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.

EBR01320
NOTICE
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

3. Bleed:
- Brake system
  Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.

4. Check:
- Brake fluid level
  Below the minimum level mark → Add the specified brake fluid to the proper level.
  Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-14.

5. Check:
- Brake lever operation
  Soft or spongy feeling → Bleed the brake system.
  Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.

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
  Cracks/damage → Replace.

4. Check:
- Brake hoses
  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.
- Whenever a master cylinder is disassembled, replace the brake master cylinder kit.

| Specified brake fluid | DOT 4 |

INSTALLING THE FRONT BRAKE MASTER CYLINDER

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

**TIP**

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

2. Install:
   - Brake hose
   - Copper washers **New**
   - Brake hose union bolt

**TIP**

- 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 split brake fluid immediately.

| Brake hose union bolt | 27 Nm (2.7 m-kgf, 20 ft-lbf) |

3. Fill:
   - Brake master cylinder reservoir
     (with the specified amount of the specified brake fluid)

**WARNING**

Proper brake hose routing is essential to insure safe vehicle operation.

Refer to “CABLE ROUTING” on page 2-33.

**TIP**

- While holding the brake hose, tighten the union bolt 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.
4. Bleed:
   • Brake system
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.

5. Check:
   • Brake fluid level
     Below the minimum level mark → Add the specified brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-14.

6. Check:
   • Brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.
Removing the brake pedal

<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 pedal cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Brake pedal spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake pedal</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Seat/Top cover/Side panels
Front fender inner panel (right)
Footrest board (right)

Refer to “GENERAL CHASSIS (1)” on page 4-1.
Refer to “GENERAL CHASSIS (3)” on page 4-8.
Refer to “GENERAL CHASSIS (4)” on page 4-11.

7 Nm (0.7 m-kgf, 5.1 ft-lbf)
Removing the rear brake pads

The following procedure applies to both of the rear 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></td>
<td>Rear wheel</td>
<td></td>
<td>The following procedure applies to both of the rear brake calipers.</td>
</tr>
<tr>
<td>1</td>
<td>Rear brake caliper bolt</td>
<td>2</td>
<td>Refer to “REAR WHEELS” on page 4-23.</td>
</tr>
<tr>
<td>2</td>
<td>Brake pad holding bolt plug</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake pad holding bolt</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 spring</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

*Note:* Torque values are in Nm (Nm) unless specified otherwise.
## Removing the rear brake master cylinder

### Diagram

![Diagram of rear brake components](image)

### Table: Order/Parts to remove

<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 fluid reservoir cap</td>
<td>1</td>
<td><strong>Drain.</strong> Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.</td>
</tr>
<tr>
<td>2</td>
<td>Brake fluid reservoir diaphragm holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake fluid reservoir diaphragm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Shift control cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Rear brake cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Brake lever</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Brake lever bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Copper washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Rear brake hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>11</td>
<td>Rear brake light switch connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>12</td>
<td>Rear brake light 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</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
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>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake master cylinder kit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake master cylinder body</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the rear brake calipers

The following procedure applies to both of the rear 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></td>
<td>Brake fluid</td>
<td></td>
<td>Drain. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.</td>
</tr>
<tr>
<td>Rear wheel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Copper washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear brake hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Brake pad holding bolt plug</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake pad holding bolt</td>
<td>1</td>
<td>Loosen.</td>
</tr>
<tr>
<td>6</td>
<td>Rear brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rear brake caliper assembly</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Disassembling the rear brake calipers

The following procedure applies to both of the rear 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 holding bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake pad</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake pad spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake caliper bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake caliper guide pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake caliper retaining pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Brake caliper piston</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Brake caliper dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Brake caliper piston seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bleed screw</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

The following procedure applies to both of the rear brake calipers.
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 spilt brake fluid immediately.
- Avoid brake fluid coming into contact with the eyes as it can cause serious injury.

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

CHECKING THE REAR BRAKE DISCS

The following procedure applies to both brake discs.

1. Remove:
   - Rear wheel
      Refer to “REAR WHEELS” on page 4-23.

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 4-31.

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

5. Adjust:
   - Brake disc deflection
     Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-31.

6. Install:
   - Rear wheels
     Refer to “REAR WHEELS” on page 4-23.

REPLACING THE REAR 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 and brake pad spring as a set.

2. Install:
   - Brake pad spring
   - Brake pads

TIP

Always install new brake pads and a new brake pad spring as a set.
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 piston into the brake caliper with your finger.

c. Tighten the bleed screw.

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

3. Install:
   - Brake pad holding bolt
   - Brake pad holding bolt plug
   - Brake caliper

4. Check:
   - Brake fluid level
     Below the minimum level mark → Add the specified brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-14.

5. Check:
   - Brake lever and pedal operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.

REMOVING THE REAR BRAKE MASTER CYLINDER
1. Remove:
   - Brake lever
CHECKING THE REAR BRAKE CALIPERS
The following procedure applies to both of the brake calipers.

<table>
<thead>
<tr>
<th>Recommended brake component replacement schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake pads</td>
</tr>
<tr>
<td>Piston seals, dust seals</td>
</tr>
<tr>
<td>Brake hoses</td>
</tr>
<tr>
<td>Brake fluid</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**
Whenever a brake caliper is disassembled, replace the brake caliper piston dust seals and brake caliper piston seals.

ASSEMBLING THE REAR BRAKE CALIPERS
The following procedure applies to both of the brake calipers.

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

INSTALLING THE REAR BRAKE CALIPERS
The following procedure applies to both of the brake calipers.
1. Install:
   • Brake caliper assembly
   • Brake caliper bolts “1”
   • Brake hose “2”
   • Copper washers “3” New
   • Brake hose union bolt “4”

**WARNING**
Proper brake hose routing is essential to ensure safe vehicle operation.
Refer to “CABLE ROUTING” on page 2-33.

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

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

Specified brake fluid
DOT 4

Rear brake caliper bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)
Brake hose union bolt
27 Nm (2.7 m·kgf, 20 ft·lbf)
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 spilt brake fluid immediately.

3. Bleed:
   - Brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-14.

4. Check:
   - Brake fluid level
     Below the minimum level mark → Add the specified brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-14.

5. Check:
   - Brake lever and pedal operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-14.

CHECKING THE REAR BRAKE MASTER CYLINDER
1. Check:
   - Brake master cylinder
     Damage/scratches/wear → Replace.
   - Brake master cylinder reservoir
     Cracks/damage → Replace.
   - Brake master cylinder reservoir diaphragm
     Cracks/damage → Replace.

4. Check:
   - Brake hoses
     Cracks/damage/wear → Replace.

ASSIMBLING 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.
- Whenever a master cylinder is disassembled, replace the brake master cylinder kit.

INSTALLING THE REAR BRAKE MASTER CYLINDER
1. Install:
   - Brake master cylinder "1"
   - Brake master cylinder holder "2"

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

2. Install:
   - Brake hose
• Copper washers
• Brake hose union bolt

Brake hose union bolt
27 Nm (2.7 m-kgf, 20 ft-lbf)

**WARNING**
Proper brake hose routing is essential to ensure safe vehicle operation.

Refer to “CABLE ROUTING” on page 2-33.

**TIP**
• While holding the brake hose, tighten the union bolt 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. Install:
• Brake lever bracket
• Brake lever

Rear brake lever pivot bolt
6 Nm (0.6 m-kgf, 4.3 ft-lbf)
Rear brake lever pivot nut
6 Nm (0.6 m-kgf, 4.3 ft-lbf)

**NOTICE**
The brake lever pivot bolt and nut have left-handed threads. To tighten the pivot bolt and nut, turn them counterclockwise.

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

Specified brake 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 spilled brake fluid immediately.

5. Bleed:
• Brake system
  Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.

6. Check:
• Brake fluid level
  Below the minimum level mark → Add the specified brake fluid to the proper level.
  Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-14.

7. Check:
• Brake lever and pedal operation
  Soft or spongy feeling → Bleed the brake system.
  Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-14.
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>1</td>
<td>Handle mounted light cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Multi-function meter</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Handlebar cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Plastic band</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>On-Command four-wheel-drive motor switch and differential gear lock switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Throttle cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Throttle lever assembly holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Throttle lever assembly</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
### 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>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>Rear brake master cylinder holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Rear brake light switch connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>13</td>
<td>Rear brake master cylinder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Handlebar switch (left)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Horn switch</td>
<td>1</td>
<td>Except for CDN</td>
</tr>
<tr>
<td>16</td>
<td>Handlebar grip</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Handle mounted light assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Handlebar holder</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Handlebar</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Torque Values**
- 0.5 Nm (0.05 m-kgf, 0.36 ft-lbf) T.R.
- 3.5 Nm (0.35 m-kgf, 2.5 ft-lbf)
- 7 Nm (0.7 m-kgf, 5.1 ft-lbf) T.R.
- 4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)
- 20 Nm (2.0 m-kgf, 14 ft-lbf)
- 7 Nm (0.7 m-kgf, 5.1 ft-lbf) T.R.
- 7 Nm (0.7 m-kgf, 5.1 ft-lbf) T.R.
- 2 Nm (0.2 m-kgf, 1.4 ft-lbf)
REMOVING THE HANDLEBAR
1. Place the vehicle on a level surface.
2. Remove:
   • Handlebar grips “1”

TIP
Blow compressed air between the handlebar end 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. Place the vehicle on a level surface.
2. Install:
   • Handlebar
   • Handlebar holders
   • Handle mounted light assembly

TIP
• Install the handlebar within 15° from the horizontal line shown in the illustration.
• The handlebar holders should be installed with the punch mark “a” forward “A”.
• Align the punch mark “b” on the handlebar with the lower surface of the right handlebar holder.
• First tighten the bolts “1” on the front side of the handlebar holders, and then tighten the bolts “2” on the rear side.

a. Wipe off grease or oil on the handlebar surface “a” with a lacquer thinner.
b. Apply a thin coat of rubber adhesive onto the left and right ends of the handlebar.
c. Install the handlebar grips to the handlebar so that arrow mark “L” faces up on the left handlebar grip and the arrow mark “R” faces up on the right handlebar.
d. Wipe off any excess rubber adhesive with a clean rag.

**WARNING**

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

4. Install:
- Handlebar switch (left)
- Rear brake master cylinder “1”
- Rear brake master cylinder holder “2”

**TIP**
- Align the end of the brake master cylinder holder with the punch mark “a” on the handlebar.
- The “UP” mark “b” on the brake master cylinder holder should face up.
- First tighten the bolt on the upper side of the brake master cylinder holder, and then tighten the bolt on the lower side.

5. Install (except for CDN):
- Horn switch “1”

**TIP**
Be sure to fit the projection “a” on the handlebar “2” between the ends of the horn switch.

6. Install:
- Front brake master cylinder “1”
- Front brake master cylinder holder “2”

**Front brake master cylinder holder bolt**
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

**TIP**
- Align the end of the brake master cylinder holder with the punch mark “a” on the handlebar.
- The “UP” mark “b” on the brake master cylinder holder should face up.
- First tighten the bolt “3” on the upper side of the brake master cylinder holder, and then tighten the bolt “4” on the lower side.

7. Install:
- Throttle lever assembly “1”
- Throttle lever assembly holder

**TIP**
Align the projection “a” on the throttle lever assembly with the end of the brake master cylinder holder “b”.

**Horn switch holder screw (except for CDN)**
0.5 Nm (0.05 m·kgf, 0.36 ft·lbf)
8. Connect:
   • Throttle cable

   **TIP**
   Lubricate the end of the throttle cable with a thin coat of lithium-soap-based grease.

   ![](image.png)

   Throttle lever assembly cover bolt
   1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)

9. Adjust:
   • Rear brake lever free play
     Refer to “ADJUSTING THE REAR DISC BRAKE” on page 3-12.

10. Adjust:
    • Throttle lever free play
     Refer to “ADJUSTING THE THROTTLE LEVER FREE PLAY” on page 3-33.
Removing the steering stem (except for EPS models)

**Order Job/Parts to remove** | **Q’ty** | **Remarks**
--- | --- | ---
Front skid plate/Battery cover/Seat/Top cover/Side panels | Refer to “GENERAL CHASSIS (1)” on page 4-1. |
Front carrier/Front guard | Refer to “GENERAL CHASSIS (2)” on page 4-6. |
Front fender | Refer to “GENERAL CHASSIS (3)” on page 4-8. |
Electrical components tray | Refer to “GENERAL CHASSIS (4)” on page 4-11. |
Storage compartment | Refer to “GENERAL CHASSIS (5)” on page 4-17. |
Handlebar | Refer to “HANDLEBAR” on page 4-48. |
1 Lock washer | 1 | |
2 Cable guide | 1 | |
3 Steering stem bushing holder | 2 | |
4 Steering stem bushing | 2 | |
5 Collar | 2 | |
Removing the steering stem (except for EPS models)

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Tie-rod nut</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Tie-rod</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>Pitman arm nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Pitman arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Steering stem</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Plug</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Oil seal</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>Bearing retainer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Steering stem support</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Steering stem bracket</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the steering stem (for EPS models)

<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 skid plate/Battery cover/Seat/Top cover/Side panels</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (1)” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Front carrier/Front guard</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (2)” on page 4-6.</td>
</tr>
<tr>
<td></td>
<td>Front fender</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (3)” on page 4-8.</td>
</tr>
<tr>
<td></td>
<td>Electrical components tray</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (4)” on page 4-11.</td>
</tr>
<tr>
<td></td>
<td>Storage compartment</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (5)” on page 4-17.</td>
</tr>
<tr>
<td></td>
<td>Handlebar</td>
<td></td>
<td>Refer to “HANDLEBAR” on page 4-48.</td>
</tr>
<tr>
<td>1</td>
<td>Lock washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cable guide</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Steering stem bushing holder</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Steering stem bushing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Collar</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

- **23 Nm (2.3 m-kgf, 17 ft-lbf)** New
- **7 Nm (0.7 m-kgf, 5.1 ft-lbf)** New
- **30 Nm (3.0 m-kgf, 22 ft-lbf)**
- **35 Nm (3.5 m-kgf, 25 ft-lbf)**
- **25 Nm (2.5 m-kgf, 18 ft-lbf)**
- **210 Nm (21.0 m-kgf, 152 ft-lbf)**
- **51 Nm (5.1 m-kgf, 37 ft-lbf)**
- **25 Nm (2.5 m-kgf, 18 ft-lbf)**

New parts are indicated with “New”. The table provides the order, job/parts to remove, quantity (Q’ty), and remarks for each component.
Removing the steering stem (for EPS models)

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Tie-rod nut</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Tie-rod</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>Pitman arm nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Pitman arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Steering stem pinch bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Steering stem</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Plug</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>EPS motor cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>EPS unit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Steering stem bracket</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

New

[23 Nm (2.3 m-kgf, 17 ft-lbf)]

New

[25 Nm (2.5 m-kgf, 18 ft-lbf)]

[30 Nm (3.0 m-kgf, 22 ft-lbf)]

[35 Nm (3.5 m-kgf, 25 ft-lbf)]

[51 Nm (5.1 m-kgf, 37 ft-lbf)]

[210 Nm (21.0 m-kgf, 152 ft-lbf)]

(4)
REMOVING THE BEARING RETAINER
(except for EPS models)
1. Remove:
   • Bearing retainer “1”
TIP
Remove the bearing retainer with the damper rod holder “2”.

CHECKING THE STEERING STEM
1. Check:
   • Steering stem
     Bends → Replace.
   • Steering stem bushings
     Wear/damage → Replace.

WARNING
Do not attempt to straighten a bent stem; this may dangerously weaken the stem.

INSTALLING THE STEERING STEM (except for EPS models)
1. Install:
   • Bearing “1”
   • Bearing retainer “2”
   • Oil seals “3” New
   • Bearing retainer (steering stem)
     40 Nm (4.0 m-kgf, 29 ft·lbf)
   • Damper rod holder (30 mm)
     90890-01327
     YM-01327
TIP
Install the bearing retainer with the damper rod holder.

2. Install:
   • Steering stem support “4”
   • Steering stem support bolts “5”
     (temporarily tighten)
3. Install:
   • Steering stem “6”
4. Install:
   • Collars “7”
   • Steering stem bushings “8”
   • Steering stem bushing holders “9”
   • Cable guide “10”
   • Lock washer “11” New
INSTALLING THE STEERING STEM (for EPS models)

1. Install:
   • Collars “1”
   • Steering stem bushings “2”
   • Steering stem bushing holders “3”
   • Cable guide “4”
   • Lock washer “5” New
   • Steering stem bracket “6”
   • Steering stem bolts “7” (temporarily tighten)

   **TIP**
   Apply lithium-soap-based grease to the steering stem bushings.

2. Install:
   • EPS unit “8”
   • EPS unit bolts “9” (temporarily tighten)

3. Install:
   • Steering stem “10”
   • Steering stem pinch bolt “11” (temporarily tighten)

   **TIP**
   Align the punch mark “a” on the EPS unit with the groove “b” in the steering stem.

---

**STEERING STEM**

- Steering stem bolts “12” (temporarily tighten)

  **TIP**
  Apply lithium-soap-based grease to the steering stem bushings.

5. Install:
   - Steering stem bracket “13”
   - Steering stem bracket bolts “14” (temporarily tighten)

6. Tighten:
   - Steering stem bolts “12”

   **TIP**
   - Bend the lock washer tabs “a” along a flat side of the bolts.
   - Pass the brake hoses through the cable guide.
   Refer to “CABLE ROUTING” on page 2-33.

7. Tighten:
   - Steering stem support bolts “5”

   **TIP**
   Apply lithium-soap-based grease to the steering stem bushings.

8. Tighten:
   - Steering stem bracket bolts “14”

---

Steering stem bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)

Steering stem support bolt (except for EPS models)
34 Nm (3.4 m·kgf, 25 ft·lbf) LOCTITE®

Steering stem bracket bolt
51 Nm (5.1 m·kgf, 37 ft·lbf) LOCTITE®
4. Install:
   • Steering stem bracket bolts “12”
     (temporarily tighten)
5. Tighten:
   • EPS unit bolts “9”
   • Steering stem pinch bolts “11”

6. Tighten:
   • Steering stem bolts “7”

TIP
   • Align the groove “a” in the pitman arm with the
     steering stem spline “b” that is indented.
   • Install the washer so that the rubber side “c” of
     the washer faces towards the pitman arm.

7. Tighten:
   • Steering stem bracket bolts “12”

---

**INSTALLING THE PITMAN ARM (except for EPS models)**

1. Install:
   • Pitman arm “1”
   • Washer
   • Pitman arm nut
   • Cotter pin [New]

**TIP**
   • Align the groove “a” in the pitman arm with the
     steering stem spline “b” that is indented.
   • Install the washer so that the rubber side “c” of
     the washer faces towards the pitman arm.

---

**INSTALLING THE PITMAN ARM (for EPS models)**

1. Install:
   • Pitman arm “1”
   • Washer
   • Cotter pin [New]
TIP
Align the punch mark “a” on the EPS unit with the groove “b” in the pitman arm.
Removing the tie-rods and steering knuckles

The following procedure applies to both of the tie-rods and steering knuckles.

Order | Job/Parts to remove | Q’ty | Remarks
--- | --- | --- | ---
Front wheel hub | Refer to “FRONT WHEELS” on page 4-20.
1 | Brake disc guard | 1 | New
2 | Front arm protector | 1 | New
3 | Tie-rod end locknut | 2 | New
4 | Tie-rod end | 2 | New
5 | Tie-rod | 1 | New
6 | Nut | 2 | New
7 | Steering knuckle | 1 | New
8 | Circlip | 1 | New
9 | Ball joint | 1 | New
10 | Circlip | 1 | New
11 | Wheel bearing | 1 | New

25 Nm (2.5 m-kgf, 18 ft-lbf)
30 Nm (3.0 m-kgf, 22 ft-lbf)
7 Nm (0.7 m-kgf, 5.1 ft-lbf)
15 Nm (1.5 m-kgf, 11 ft-lbf)
25 Nm (2.5 m-kgf, 18 ft-lbf)
7 Nm (0.7 m-kgf, 5.1 ft-lbf)
30 Nm (3.0 m-kgf, 22 ft-lbf)
TIE-RODS AND STEERING KNUCKLES

REMOVING THE STEERING KNUCKLES
The following procedure applies to both of the steering knuckles.
1. Remove:
   • Steering knuckle “1”

TIP
Use a general puller to separate the ball joints “2” from the steering knuckle “1” or the front lower arm “3”.

CHECKING THE TIE-RODS
The following procedure applies to both of the tie-rods.
1. Check:
   • Tie-rod movement
     Rough movement → Replace the tie-rod end.

2. Check:
   • Tie-rod
     Bends/damage → Replace.
     Rubber boot damage → Replace the tie-rod end.

   d. Apply lithium-soap-based grease to the balls of the new bearing.
   e. Install the new bearing.

   NOTICE
Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.

   f. Install a new circlip.

CHECKING THE STEERING KNUCKLE BALL JOINTS
The following procedure applies to both of the steering knuckle ball joints.
1. Check:
   • Ball joint (steering knuckle)
     Damage/pitting → Replace the ball joint.
     Rubber boot damage → Replace the ball joint.
     Rough movement → Replace the ball joint.
a. Clean the surface of the steering knuckle.
b. Remove the circlip “1”.

c. Remove the ball joint “2”.

**TIP**

Use a suitable socket “3” to separate the ball joint “2” from the steering knuckle “4”.

d. Measure the ball joint bore inside diameter “a”.
   Out of specification → Replace the steering knuckle.

**Ball joint bore inside diameter**

32.45–32.50 mm (1.278–1.280 in)

e. Attach the special tools and new ball joint “5” to the steering knuckle “4”.

**TIP**

- Always use a new ball joint.
- Do not tap or damage the top of the ball joint.

f. Hold the base “8” in place while turning in the short bolt “11” to install the new ball joint “5” into the steering knuckle “4”.

g. Remove the special tools.
h. Install a new circlip.

INSTALLING THE TIE-RODS

The following procedure applies to both of the tie-rods.

1. Install:
   • Tie-rod

   ![Tie-rod installation diagram]

   **TIP**
   Install the tie-rod so that the groove “1” is on the wheel side.

2. Adjust:
   • Toe-in
     Refer to “ADJUSTING THE TOE-IN” on page 3-21.

INSTALLING THE FRONT ARM PROTECTORS

The following procedure applies to both of the front arm protectors.

1. Install:
   • Front arm protector “1”

   ![Front arm protector installation diagram]

   **Front arm protector bolt**
   7 Nm (0.7 m·kgf, 5.1 ft·lbf)

   a. Fit the holders “a” on the front arm protector onto the lower arm.
   b. Tighten the bolt “b”.

---

Steering knuckle and tie-rod nut
25 Nm (2.5 m·kgf, 18 ft·lbf)

Pitman arm and tie-rod nut
25 Nm (2.5 m·kgf, 18 ft·lbf)
Removing the front arms and front shock absorber assemblies

The following procedure applies to both of the front upper arms, front lower arms, and front shock absorber assemblies.

Front wheel hub Refer to “FRONT WHEELS” on page 4-20.
Front brake caliper assembly Refer to “FRONT BRAKE” on page 4-26.

<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 disc guard</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Front arm protector</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Front brake hose holder</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Nut</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Nut/Bolt</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Front shock absorber assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Nut/Washer/Bolt</td>
<td>2/2/2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Front upper arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Nut/Bolt</td>
<td>2/2</td>
<td></td>
</tr>
</tbody>
</table>

**T.R.**

| 45 Nm (4.5 m-kgf, 33 ft-lbf)
| 55 Nm (5.5 m-kgf, 40 ft-lbf)
| 30 Nm (3.0 m-kgf, 22 ft-lbf)
| 7 Nm (0.7 m-kgf, 5.1 ft-lbf)

New
Removing the front arms and front shock absorber assemblies

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Front lower arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Dust cover</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Bushing</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Ball joint</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

 torque values:

- 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
- 45 Nm (4.5 m-kgf, 33 ft-lbf)
- 55 Nm (5.5 m-kgf, 40 ft-lbf)
- 30 Nm (3.0 m-kgf, 22 ft-lbf)
- 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
- 45 Nm (4.5 m-kgf, 33 ft-lbf)
- 30 Nm (3.0 m-kgf, 22 ft-lbf)
- 55 Nm (5.5 m-kgf, 40 ft-lbf)
- 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
- 45 Nm (4.5 m-kgf, 33 ft-lbf)
- 30 Nm (3.0 m-kgf, 22 ft-lbf)
CHECKING THE FRONT ARMS
The following procedure applies to both of the front upper arms and front lower arms.
1. Check:
   * Front arm free play

   ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼
   a. Check the front arm side play “A” by moving it from side to side.
      If side play is noticeable, check the bushings.
   b. Check the front arm vertical movement “B” by moving it up and down.
      If the vertical movement is tight or rough, or if there is binding, check the bushings.

   ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲

2. Check:
   * Front upper arm
   * Front lower arm

   Bends/damage → Replace.

3. Check:
   * Bushings

   Wear/damage → Replace.

CHECKING THE FRONT SHOCK ABSORBER ASSEMBLIES
The following procedure applies to both of the front shock absorber assemblies.
1. Check:
   * Front shock absorber assembly

   Oil leaks → Replace the front shock absorber assembly.

   • Spring

   Move the spring up and down.
   Fatigue → Replace the front shock absorber assembly.

CHECKING THE FRONT ARM BALL JOINTS
The following procedure applies to both of the front arm ball joints.
1. Check:
   * Ball joint (front upper arm)

   Damage/pitting → Replace the ball joint.
   Rubber boot damage → Replace the ball joint.
   Rough movement → Replace the ball joint.

   ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼
   a. Clean the surface of the front upper arm.
   b. Remove the circlip “1”.
   c. Remove the ball joint “2”.

   TIP
   Use the suitable socket “3” to separate the ball joint “2” from the front upper arm “4”.

Front shock absorber rod
Bends/damage → Replace the front shock absorber assembly.
• Spring
Move the spring up and down.
Fatigue → Replace the front shock absorber assembly.
d. Attach the special tools and new ball joint “5” to the front upper arm “4”.

**TIP**
- Always use a new ball joint.
- Do not tap or damage the top of the ball joint.

e. Hold the base “12” in place while turning in the long bolt “6” to install the new ball joint “5” into the front upper arm “4”.

f. Remove the special tools.
g. Install a new circlip.

---

**INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES**

The following procedure applies to both of the front upper arms, front lower arms, and front shock absorber assemblies.

1. Install:
   - Front upper arm
   - Front lower arm
   - Front shock absorber assembly

   ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲▲▲

   a. Install the front upper arm “1” and front lower arm “2”.

   **TIP**
   - Lubricate the front upper and lower arm bolts “3” with lithium-soap-based grease.
   - Be sure to position the front upper and lower arm bolts “3” so that the bolt heads face forward.
   - Install the washers “4”.
   - Temporarily tighten the front upper and lower arm nuts “5”.

   b. Install the front shock absorber assembly “6”, bolts “7”, and nuts “8”.

   ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲▲▲

   c. Install the steering knuckle, upper steering knuckle nut “9”, and lower steering knuckle nut “10”.

---

**Ball joint remover**
90890-01474

**Ball joint remover**
YM-01474

**Ball joint remover attachment set**
90890-01480

**Ball joint adapter set**
YM-01480

<table>
<thead>
<tr>
<th>No.</th>
<th>Tool name</th>
<th>Tool No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Long bolt</td>
<td>90890-01474</td>
</tr>
<tr>
<td>7</td>
<td>Body</td>
<td>YM-01474</td>
</tr>
<tr>
<td>8</td>
<td>Guide bolt</td>
<td>90890-01474</td>
</tr>
<tr>
<td>9</td>
<td>Remover attachment</td>
<td>YM-01474</td>
</tr>
<tr>
<td>10</td>
<td>Installer spacer</td>
<td>90890-01480</td>
</tr>
<tr>
<td>11</td>
<td>Installer washer</td>
<td>YM-01480</td>
</tr>
<tr>
<td>12</td>
<td>Base</td>
<td>YM-01480</td>
</tr>
</tbody>
</table>

---

**Front shock absorber assembly nut**

45 Nm (4.5 m-kgf, 33 ft-lbf)
d. Install the new cotter pins.
e. Tighten the front upper and lower arm nuts “5” to specification.

**Steering knuckle and front upper arm nut**
30 Nm (3.0 m-kgf, 22 ft-lbf)

**Steering knuckle and front lower arm nut**
30 Nm (3.0 m-kgf, 22 ft-lbf)

**Front upper arm nut**
55 Nm (5.5 m-kgf, 40 ft-lbf)

**Front lower arm nut**
55 Nm (5.5 m-kgf, 40 ft-lbf)

b. Tighten the bolt “b”.

---

**INSTALLING THE FRONT ARM PROTECTORS**

The following procedure applies to both of the front arm protectors.

1. Install:
   - Front arm protector “1”

**Front arm protector bolt**
7 Nm (0.7 m-kgf, 5.1 ft-lbf)

**Rear arm protector nut**
7 Nm (0.7 m-kgf, 5.1 ft-lbf)

a. Fit the holders “a” on the front arm protector onto the lower arm.
## Removing the rear knuckles and stabilizer

### The following procedure applies to both of the rear knuckles.

<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 hub</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Brake disc guard</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rear arm protector</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear brake disc cleaning plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rear knuckle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spacer cover</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Spacer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Wheel bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Stabilizer joint</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Stabilizer holder</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Bushing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Stabilizer</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- **56 Nm (5.6 m-kgf, 41 ft-lbf)**
- **30 Nm (3.0 m-kgf, 22 ft-lbf)**
- **7 Nm (0.7 m-kgf, 5.1 ft-lbf)**
- **7 Nm (0.7 m-kgf, 5.1 ft-lbf)**
- **45 Nm (4.5 m-kgf, 33 ft-lbf)**
- **56 Nm (5.6 m-kgf, 41 ft-lbf)**

Refer to “REAR WHEELS” on page 4-23.
CHECKING THE REAR KNUCKLES AND REAR WHEEL BEARINGS
The following procedure applies to both of the rear knuckles and rear wheel bearings.

1. Check:
   • Rear knuckle
     Damage/pitting → Replace.

de 

2. Check:
   • Rear wheel bearing “1”
     Rough movement/excessive free play → Replace.

WARNING
Eye protection is recommended when using striking tools.

d. Apply lithium-soap-based grease to the bearing.
e. Install the new bearing.

NOTICE
Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.

f. Install the new circlip.

CHECKING THE STABILIZER
1. Check:
   • Stabilizer
     Bends/cracks/damage → Replace.

INSTALLING THE REAR ARM PROTECTORS
The following procedure applies to both of the rear arm protectors.
1. Install:
   • Rear arm protector “1”
Removing the rear arms and rear shock absorber assemblies

The following procedure applies to both of the rear upper arms, rear lower arms, and rear shock absorber assemblies.

Rear knuckle/Stabilizer Refer to “REAR KNUCKLES AND STABILIZER” on page 4-70.

<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 hose guide</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Nut/Washer/Bolt</td>
<td>2/1/2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear shock absorber assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Nut/Washer/Bolt</td>
<td>2/2/2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear upper arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dust cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Nut/Bolt</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Rear lower arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Dust cover</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bushing</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

55 Nm (5.5 m-kgf, 40 ft-lbf)

45 Nm (4.5 m-kgf, 33 ft-lbf)

7 Nm (0.7 m-kgf, 5.1 ft-lbf)
REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES

CHECKING THE REAR ARMS

The following procedure applies to both of the rear upper arms and rear lower arms.

1. Check:
   • Rear arm free play

      ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲

      a. Check the rear arm side play “A” by moving it from side to side.
         If side play is noticeable, check the bushings.

      b. Check the rear arm vertical movement “B” by moving it up and down.
         If the vertical movement is tight or rough, or if there is binding, check the bushings.

   ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲

2. Check:
   • Rear upper arm
   • Rear lower arm

   Bends/damage → Replace.

3. Check:
   • Bushings

   Wear/damage → Replace.

CHECKING THE REAR SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the rear shock absorber assemblies.

1. Check:
   • Rear shock absorber assembly

      Oil leaks → Replace the rear shock absorber assembly.

   • Rear shock absorber rod

      Bends/damage → Replace the rear shock absorber assembly.

   • Spring

      Move the spring up and down.
      Fatigue → Replace the rear shock absorber assembly.

INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the rear upper arms, rear lower arms, and rear shock absorber assemblies.

1. Install:
   • Rear upper arm
   • Rear lower arm
   • Rear shock absorber assembly

      ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲

   a. Install the rear upper arm “1” and rear lower arm “2”.

      TIP

      • Lubricate the rear upper and lower arm bolts “3” with lithium-soap-based grease.
      • Be sure to position the rear upper and lower arm bolts “3” so that the bolt heads face outward.
      • Installed the washers “4”.
      • Temporarily tighten the rear upper and lower arm nuts “5”.

   b. Install the rear shock absorber assembly “6”, bolts “7”, washer “8”, and nuts “9”.

   ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲

   c. Install the rear knuckle and nuts “10”.

   ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲

   d. Tighten the rear upper and lower arm nuts “5” to specification.

   ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲

   Rear shock absorber assembly nut
   45 Nm (4.5 m·kgf, 33 ft·lbf)

   Rear knuckle nut
   45 Nm (4.5 m·kgf, 33 ft·lbf)

   Rear upper arm nut
   55 Nm (5.5 m·kgf, 40 ft·lbf)
   Rear lower arm nut
   55 Nm (5.5 m·kgf, 40 ft·lbf)
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MEASURING THE COMPRESSION PRESSURE

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 3-5.

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

3. Remove:
   - Top cover
   - Side panel (right)
   - Storage compartment
     Refer to “GENERAL CHASSIS (2)” on page 4-6.

4. Disconnect:
   - Spark plug cap

5. Remove:
   - Spark plug

NOTICE

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

6. Install:
   - Extension “1”
   - Compression gauge “2”

7. Measure:
   - Compression pressure
     Out of specification → Refer to steps (b) and (c).

Standard compression pressure (at sea level)
650–1000 kPa (6.5–10.0 kgf/cm², 92.4–142.2 psi)

WARNING

To prevent sparking, ground the spark plug lead before cranking the engine.

b. If the compression pressure is above the maximum specification, check the cylinder head, valve surfaces and piston crown for carbon deposits.
Carbon deposits → Eliminate.

c. 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.

<table>
<thead>
<tr>
<th>Reading</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher than without oil</td>
<td>Piston ring(s) wear or damage → Repair.</td>
</tr>
<tr>
<td>Same as without oil</td>
<td>Piston, valves, cylinder head gasket, or piston ring(s) possibly defective → Repair.</td>
</tr>
</tbody>
</table>

Spark plug (reused)
Specified angle 30°–45°

7. Measure:
   - Compression pressure
     Out of specification → Refer to steps (b) and (c).

8. Install:
   - Spark plug

9. Connect:
   - Spark plug cap

10. Install:
    - Storage compartment
    - Side panel (right)
• Top cover
  Refer to “GENERAL CHASSIS (2)” on page 4-6.
Removing the V-belt cooling ducts, muffler and exhaust pipe

<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 fender/Rear fender</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (3)” on page 4-8.</td>
</tr>
<tr>
<td></td>
<td>Footrest board (left)</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (4)” on page 4-11.</td>
</tr>
<tr>
<td>1</td>
<td>V-belt cooling exhaust duct</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>V-belt cooling exhaust duct joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>V-belt cooling intake duct joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>V-belt cooling intake duct</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Exhaust pipe protector</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Spring</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Muffler</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Muffler bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Exhaust pipe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Gasket</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Torque Specifications**

- 33 Nm (3.3 m-kgf, 24 ft-lbf)
- 20 Nm (2.0 m-kgf, 14 ft-lbf)
- 1.5 Nm (0.15 m-kgf, 1.1 ft-lbf)
- 7 Nm (0.7 m-kgf, 5.1 ft-lbf)

**T.R.**

- 20 Nm (2.0 m-kgf, 14 ft-lbf)
- 1.5 Nm (0.15 m-kgf, 1.1 ft-lbf)
- 1.5 Nm (0.15 m-kgf, 1.1 ft-lbf)

**New**

- 1.5 Nm (0.15 m-kgf, 1.1 ft-lbf)
INSTALLING THE EXHAUST PIPE AND MUFFLER

1. Install:
   - Gasket “1” New
   - Exhaust pipe “2”
   - Exhaust pipe nuts “3”

<table>
<thead>
<tr>
<th>Exhaust pipe nut</th>
<th>20 Nm (2.0 m·kgf, 14 ft·lbf)</th>
</tr>
</thead>
</table>

2. Install:
   - Muffler bracket “4”
   - Muffler bracket bolts “5”

<table>
<thead>
<tr>
<th>Muffler bracket bolt</th>
<th>20 Nm (2.0 m·kgf, 14 ft·lbf)</th>
</tr>
</thead>
</table>

3. Install:
   - Gasket “6” New
   - Muffler “7”
   - Washer “8”
   - Muffler bolt “9”

TIP
Do not fully tighten the muffler bolt.

4. Install:
   - Springs “10”

TIP
Install the springs so that the spring ends are pointing inward as shown in the illustration.

5. Tighten:
   - Muffler bolt “9”

<table>
<thead>
<tr>
<th>Muffler bolt</th>
<th>33 Nm (3.3 m·kgf, 24 ft·lbf)</th>
</tr>
</thead>
</table>

INSTALLING THE V-BELT COOLING DUCTS

1. Install:
   - V-belt cooling intake duct joint “1”
   - V-belt cooling intake duct “2”

TIP
Do not fully tighten the muffler bolt.

a. Position the V-belt cooling intake duct joint with its arrow mark “a” pointing toward the engine.

b. Align the projection on the V-belt cooling intake duct joint with the rib on the crankcase in the area “b” shown in the illustration.

c. Align the screw head with the seam on the V-belt cooling intake duct joint in the area “c” shown in the illustration.

d. Align the projection on the V-belt cooling intake duct with the projection on the V-belt cooling intake duct joint in the area “d” shown in the illustration.

e. Align the bend in the screw clamp with the projection on the V-belt cooling intake duct joint in the area “e” shown in the illustration.
2. Install:
   - V-belt cooling exhaust duct joint “1”
   - V-belt cooling exhaust duct “2”

a. Position the V-belt cooling exhaust duct joint with its arrow mark “a” pointing toward the engine.
b. Align the projection on the V-belt cooling exhaust duct joint with the projection on the drive belt case in the area “b” shown in the illustration.
c. Align the screw head with the arrow mark “a” on the V-belt cooling exhaust duct joint in the area “c” shown in the illustration.
d. Align the projection on the V-belt cooling exhaust duct with the projection on the V-belt cooling exhaust duct joint in the area “d” shown in the illustration.
e. Align the screw head with the rib on the V-belt cooling exhaust duct in the area “e” shown in the illustration.
Removing the drive select lever unit

<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>Drive select lever shift rod</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Drive select lever unit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Shift arm</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
INSTALLING THE DRIVE SELECT LEVER UNIT

1. Install:
   - Shift arm “1"
   - Drive select lever unit “2”
   - Drive select lever shift rod “3”

<table>
<thead>
<tr>
<th>Component</th>
<th>Torque Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift arm bolt</td>
<td>14 Nm (1.4 m·kgf, 10 ft·lbf)</td>
</tr>
<tr>
<td>LOCTITE®</td>
<td></td>
</tr>
<tr>
<td>Drive select lever unit bolt</td>
<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
</tr>
<tr>
<td>Drive select lever shift rod lock-nut</td>
<td>8 Nm (0.8 m·kgf, 5.8 ft·lbf)</td>
</tr>
<tr>
<td>(select lever unit side)</td>
<td></td>
</tr>
<tr>
<td>Drive select lever shift rod lock-nut</td>
<td>8 Nm (0.8 m·kgf, 5.8 ft·lbf)</td>
</tr>
<tr>
<td>(shift arm side)</td>
<td></td>
</tr>
</tbody>
</table>

TIP

- Make sure that the drive select lever and transmission are in “N” (neutral).
- The installed length “a” of the shift rod is 410 mm (16.1 in).
Disconnecting the leads, cables and hoses

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Footrest board</td>
<td></td>
<td></td>
<td>Refer to “GENERAL CHASSIS (4)” on page 4-11.</td>
</tr>
<tr>
<td>Air filter case</td>
<td></td>
<td></td>
<td>Refer to “GENERAL CHASSIS (5)” on page 4-17.</td>
</tr>
<tr>
<td>Air cut-off valve assembly</td>
<td></td>
<td></td>
<td>Refer to “AIR INDUCTION SYSTEM” on page 7-9.</td>
</tr>
<tr>
<td>Throttle body assembly</td>
<td></td>
<td></td>
<td>Refer to “THROTTLE BODY” on page 7-4.</td>
</tr>
<tr>
<td>Coolant reservoir</td>
<td></td>
<td></td>
<td>Refer to “RADIATOR” on page 6-4.</td>
</tr>
<tr>
<td>Thermostat</td>
<td></td>
<td></td>
<td>Refer to “THERMOSTAT” on page 6-7.</td>
</tr>
<tr>
<td>Water pump assembly</td>
<td></td>
<td></td>
<td>Refer to “WATER PUMP” on page 6-10.</td>
</tr>
<tr>
<td>Differential assembly</td>
<td></td>
<td></td>
<td>Refer to “FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT” on page 8-4.</td>
</tr>
<tr>
<td>Final drive assembly</td>
<td></td>
<td></td>
<td>Refer to “REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT” on page 8-15.</td>
</tr>
<tr>
<td>Starter motor</td>
<td></td>
<td></td>
<td>Refer to “ELECTRIC STARTER” on page 5-40.</td>
</tr>
</tbody>
</table>
### Disconnecting the leads, cables and hoses

<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>Cylinder head breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Coolant temperature sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Spark plug cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Shift control cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Reverse switch lead</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Speed sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Crankshaft position sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>AC magneto lead coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>9</td>
<td>Gear position switch coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>10</td>
<td>Water pump drain hose</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

17 Nm (1.7 m-kgf, 12 ft-lbf)
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>Rubber damper nut (front side)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Engine mounting bolt (rear) (M6)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Engine mounting bolt (rear) (M10)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rubber damper nut (rear side)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rubber damper (rear side)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Engine</td>
<td>1</td>
<td><em><strong>TIP</strong></em> Remove the engine from the left side of the vehicle.</td>
</tr>
<tr>
<td>7</td>
<td>Engine mounting bolt (front) (M6)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Engine mounting bolt (front) (M10)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Rubber damper (front side)</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
INSTALLING THE ENGINE

1. Install:
   - Rubber dampers (front side) “1”
   - Engine mounting bolts (front) (M10) “2”
   - Engine mounting bolts (front) (M6) “3”
   - Engine “4”
   - Rubber dampers (rear side) “5”
   - Rubber damper nuts (rear side) “6”
   - Engine mounting bolts (rear) (M10) “7”
   - Engine mounting bolts (rear) (M6) “8”
   - Rubber damper nuts (front side) “9”

2. Tighten:
   - Engine mounting bolts (front) (M10) “2”
   - Engine mounting bolts (front) (M6) “3”
   - Engine mounting bolts (rear) (M10) “7”
   - Engine mounting bolts (rear) (M6) “8”
   - Rubber damper nuts (front side) “9”
   - Rubber damper nuts (rear side) “6”

---

**NOTICE**

Make sure that the engine does not strike the brake pipe when installing it.

**TIP**

Do not fully tighten the bolts and nuts.
**Removing the cylinder head cover**

- **10 Nm (1.0 m-kgf, 7.2 ft-lbf)**
- **11 Nm (1.1 m-kgf, 8.0 ft-lbf)**
- Specified angle 30°–45°

<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>Storage compartment</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (5)” on page 4-17.</td>
</tr>
<tr>
<td>2</td>
<td>Cylinder head breather hose</td>
<td></td>
<td>Refer to “ENGINE REMOVAL (3)” on page 5-8.</td>
</tr>
<tr>
<td>1</td>
<td>Spark plug cap</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Spark plug</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Breather plate cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Breather plate cover gasket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Breather plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Cylinder head cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Cylinder head cover gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Timing chain guide (upper side)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the camshafts

<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>Crankshaft end accessing screw</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Timing mark accessing screw</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Timing chain tensioner</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Timing chain tensioner gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Camshaft cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bearing stopper</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Intake camshaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Exhaust camshaft</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

* Torque values in parentheses are for new parts. New parts are marked with “E.”

- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
- 5 Nm (0.5 m-kgf, 3.6 ft-lbf)
- 11 Nm (1.1 m-kgf, 8.0 ft-lbf)
- 4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)
REMOVING THE CAMSHAFTS

1. Remove:
   - Crankshaft end accessing screw “1”
   - Timing mark accessing screw “2”

2. Align:
   - Mark “a” on the AC magneto rotor
     (with the mark “b” in the AC magneto cover)

   ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼

   a. Turn the crankshaft counterclockwise.

   b. Position the mark “a” on the AC magneto rotor with the mark “b” in the AC magneto cover.

   ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲▲▲

TIP

When the holes “c” in the intake camshaft sprocket and exhaust camshaft sprocket are positioned above the cylinder head mating surface “d” as shown in the illustration, and the marks “e” and “f” on the sprockets are aligned with the cylinder head mating surface “d”, the piston is at TDC.

3. Remove:
   - Timing chain tensioner
   - Timing chain tensioner gasket

4. Remove:
   - Camshaft cap “1”
   - Bearing stoppers “2”

NOTICE

- To prevent damage to the cylinder head, camshafts or camshaft cap, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.
- Be sure not to let the bearing stoppers fall into the crankcase when removing it.

5. Remove:
   - Intake camshaft “1”
   - Exhaust camshaft “2”

TIP

To prevent the timing chain from coming off the crankshaft sprocket, fasten it with a wire “3”.

5-14
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.

3. Measure:
   - Camshaft-journal-to-camshaft-cap clearance
     Out of specification → Measure the camshaft journal diameter.

   Camshaft-journal-to-camshaft-cap clearance
   0.037–0.075 mm (0.0015–0.0030 in)

   ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼ ▼ ▼▼▼▼ ▼▼▼

   a. Install the camshafts into the cylinder head (without the camshaft cap).
   b. Position a strip of Plastigauge® “1” onto the camshaft journal as shown.
   c. Install the camshaft cap.

   **TIP**
   - Tighten the camshaft cap bolts in the tightening sequence as shown.
   - Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance with the Plastigauge®.

   ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼ ▼ ▼▼▼▼ ▼▼▼

   Camshaft cap bolt
   10 Nm (1.0 m-kgf, 7.2 ft-lbf)

   d. Remove the camshaft cap, and then measure the width of the Plastigauge® “1”.

   ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼ ▼ ▼▼▼▼ ▼▼▼
4. Measure:
- Camshaft journal diameter “a”
  Out of specification → Replace the camshaft.
  Within specification → Replace the cylinder head and camshaft cap as a set.

Camshaft journal diameter
21.946–21.963 mm (0.8640–0.8647 in)

CHECKING THE CAMSHAFT SPROCKETS
1. Check:
- Camshaft sprocket
  More than 1/4 tooth wear “a” → Replace the camshaft sprockets and timing chain as a set.

CHECKING THE TIMING CHAIN TENSIONER
1. Check:
- Timing chain tensioner
  Cracks/damage/rough movement → Replace.
  a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.

TIP
While pressing the timing chain tensioner rod, wind it clockwise with a flat-head screwdriver until it stops.

b. Make sure that the timing chain tensioner rod moves in and out of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.

INSTALLING THE CAMSHAFTS
1. Align:
- Mark “a” on the AC magneto rotor (with the mark “b” in the AC magneto cover)
  a. Turn the crankshaft counterclockwise.

a. 1/4 tooth
b. Correct
1. Timing chain
2. Camshaft sprocket
b. Position the mark “a” on the AC magneto rotor with the mark “b” in the AC magneto cover.

2. Install:
   • Timing chain “1”
     (onto the camshaft sprockets “2”)
   • Exhaust camshaft
   • Intake camshaft

   NOTICE
ECB02440
Do not turn the crankshaft when installing the timing chain to avoid damage or improper valve timing.

   TIP
When installing the timing chain “1”, make sure that the holes “a” in the camshaft sprockets “2” are positioned above the cylinder head mating surface “b” as shown in the illustration, and the marks “c” and “d” on the sprockets are aligned with the cylinder head mating surface “b”.

3. Install:
   • Bearing stoppers
   • Camshaft cap “1”

   Camshaft cap bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

   NOTICE
ECB02450
• The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft cap, and camshafts will result.
• Do not turn the crankshaft when installing the camshaft cap to avoid damage or improper valve timing.

   TIP
Tighten the camshaft cap bolts in the tightening sequence as shown.

4. Install:
   • Timing chain tensioner gasket New
   • Timing chain tensioner

   ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼
a. Remove the timing chain tensioner cap bolt and gasket.
b. Install a new gasket and the timing chain tensioner “1” onto the cylinder.

   Timing chain tensioner bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

   TIP
Turn the timing chain tensioner rod fully clockwise with a flat-head screwdriver, and then, with the tensioner rod turned all the way into the timing chain tensioner housing (with the thin screwdriver still installed), install the timing chain tensioner “1” onto the cylinder.
c. Install a new gasket and the timing chain tensioner cap bolt.

Timing chain tensioner cap bolt
5 Nm (0.5 m·kgf, 3.6 ft·lbf)

5. Turn:
   • Crankshaft
     (several turns counterclockwise)

6. Check:
   • Mark “a”
     Make sure the mark “a” on the AC magneto rotor is aligned with the mark “b” in the AC magneto cover.
   • Camshaft sprocket mark “c”
     Make sure the marks “c” on the camshaft sprockets are aligned with the cylinder head mating surface “d”.
     Out of alignment → Adjust.
     Refer to the installation steps above.
   • Timing chain guide
     Make sure that the timing chain guide and timing chain are positioned correctly.

7. Measure:
   • Valve clearance
     Out of specification → Adjust.
     Refer to “ADJUSTING THE VALVE CLEARANCE” on page 3-5.

INSTALLING THE BREATHER PLATE

1. Install:
   • Breather plate cover gaskets
   • Breather plate
   • Breather plate cover

Breather plate cover bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

TIP
Tighten the breather plate cover bolts in the proper tightening sequence as shown.
## CYLINDER HEAD, CYLINDER, AND PISTON

### 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>Coolant</td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-29.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exhaust pipe</td>
<td>Refer to “ENGINE REMOVAL (1)” on page 5-3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cylinder head cover/intake camshaft/Exhaust camshaft</td>
<td>Refer to “CAMSHAFTS” on page 5-12.</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>Water jacket joint</td>
<td>Refer to “WATER PUMP” on page 6-10.</td>
<td></td>
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<tr>
<td>Throttle body assembly</td>
<td>Refer to “THROTTLE BODY” on page 7-4.</td>
<td></td>
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<tr>
<td>Reed valve assembly</td>
<td>Refer to “AIR INDUCTION SYSTEM” on page 7-9.</td>
<td></td>
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</table>
Removing the cylinder head

- Order Job/Parts to remove
- Q’ty
- Remarks

<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 hose (crankcase to cylinder)</td>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>Cylinder bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cylinder head bolt</td>
<td>2</td>
<td>M6</td>
</tr>
<tr>
<td>4</td>
<td>Cylinder head bolt</td>
<td>4</td>
<td>M11</td>
</tr>
<tr>
<td>5</td>
<td>Cylinder head</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Cylinder head gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Dowel pin</td>
<td>2</td>
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</table>
## Removing the cylinder and piston

<table>
<thead>
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<th>Remarks</th>
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<td>1</td>
<td>Timing chain guide (exhaust side)</td>
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</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>
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<tr>
<td>4</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Piston pin clip</td>
<td>2</td>
<td></td>
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<tr>
<td>6</td>
<td>Piston pin</td>
<td>1</td>
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<td>7</td>
<td>Piston</td>
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<td>8</td>
<td>Top ring</td>
<td>1</td>
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<tr>
<td>9</td>
<td>2nd ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Oil ring</td>
<td>1</td>
<td></td>
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</tbody>
</table>
REMOVING THE CYLINDER HEAD

1. Remove:
   - Cylinder bolt (M6) (×2)
   - Cylinder head bolt (M6) (×2)
   - Cylinder head bolt (M11) (×4)
   - Cylinder head

TIP

- Loosen the bolts in the proper sequence as shown.
- Loosen each bolt 1/2 of a turn at a time. After all of the bolts are fully loosened, remove them.

- M6 × 25 mm: “1”–“4”
- M11 × 208 mm: “5”–“8”

2. Before removing the piston pin, deburr the piston pin clip grooves and the piston 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”.
- Remove the piston pin from the side of the piston that has the manufacturer’s mark “a”.

REMOVING THE PISTON

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

TIP

- Before removing the piston pin clips, cover the crankcase opening with a clean rag to prevent the piston pin clips from falling into the crankcase.

NOTICE

Do not use a hammer to drive the piston pin out.

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 CYLINDER HEAD

1. Eliminate:
   - Combustion chamber carbon deposits (with a rounded scraper)

**NOTICE**

Do not use a sharp instrument; otherwise, the following may be damaged or scratched:
- 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.

   **Warpage limit**
   0.03 mm (0.0012 in)

   ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼

   a. Place a straightedge “1” and a thickness gauge “2” across the cylinder head.

   b. Measure the warpage.
   c. If the limit is exceeded, resurface the cylinder head as follows.
   d. Place a 400–600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

---

CHECKING THE CYLINDER AND PISTON

1. Check:
   - Piston wall
   - Cylinder wall
     Vertical scratches → Replace the cylinder, and replace the piston and piston rings as a set.

2. Measure:
   - Piston-to-cylinder clearance

   ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼

   a. Measure the cylinder bore “C” with the cylinder bore gauge.

   **TIP**

   Measure the cylinder bore “C” by taking side-to-side and front-to-back measurements of the cylinder.

   **Bore**
   103.000–103.020 mm (4.0551–4.0559 in)

   **Wear limit**
   103.080 mm (4.0583 in)

   **Taper limit**
   0.050 mm (0.0020 in)

   **Out of round limit**
   0.050 mm (0.0020 in)

   “C” = maximum of D1, D2, D3, D4, D5, D6

   Taper (front-to-back) = maximum difference between D1, D3, D5
   Taper (side-to-side) = maximum difference between D2, D4, D6

   Out of round (top) = difference between D1, D2
   Out of round (middle) = difference between D3, D4
   Out of round (bottom) = difference between D5, D6

---

TIP

To ensure an even surface, rotate the cylinder head several times.
b. If out of specification, replace the cylinder, and replace the piston and piston rings as a set.

c. Measure piston skirt diameter “P” with a micrometer.

Diameter
102.960–102.975 mm (4.0535–4.0541 in)

a. 11.0 mm (0.43 in) from the bottom edge of the piston

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.

Top ring
Ring side clearance limit
0.12 mm (0.0047 in)

2nd ring
Ring side clearance limit
0.12 mm (0.0047 in)

Piston-to-cylinder clearance
0.040–0.075 mm (0.0016–0.0030 in)

f. If out of specification, 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.

2. Install:
   • Piston ring
     (into the cylinder)

TIP
Use the piston crown to level the piston ring near bottom of cylinder “a”, where cylinder wear is lowest.

b. Upper of cylinder

3. Measure:
   • Piston ring end gap
     Out of specification → Replace the piston ring.

TIP
The oil ring expander end gap cannot be measured. If the oil ring rail gap is excessive, replace all three piston rings.
CHECKING THE PISTON PIN
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.

INSTALLING THE PISTON AND CYLINDER
1. Install:
   • Oil ring expander “1”
   • Lower oil ring rail “2”
   • Upper oil ring rail “3”
   • 2nd ring “4”
   • Top ring “5”
   TIP
   Be sure to install the piston rings so that the manufacturer’s marks or numbers face up.

2. Install:
   • Piston “1”
   • Piston pin “2”
   • Piston pin clips “3”
   TIP
   • Apply engine oil to the piston pin.
   • Make sure the manufacturer’s mark “a” on the piston points towards the AC magneto side.
   • Install the piston pin from the side of the piston that has the manufacturer’s mark “a”.
   • Before installing the piston pin clips, cover the crankcase opening with a clean rag to prevent the clips from falling into the crankcase.

3. Install:
   • Cylinder gasket
   • Dowel pins

4. Lubricate:
   • Piston
   • Piston rings
   • Cylinder
     (with the recommended lubricant)
5. Install:
   • Cylinder “1”
   • Timing chain guide (exhaust side)

**TIP**
   • While compressing the piston rings with one hand, install the cylinder with the other hand.
   • Pass the timing chain and timing chain guide (exhaust side) through the timing chain cavity.

---

**INSTALLING THE CYLINDER HEAD**
1. Install:
   • Cylinder head
     - Cylinder head bolt (M11) (×4) **New**
     - Cylinder head bolt (M6) (×2)
     - Cylinder bolt (M6) (×2)

**TIP**
   • Pass the timing chain through the timing chain cavity.
   • Lubricate the cylinder head bolt (M11) threads and mating surface with engine oil.

2. Tighten:
   • Cylinder head bolts (M11) “1”–“4”
   • Cylinder head bolts (M6) “5”, “6”
   • Cylinder bolts (M6) “7”, “8”

---

**Cylinder head bolt (M11)**
1st: 30 Nm (3.0 m-kgf, 22 ft-lbf)
2nd: 70 Nm (7.0 m-kgf, 51 ft-lbf)
3rd: Loosen 360°
4th: 30 Nm (3.0 m-kgf, 22 ft-lbf)
5th: Specified angle 85–90°
6th: Specified angle 85–90° (again)

**Cylinder head bolt (M6)**
10 Nm (1.0 m-kgf, 7.2 ft-lbf)

**Cylinder bolt (M6)**
10 Nm (1.0 m-kgf, 7.2 ft-lbf)

---

3. Install:
   • Oil hose (crankcase to cylinder) “1”
   • Clamps “2”
   • Oil hose joint “3”
   • Gaskets **New**
   • Oil hose union bolt (crankcase to cylinder) “4”

---

![Diagram](image-url)
TIP
Tighten the clamp screw of each clamp “2” until 6 slots are visible in the area “a” of the clamp as shown in the illustration.
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>
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<tbody>
<tr>
<td>1</td>
<td>Valve lifter</td>
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</tr>
<tr>
<td>2</td>
<td>Valve pad</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Valve cotter</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Valve spring retainer</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Valve spring</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Intake valve</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Exhaust valve</td>
<td>2</td>
<td></td>
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<tr>
<td>8</td>
<td>Valve stem seal (intake)</td>
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<td>Gray</td>
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<tr>
<td>9</td>
<td>Valve stem seal (exhaust)</td>
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<td>10</td>
<td>Valve spring seat</td>
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</tr>
<tr>
<td>11</td>
<td>Valve guide</td>
<td>4</td>
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</table>

\[13 \text{ Nm (1.3 m-kgf, 9.4 ft-lbf)}\]
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 5-31.

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   a. Pour a clean solvent “a” into the intake and exhaust ports.
   b. Check that the valves properly seal.

**TIP**
There should be no leakage at the valve seat “1”.

3. Remove:
   - Valve cotters

**TIP**
Remove the valve cotters by compressing the valve spring with the valve spring compressor “1” and the valve spring compressor attachment “2”.

4. Remove:
   - Valve spring retainer “1”
   - Valve spring “2”
   - Valve “3”
   - Valve stem seal “4”
   - Valve 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.
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”

   Valve-stem-to-valve-guide clearance (intake) limit
   0.080 mm (0.0032 in)
   Valve-stem-to-valve-guide clearance (exhaust) limit
   0.100 mm (0.0039 in)

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.

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### CHECKING THE VALVE SEATS

The following procedure applies to all of the valves and valve seats.

<table>
<thead>
<tr>
<th>Component</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve guide remover &amp; installer set (ø5.5)</td>
<td>90890-04016</td>
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</tr>
<tr>
<td>Valve guide remover (5.5 mm)</td>
<td>YM-01122</td>
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<tr>
<td>Valve guide remover &amp; installer set (ø5.5)</td>
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<tr>
<td>Valve guide installer (5.5 mm)</td>
<td>YM-04015</td>
<td></td>
</tr>
<tr>
<td>Valve guide remover &amp; installer set (ø5.5)</td>
<td>90890-04016</td>
<td></td>
</tr>
<tr>
<td>Valve guide reamer (5.5 mm)</td>
<td>YM-01196</td>
<td></td>
</tr>
</tbody>
</table>

1. **Eliminate:**
   - Carbon deposits (from the valve face and valve seat)

2. **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.

3. **Measure:**
   - Valve stem runout
     - Out of specification → Replace the valve.

4. **Lap:**
   - Valve face
   - Valve seat

**TIP**

- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the valve stem seal.

**Valve Stem Runout**

0.040 mm (0.0016 in)

**Valve Seat Contact Width**

#### Intake

- 1.34–1.48 mm (0.0528–0.0583 in)

#### Exhaust

- 1.34–1.48 mm (0.0528–0.0583 in)

---

**CHECKING THE VALVE SEATS**

The following procedure applies to all of the valves and valve seats.

3. **Eliminate:**
   - Carbon deposits (from the valve face and valve seat)

4. **Check:**
   - Valve face
     - Pitting/wear → Replace the cylinder head.
   - Valve stem end
     - Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.

5. **Measure:**
   - Valve seat width “a”
     - Out of specification → Replace the cylinder head.

**TIP**

- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the valve stem seal.

**Valve Seat Contact Width**

#### Intake

- 1.34–1.48 mm (0.0528–0.0583 in)

#### Exhaust

- 1.34–1.48 mm (0.0528–0.0583 in)

---

**CHECKING THE VALVE SEATS**

The following procedure applies to all of the valves and valve seats.

3. **Eliminate:**
   - Carbon deposits (from the valve face and valve seat)

4. **Check:**
   - Valve face
     - Pitting/wear → Replace the cylinder head.

5. **Measure:**
   - Valve seat width “a”
     - Out of specification → Replace the cylinder head.

**Valve Seat Contact Width**

#### Intake

- 1.34–1.48 mm (0.0528–0.0583 in)

#### Exhaust

- 1.34–1.48 mm (0.0528–0.0583 in)

---

**CHECKING THE VALVE SEATS**

The following procedure applies to all of the valves and valve seats.

3. **Eliminate:**
   - Carbon deposits (from the valve face and valve seat)

4. **Check:**
   - Valve face
     - Pitting/wear → Replace the cylinder head.

5. **Measure:**
   - Valve seat width “a”
     - Out of specification → Replace the cylinder head.

**Valve Seat Contact Width**

#### Intake

- 1.34–1.48 mm (0.0528–0.0583 in)

#### Exhaust

- 1.34–1.48 mm (0.0528–0.0583 in)

---

**CHECKING THE VALVE SEATS**

The following procedure applies to all of the valves and valve seats.

3. **Eliminate:**
   - Carbon deposits (from the valve face and valve seat)

4. **Check:**
   - Valve face
     - Pitting/wear → Replace the cylinder head.

5. **Measure:**
   - Valve seat width “a”
     - Out of specification → Replace the cylinder head.

**Valve Seat Contact Width**

#### Intake

- 1.34–1.48 mm (0.0528–0.0583 in)

#### Exhaust

- 1.34–1.48 mm (0.0528–0.0583 in)

---

**CHECKING THE VALVE SEATS**

The following procedure applies to all of the valves and valve seats.

3. **Eliminate:**
   - Carbon deposits (from the valve face and valve seat)

4. **Check:**
   - Valve face
     - Pitting/wear → Replace the cylinder head.

5. **Measure:**
   - Valve seat width “a”
     - Out of specification → Replace the cylinder head.

**Valve Seat Contact Width**

#### Intake

- 1.34–1.48 mm (0.0528–0.0583 in)

#### Exhaust

- 1.34–1.48 mm (0.0528–0.0583 in)

---

**CHECKING THE VALVE SEATS**

The following procedure applies to all of the valves and valve seats.

3. **Eliminate:**
   - Carbon deposits (from the valve face and valve seat)

4. **Check:**
   - Valve face
     - Pitting/wear → Replace the cylinder head.

5. **Measure:**
   - Valve seat width “a”
     - Out of specification → Replace the cylinder head.

**Valve Seat Contact Width**

#### Intake

- 1.34–1.48 mm (0.0528–0.0583 in)

#### Exhaust

- 1.34–1.48 mm (0.0528–0.0583 in)
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 engine 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 blue layout fluid “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 “c” 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 tilt “a”
     - Out of specification → Replace the valve spring.

   **Spring tilt (intake)**
   - 1.7 mm (0.07 in)

   **Spring tilt (exhaust)**
   - 1.7 mm (0.07 in)
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 end
   • Valve stem seal “2”
     (with the recommended lubricant)
3. Install:
   • Valve spring seat “1”
     (into the cylinder head)
   • Valve stem seal “2” New
   • Valve “3”
   • Valve spring “4”
   • Valve spring retainer “5”

TIP
- Make sure each valve is installed in its original place.
- Install the valve springs with the larger pitch “a” facing up.

Recommended lubricant
Engine oil

b. Smaller pitch
4. Install:
   • Valve cotters

TIP
Install the valve cotters by compressing the valve spring with the valve spring compressor “1” and the valve spring compressor attachment “2”.

Valve spring compressor
90890-04019
Valve spring compressor
YM-04019
Valve spring compressor attachment
90890-01243
Valve spring compressor adapter (26 mm)
YM-01253-1
5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

**NOTICE**
Hit the valve tip with excessive force could damage the valve.

6. Lubricate:
- Valve pad
- Valve lifter
(with the recommended lubricant)

<table>
<thead>
<tr>
<th>Recommended lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine oil</td>
</tr>
</tbody>
</table>

7. Install:
- Valve pad
- Valve lifter

**TIP**
- The valve lifter must move smoothly when rotated with a finger.
- Each valve lifter and valve pad must be reinstalled in their original position.
Removing the AC magneto 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>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-29.</td>
</tr>
<tr>
<td></td>
<td>Footrest board (left)</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (4)” on page 4-11.</td>
</tr>
<tr>
<td></td>
<td>Drive select lever unit</td>
<td></td>
<td>Refer to “ENGINE REMOVAL (2)” on page 5-6.</td>
</tr>
<tr>
<td></td>
<td>Water pump housing</td>
<td></td>
<td>Refer to “WATER PUMP” on page 6-10.</td>
</tr>
<tr>
<td>1</td>
<td>Oil pipe (AC magneto cover)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Lead holder bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>AC magneto cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>AC magneto cover gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>AC magneto/crankshaft position sensor lead holder</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the AC magneto 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>6</td>
<td>Crankshaft position sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Stator coil</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Starter idle gear 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Starter idle gear shaft 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Starter idle gear 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Starter idle gear shaft 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>AC magneto rotor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Woodruff key</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Starter wheel gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Bushing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Starter clutch</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Torque Specifications**

- 3.0 Nm (0.30 m-kgf, 2.2 ft-lbf)
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
- 14 Nm (1.4 m-kgf, 10 ft-lbf)
- 160 Nm (16 m-kgf, 116 ft-lbf)
- 18 Nm (1.8 m-kgf, 13 ft-lbf)
- 11 Nm (1.1 m-kgf, 8.0 ft-lbf)
- 4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)
- 160 Nm (16 m-kgf, 116 ft-lbf)

**Notes:**

- New components are indicated with "New."
AC MAGNETO AND STARTER CLUTCH

REMOVING THE AC MAGNETO ROTOR
1. Remove:
   • AC magneto 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:
   • AC magneto rotor nut “1”
   • Washer

   **TIP**
   Hold the AC magneto rotor “2” with the rotor holding tool “3” while loosening the AC magneto rotor nut.

3. Remove:
   • AC magneto rotor “1” (with the starter clutch)
   • Woodruff key

   **NOTICE**
   To protect the end of the crankshaft, place an appropriate sized socket between the flywheel puller set center bolt and the crankshaft.

   **TIP**
   • Use the flywheel puller “2”.

   **Make sure the flywheel puller is centered over the AC magneto rotor.**

   ![Flywheel puller (M38 X P1.5)]

   Flywheel puller (M38 X P1.5)
   90890-04178
   Flywheel puller (M38 X P1.5)
   YM-04178

   ![Rotor holding tool](90890-04166)

   Rotor holding tool
   90890-04166
   YM-04166

   ![Flywheel puller (M38 X P1.5)]

   REMOVING THE STARTER CLUTCH
1. Remove:
   • Starter clutch bolts “1”

   **TIP**
   Hold the AC magneto rotor “2” with the rotor holding tool “3” while removing the starter clutch bolts.

   ![Rotor holding tool](90890-04166)

   Rotor holding tool
   90890-04166
   YM-04166

   ![Flywheel puller (M38 X P1.5)]

   CHECKING THE STARTER CLUTCH
1. Check:
   • Starter clutch rollers
     Damage/wear → Replace.

2. Check:
   • Starter idle gear
   • Starter wheel gear
     Burrs/chips/roughness/wear → Replace the defective part(s).
3. Check:
   - Starter clutch gear contact surfaces
     Damage/pitting/wear → Replace the defective part(s).

4. Check:
   - Starter clutch operation

   ![Diagram of starter clutch operation]

   a. Install the starter clutch and starter wheel gear “1” onto the AC magneto rotor “2”, and hold the AC magneto rotor.
   b. When turning the starter wheel gear clockwise “A”, the starter clutch and the starter wheel gear should engage; otherwise, the starter clutch is faulty and must be replaced.
   c. When turning the starter wheel gear counterclockwise “B”, it should turn freely; otherwise, the starter clutch is faulty and must be replaced.

---

**INSTALLING THE STARTER CLUTCH**

1. Install:
   - Bushing “1”
     (into the starter wheel gear “2”)

2. Install:
   - Starter clutch
   - Starter clutch bolts “1”

**TIP**

While holding the AC magneto rotor “2” with the rotor holding tool “3”, tighten the starter clutch bolts.

---

**INSTALLING THE AC MAGNETO ROTOR**

1. Install:
   - Woodruff key
   - AC magneto rotor “1”
   - Washer “2”
   - AC magneto rotor nut “3”

**TIP**

- Clean the tapered portion of the crankshaft and the AC magneto rotor hub.
- When installing the AC magneto rotor, make sure the woodruff key is properly seated in the keyway of the crankshaft.
- Lubricate the threads of the crankshaft and washer mating surfaces with engine oil.
- Install the washer “2” with its rounded side “a”, facing away from the AC magneto rotor.
- After installing the AC magneto rotor, check that the AC magneto rotor rotates smoothly. If not, reinstall the woodruff key and AC magneto rotor.

---

**Starter clutch bolt**

14 Nm (1.4 m·kgf, 10 ft·lbf)

**Rotor holding tool**

90890-04166
YM-04166
2. Tighten:
   • AC magneto rotor nut “1”

<table>
<thead>
<tr>
<th>AC magneto rotor nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>160 Nm (16 m·kgf, 116 ft·lbf)</td>
</tr>
</tbody>
</table>

**TIP**
Hold the AC magneto rotor “2” with the rotor holding tool “3” while tightening the AC magneto rotor nut.

<table>
<thead>
<tr>
<th>Rotor holding tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>90890-04166 YM-04166</td>
</tr>
</tbody>
</table>

3. Install:
   • AC magneto cover “1”

<table>
<thead>
<tr>
<th>AC magneto cover bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
</tr>
</tbody>
</table>

**TIP**
• Align the slot “a” in the impeller shaft “2” with the projection “b” on the oil pump shaft “3”.
• Tighten the AC magneto cover bolts in the proper tightening sequence as shown.
Removing the starter motor

- Disconnect the starter motor lead.
- Disconnect the engine ground lead.
- Remove the starter motor.

**Order** | **Job/Parts to remove** | **Q’ty** | **Remarks** |
---|---|---|---|
Muffler | | | Refer to “ENGINE REMOVAL (1)” on page 5-3. |
1 | Starter motor lead | 1 | Disconnect. |
2 | Engine ground lead | 1 | Disconnect. |
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>Starter motor rear cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brush set</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Armature assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Starter motor yoke</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
CHECKING THE STARTER MOTOR

1. Check:
   • Commutator
     Dirt → Clean with 600-grit sandpaper.

2. Measure:
   • Mica undercut “a”
     Out of specification → Cut the mica to the proper measurement with a hacksaw blade that has been grounded to fit 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 digital circuit tester.

   Digital circuit tester
   90890-03174
   Model 88 Multimeter with tachometer
   YU-A1927

   b. If any resistance is out of specification, replace the starter motor.

4. Measure:
   • Brush length “a”
     Out of specification → Replace the brush set.

   ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲▲▲

5. Check:
   • Gear teeth
     Damage/wear → Replace the gear.

6. Check:
   • Bearing
   • Oil seal
     Damage/wear → Replace the defective part(s).

ASSEMBLING THE STARTER MOTOR

1. 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 starter motor front and rear covers.
Removing the oil pump sprockets

<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>AC magneto rotor</td>
<td></td>
<td>Refer to “AC MAGNETO AND STARTER CLUTCH” on page 5-35.</td>
</tr>
<tr>
<td>2</td>
<td>Timing chain stopper guide (lower)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oil pump driven sprocket</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>Oil pump drive sprocket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chain</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
OIL PUMP SPROCKETS

REMOVING THE OIL PUMP DRIVE SPROCKET AND OIL PUMP DRIVEN SPROCKET

1. Loosen:
   • Oil pump driven sprocket nut “1”
   • Oil pump drive sprocket nut “2”

- Temporarily install the AC magneto rotor.
  Refer to “AC MAGNETO AND STARTER CLUTCH” on page 5-35.
- Hold the AC magneto rotor “3” with the rotor holding tool “4” while loosening the oil pump driven sprocket nut and oil pump drive sprocket nut.

CHECKING THE OIL PUMP SPROCKETS

1. Check:
   • Oil pump drive sprocket
   • Oil pump driven sprocket
     Cracks/wear/damage → Replace.

INSTALLING THE OIL PUMP DRIVE SPROCKET AND OIL PUMP DRIVEN SPROCKET

1. Install:
   • Oil pump drive sprocket “1”

   TIP
   Install the oil pump drive sprocket so that the protruding portion “a” of the sprocket is facing toward the crankcase.

2. Install:
   • Washer “1”
   • Oil pump drive sprocket nut

   TIP
   Install the washer with its rounded side “a” facing away from the crankcase.

3. Install:
   • Oil pump driven sprocket “1”
   • Chain “2”
   • Oil pump driven sprocket nut

   TIP
   Install the oil pump driven sprocket with the “23A” mark “a” facing out.

4. Tighten:
   • Oil pump drive sprocket nut “1”
   • Oil pump driven sprocket nut “2”
a. Temporarily install the AC magneto rotor. Refer to “AC MAGNETO AND STARTER CLUTCH” on page 5-35.
b. Hold the AC magneto rotor “3” with the rotor holding tool “4” while tightening the oil pump drive sprocket nut and oil pump driven sprocket nut.

Oil pump drive sprocket nut
25 Nm (2.5 m-kgf, 18 ft-lbf)
LOCTITE®

Oil pump driven sprocket nut
25 Nm (2.5 m-kgf, 18 ft-lbf)
LOCTITE®

Rotor holding tool
90890-04166
YM-04166
Removing the shift levers and stopper lever

<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>Shift lever cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Shift lever cover gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Dowel pin</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>Shift lever 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Stopper lever spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Shift lever 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Stopper lever</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
CHECKING THE STOPPER LEVER
1. Check:
• Stopper lever
  Damage/wear → Replace.
• Stopper lever spring
  Damage/wear → Replace.

CHECKING THE SHIFT LEVERS
1. Check:
• Shift lever 1
• Shift lever 2
  Damage/wear → Replace.

INSTALLING THE SHIFT LEVERS
1. Install:
• Collar “1” (onto the stopper lever “2”)
• Shift lever 2 “3”
• Washer “4”
• Stopper spring “5”

TIP
• Make sure the projection “a” on the stopper lever “2” facing toward the collar.
• Install the shift lever 2 “3” with the marks “b” facing the stopper spring.

2. Install:
• Shift lever 2 assembly “1”

Shift lever 2 bolt
14 Nm (1.4 m-kgf, 10 ft-lbf)

TIP
Align the projection “a” on the shift drum with the slit “b” in the stopper lever.

3. Install:
• Shift lever 1 “1”

TIP
When installing shift lever 1, align the alignment mark “a” on shift lever 1 with the punch marks “b” on shift lever 2 “2”.

4. Install:
• Oil seal “1” New
  (into the shift lever cover “2”)

Installed depth “a”
1.0–1.5 mm (0.04–0.06 in)
Removing the primary and secondary sheaves

![Diagram of removing primary and secondary sheaves]

<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>Footrest board (right)</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (4)” on page 4-11.</td>
</tr>
<tr>
<td></td>
<td>V-belt cooling ducts</td>
<td></td>
<td>Refer to “ENGINE REMOVAL (1)” on page 5-3.</td>
</tr>
<tr>
<td>1</td>
<td>Drive belt cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rubber gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bearing housing</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>Primary sheave assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>V-belt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Primary fixed sheave</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Secondary sheave assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Drive belt case</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Rubber gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Rubber gasket</td>
<td>1</td>
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</tr>
</tbody>
</table>
Disassembling the primary sheave

* Apply Yamaha Grizzly grease or Yamaha grease F.

<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 cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Primary sheave slider</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Primary sheave cam</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Primary sheave weight</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oil seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Primary sliding sheave</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

3.0 Nm (0.30 m-kgf, 2.2 ft-lbf)

Order Job/Parts to remove Remarks
1 Primary sheave cap
2 Primary sheave slider
3 Primary sheave cam
4 Primary sheave weight
5 Spacer
6 Oil seal
7 Primary sliding sheave
8 O-ring
Disassembling the secondary sheave

1. Secondary sheave spring retaining nut
2. Upper spring seat
3. Compression spring
4. Lower spring seat
5. Guide pin
6. Secondary sliding sheave
7. O-ring
8. Secondary fixed sheave
9. Oil seal

* Apply Yamaha grease H or POLYREX EM®

<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 retaining 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>Compression spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Lower 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>Secondary fixed sheave</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Oil seal</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

90 Nm (9.0 m-kgf, 65 ft-lbf)
REMOVING THE PRIMARY AND SECONDARY SHEAVES

1. Loosen:
   • Primary sheave assembly nut “1”

TIP
Use the rotor holding tool “2” to hold the primary sheave.

2. Loosen:
   • Secondary sheave assembly nut “1”

TIP
Shift the transmission into “R” (reverse), set the parking brake, and then loosen the secondary sheave assembly nut.

DISASSEMBLING THE SECONDARY SHEAVE

1. Remove:
   • Secondary sheave spring retaining nut “1”

a. Attach the sheave fixed block “2”, locknut wrench “3” and sheave spring compressor “4” to the secondary sheave assembly.

b. Place the sheave fixed block in a vise and secure it.
c. Tighten the sheave spring compressor nut “5” and compress the spring.
d. Loosen the secondary sheave spring retaining nut “1” with the locknut wrench “3”.
e. Remove the secondary sheave spring retaining nut “1”.
f. Remove the sheave spring compressor and locknut wrench.

Sheave fixed block
90890-04135
Sheave fixed bracket
YM-04135
Locknut wrench
90890-01348
Locknut wrench
YM-01348
Sheave spring compressor
90890-04134
Sheave spring compressor
YM-04134
CHECKING THE V-BELT
1. Check:
   • V-belt “1”
     Cracks/damage/wear → Replace.
     Grease/oil → Clean the primary and secondary sheaves.
2. Measure:
   • V-belt width “a”
     Out of specification → Replace.

V-belt width limit
31.3 mm (1.23 in)

CHECKING THE PRIMARY SHEAVE
1. Check:
   • Primary sliding sheave splines
     Wear/cracks/damage → Replace.
   • Primary sheave cam
     Cracks/damage → Replace.

2. Check:
   • Primary sliding sheave
   • Primary fixed sheave
     Cracks/damage → 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 “a”
     Out of specification → Replace.

   Primary sheave weight outside
diameter
30 mm (1.18 in)
Limit
29.5 mm (1.16 in)

CHECKING THE PRIMARY SHEAVE SLIDERS
The following procedure applies to all of the primary sheave sliders.
1. Check:
   • Primary sheave slider
     Cracks/damage/wear → Replace.

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:
   • Torque cam grooves “1”
     Damage/wear → Replace the secondary fixed and sliding sheaves as a set.
3. Check:
• Guide pins “2”
  Damage/wear → Replace the secondary fixed and sliding sheaves as a set.

4. Check:
• Secondary sheave spring
  Damage → Replace.

5. Measure:
• Secondary sheave spring free length “a”
  Out of specification → Replace the secondary sheave spring.

<table>
<thead>
<tr>
<th>Free length</th>
</tr>
</thead>
<tbody>
<tr>
<td>130.6 mm (5.14 in)</td>
</tr>
<tr>
<td>Limit</td>
</tr>
<tr>
<td>128.0 mm (5.04 in)</td>
</tr>
</tbody>
</table>

2. Install:
• Oil seals “1” [New]
  (into the primary sliding sheave “2”)

<table>
<thead>
<tr>
<th>Installed depth “a”</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 mm (0 in)</td>
</tr>
</tbody>
</table>

3. Lubricate:
• Spacer inner surface
• Primary sliding sheave inner surface

<table>
<thead>
<tr>
<th>Recommended lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yamaha Grizzly grease or Yamaha grease F</td>
</tr>
</tbody>
</table>

TIP
• Apply Yamaha Grizzly grease or Yamaha grease F (2.5 g) to the inner surface of the spacer.
• Apply Yamaha Grizzly grease or Yamaha grease F (2.5 g) to the inner surface of the primary sliding sheave.
4. Install:
   • Primary sheave weights “1”

TIP
Apply Yamaha Grizzly grease or Yamaha grease F (90 g) to the whole outer surface of the weights and install.

ASSEMBLING THE SECONDARY SHEAVE
1. Install:
   • Oil seals “1” [New]
      (into the secondary sliding sheave “2”)

   Installed depth “a”
   0 mm (0 in)

2. Lubricate:
   • Secondary sliding sheave “1”
   • Secondary fixed sheave “2”
      (with the recommended lubricant)

TIP
Apply Yamaha grease H or POLYREX EM® (15 g) to the guide pin grooves.

5. Lubricate:
   • Guide pin grooves “1”
      (with the recommended lubricant)

   Recommended lubricant
   Yamaha grease H or POLYREX EM®

6. Install:
   • Lower spring seat “1”
   • Compression spring “2”
   • Upper spring seat “3”
   • Secondary sheave spring retaining nut “4”
a. Attach the sheave fixed block “5”, locknut wrench “6” and sheave spring compressor “7” to the secondary sheave.

b. Place the sheave fixed block in a vise and secure it.
c. Tighten the sheave spring compressor nut “8” and compress the spring.
d. Install the secondary sheave spring retaining nut “4” and tighten it to specification using the locknut wrench.

e. Remove the sheave spring compressor, locknut wrench, and sheave fixed block.

**Sheave fixed block**
90890-04135
**Sheave fixed bracket**
YM-04135
**Locknut wrench**
90890-01348
**Locknut wrench**
YM-01348
**Sheave spring compressor**
90890-04134
**Sheave spring compressor**
YM-04134

**Secondary sheave spring retaining nut**
90 Nm (9.0 m·kgf, 65 ft·lbf)

**TIP**
Install the secondary sheave spring retaining nut “4” with its tapered side “a” facing the secondary sheaves.

**EBSS0713**

**INSTALLING THE PRIMARY AND SECONDARY SHEAVES**

1. Install:
   - Secondary sheave
   - V-belt
   - Primary fixed sheave
   - Primary sheave
   - Washer
   - Nuts

**TIP**
- Be sure to push in the primary sheave cam “1” when installing the primary sheave so that the primary sheave weights “2” will be properly positioned “a”.
- Install the washer “3” with its rounded side “b” facing away from the primary sheave assembly.
- Tightening the bolts “4” (90101-06016) will push the secondary sliding sheave away, causing the gap between the secondary fixed and sliding sheaves to widen.
- Install the V-belt so that its arrow points in the direction of rotation as shown in the illustration.
2. Check:
   • Primary sheave weights position
     Out of specification → Repeat step (1).

**TIP**
To check that the primary sheave weights “1” are installed correctly, make sure that the secondary sheave “2”, primary sheave “3”, and V-belt “4” are positioned as shown in the illustration.

3. Tighten:
   • Primary sheave assembly nut “1”
     **Primary sheave assembly nut**
     140 Nm (14 m·kgf, 100 ft·lbf)

   **TIP**
   Use the rotor holding tool “2” to hold the primary sheave.

   **Rotor holding tool**
   90890-04166
   YM-04166

4. Tighten:
   • Secondary sheave assembly nut “1”
     **Secondary sheave assembly nut**
     100 Nm (10 m·kgf, 72 ft·lbf)
TIP
Shift the transmission into “L” (low) or “H” (high), set the parking brake, and then tighten the secondary sheave assembly nut.

5. Lubricate:
   • Bearing housing bearing inner surface and ball
   (with the recommended lubricant)

   **Recommended lubricant**
   Shell Sunlight Grease 3®

TIP
Apply 2.3 g or more of Shell Sunlight Grease 3® to the bearing inner surface and ball as shown in the illustration.
Removing the clutch

*New*

**Order** | **Job/Parts to remove** | **Q’ty** | **Remarks**
--- | --- | --- | ---
| | Drive belt case | | Refer to “PRIMARY AND SECONDARY SHEAVES” on page 5-49.
| 1 | Clutch housing assembly | 1 | |
| 2 | Clutch housing assembly gasket | 1 | |
| 3 | Dowel pin | 2 | |
| 4 | Clutch carrier assembly nut | 1 | Left-hand thread |
| 5 | Clutch carrier assembly | 1 | |
Disassembling the clutch housing 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>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bearing housing</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>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Seal ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>One-way clutch bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Clutch housing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
REMOVING THE CLUTCH

1. Remove:
   • Clutch housing assembly

TIP
Working in crisscross pattern, loosen each bolt 1/4 of a turn. Remove them after all of them are loosened.

2. Straighten:
   • Punched portion “a” of the clutch carrier assembly nut “1”

3. Remove:
   • Clutch carrier assembly nut “1”

NOTICE

The clutch carrier assembly nut has left-hand threads. To loosen the clutch carrier assembly nut, turn it clockwise.

TIP

Use a universal clutch holder “2” to hold the clutch carrier assembly.

Universal clutch holder
90890-04086
Universal clutch holder
YM-91042

CHECKING THE CLUTCH

1. Check:
   • Clutch housing
     Damage/wear → Replace.

   • One-way clutch bearing
     Chafing/wear/damage → Replace.

   • Replace the one-way clutch bearing and clutch housing as a set.
   • The one-way clutch bearing must be installed with the flange side facing inward.

2. Check:
   • One-way clutch operation

   a. Install the one-way clutch bearing and clutch carrier assembly to the clutch housing and hold the clutch carrier assembly.
   b. When turning the clutch housing clockwise “A”, it should turn freely; otherwise, the one-way clutch assembly is faulty and must be replaced.
   c. When turning the clutch housing counterclockwise “B”, the clutch housing and crankshaft should engage; otherwise, the one-way clutch assembly is faulty and must be replaced.

CHECKING THE CLUTCH SHOE

1. Check:
   • Clutch shoe
     Damage/wear → Replace.
     Glazed areas → Sand with coarse sandpaper.

   • Clutch shoe thickness
     Out of specification → Replace.

   • Clutch shoe thickness limit
     1.0 mm (0.04 in)

TIP

After sanding the glazed areas, clean the clutch with a cloth.

2. Measure:
   • Clutch shoe thickness
   Out of specification → Replace.
**ASSEMBLING THE CLUTCH HOUSING**

1. Install:
   - **Bearing “1”** (into the clutch housing “2”)

<table>
<thead>
<tr>
<th>Installed depth “a”</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5–2.7 mm (0.10–0.11 in)</td>
</tr>
</tbody>
</table>

2. Install:
   - **One-way clutch bearing**

   TIP
   The one-way clutch bearing should be installed in the clutch housing with the “OUT SIDE” mark “a” facing the clutch housing.

3. Install:
   - **Oil seal “1”** (into the bearing housing “2”)

<table>
<thead>
<tr>
<th>Installed depth “a”</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 mm (0 in)</td>
</tr>
</tbody>
</table>

---

**INSTALLING THE CLUTCH**

1. Install:
   - Clutch carrier assembly
   - Clutch carrier assembly nut “1”

   **NEW**
   Clutch carrier assembly nut
   190 Nm (19 m·kgf, 137 ft·lbf)

   **NOTICE**
   The clutch carrier assembly nut has left-hand threads. To tighten the clutch carrier assembly nut, turn it counterclockwise.

   TIP
   - Lubricate the threads of the clutch carrier assembly nut with engine oil.
   - Use a universal clutch holder “2” to hold the clutch carrier assembly.

   **NEW**
   Universal clutch holder
   90890-04086
   Universal clutch holder
   YM-91042

2. Lock the threads with a drift punch.

3. Install:
   - **Dowel pins “1”**
   - **Gasket**
   - **Clutch housing assembly**

   **NEW**
   Clutch housing assembly bolt
   10 Nm (1.0 m·kgf, 7.2 ft·lbf)
TIP

- Tighten the bolts in stages, using a crisscross pattern.
- After tightening the bolts, check that the clutch housing assembly rotates smoothly.
Separating the crankcase

- 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
- 15 Nm (1.5 m-kgf, 11 ft-lbf)
- 22 Nm (2.2 m-kgf, 16 ft-lbf)
- 26 Nm (2.6 m-kgf, 19 ft-lbf)
- 30 Nm (3.0 m-kgf, 22 ft-lbf)
- 35 Nm (3.5 m-kgf, 25 ft-lbf)
- 35 Nm (3.5 m-kgf, 25 ft-lbf)
- 17 Nm (1.7 m-kgf, 12 ft-lbf)
- 18 Nm (1.8 m-kgf, 13 ft-lbf)
- 35 Nm (3.5 m-kgf, 25 ft-lbf)

<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 (3)” on page 5-8.</td>
</tr>
<tr>
<td></td>
<td>Cylinder head/Piston</td>
<td></td>
<td>Refer to “CYLINDER HEAD, CYLINDER, AND PISTON” on page 5-19.</td>
</tr>
<tr>
<td></td>
<td>AC magneto rotor</td>
<td></td>
<td>Refer to “AC MAGNETO AND STARTER CLUTCH” on page 5-35.</td>
</tr>
<tr>
<td></td>
<td>Starter motor</td>
<td></td>
<td>Refer to “ELECTRIC STARTER” on page 5-40.</td>
</tr>
<tr>
<td></td>
<td>Oil pump sprockets</td>
<td></td>
<td>Refer to “OIL PUMP SPROCKETS” on page 5-44.</td>
</tr>
<tr>
<td></td>
<td>Shift levers</td>
<td></td>
<td>Refer to “SHIFT LEVER” on page 5-47.</td>
</tr>
<tr>
<td></td>
<td>Clutch carrier assembly</td>
<td></td>
<td>Refer to “CLUTCH” on page 5-59.</td>
</tr>
<tr>
<td>1</td>
<td>Oil filter cartridge</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Oil filter cartridge union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Adapter</td>
<td>1</td>
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</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>4</td>
<td>Oil pipe (crankcase)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Timing chain guide (intake side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Timing chain</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Speed sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Dipstick</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Reverse switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Gear position switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Main gallery bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Crankcase (right)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Crankcase (left)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Key:
- New
- Old

Torque Values:
- 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
- 15 Nm (1.5 m-kgf, 11 ft-lbf)
- 22 Nm (2.2 m-kgf, 16 ft-lbf)
- 30 Nm (3.0 m-kgf, 22 ft-lbf)
- 35 Nm (3.5 m-kgf, 25 ft-lbf)
- 17 Nm (1.7 m-kgf, 12 ft-lbf)
- 18 Nm (1.8 m-kgf, 13 ft-lbf)
- 26 Nm (2.6 m-kgf, 19 ft-lbf)
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
Removing the crankcase bearings

<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>Collar</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>Bearing retainer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Crankshaft seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Bearing</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

- Crankshaft/Oil pump: Refer to "CRANKSHAFT AND OIL PUMP" on page 5-70.
- Middle drive shaft/Middle driven shaft: Refer to "MIDDLE GEAR" on page 5-81.
- Transmission: Refer to "TRANSMISSION" on page 5-75.

10 Nm (1.0 m-kgf, 7.2 ft-lbf)
SEPARATING 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.

2. Remove:
   • Crankcase (right) “1”
   TIP
   • Remove the crankcase (right) with the crankcase separating tool “2”.
   • Make sure the crankcase separating tool is centered over the crankshaft.

NOTICE
• To protect the end of the crankshaft, place an appropriate sized socket between the crankcase separating tool bolt and the crankshaft.
• Do not tap on the crankshaft.

CHECKING THE TIMING CHAIN AND TIMING CHAIN GUIDE
1. Check:
   • Timing chain
     Damage/stiffness → Replace the timing chain and camshaft sprocket as a set.

2. Check:
   • Timing chain guide (intake side)
     Damage/wear → Replace.

CHECKING THE BEARINGS
1. Check:
   • Bearings
     Clean and lubricate, then rotate the inner race with a finger.
     Roughness → Replace.

Crankcase separating tool
90890-01135
Crankcase separator
YU-01135-B
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.

ASSEMBLING THE CRANKCASE
1. Install:
   - Oil seal “1” New
     (into the right crankcase “2”)

   **Installed depth “a”**
   0.5–1.0 mm (0.02–0.04 in)

2. Thoroughly clean the crankcase mating surfaces.
3. Apply:
   - Sealant “1”
     (onto the crankcase mating surfaces)

4. Fit the right crankcase onto the left crankcase. Tap lightly on the crankcase with a soft-face hammer.

**NOTICE**
Before tightening the crankcase bolts, make sure the transmission gears shift correctly when the shift drum assembly is turned by hand.

5. Install:
   - Crankcase bolts
6. Tighten:
   - Crankcase bolts

<table>
<thead>
<tr>
<th>Crankcase bolt (M8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 Nm (2.6 m-kgf, 19 ft-lbf)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Crankcase bolt (M6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
</tr>
</tbody>
</table>

**TIP**
Tighten the bolts in stages, using a crisscross pattern.

Do not allow any sealant to come into contact with the oil gallery.
7. Apply:
   - 4-stroke engine oil
     (onto the crankshaft pin, bearings and oil delivery hole)

8. Check:
   - Crankshaft and transmission operation
     Rough operation → Repair.

9. Install:
   - Gasket New
   - Oil cooler
   - Oil filter cartridge union bolt
     Refer to “INSTALLING THE OIL COOLER” on page 6-3.
Removing the crankshaft and 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>Crankcase</td>
<td></td>
<td>Separate. Refer to “CRANKCASE” on page 5-64.</td>
</tr>
<tr>
<td>1</td>
<td>Oil pump</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Crankshaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Balancer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Plug</td>
<td>1</td>
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<tr>
<td>6</td>
<td>Spring</td>
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</tr>
<tr>
<td>7</td>
<td>Steel ball</td>
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<td></td>
</tr>
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</table>

10 Nm (1.0 m-kgf, 7.2 ft-lbf)

13 Nm (1.3 m-kgf, 9.4 ft-lbf)
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 cover</td>
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</tr>
<tr>
<td>2</td>
<td>Pin</td>
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<td></td>
</tr>
<tr>
<td>3</td>
<td>Oil pump shaft</td>
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<tr>
<td>4</td>
<td>Oil pump inner rotor</td>
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</tr>
<tr>
<td>5</td>
<td>Oil pump outer rotor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oil pump housing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

\[5 \text{Nm (0.5 m-kgf, 3.6 ft-lbf)}\]
CRANKSHAFT AND OIL PUMP

REMOVING THE CRANKSHAFT
1. Remove:
   • Crankshaft “1”
   • Balancer “2”

TIP
   • Remove the crankshaft with the crankcase separating tool “3”. Make sure the crankcase separating tool is centered over the crankshaft.
   • Remove the crankshaft “1” and balancer “2” at the same time.

NOTICE
   • To protect the end of the crankshaft, place an appropriate sized socket between the crankcase separating tool bolt and the crankshaft.
   • Do not tap on the crankshaft.

CHECKING THE OIL PUMP
1. Check:
   • Oil pump
     Cracks/damage/wear → Replace the oil pump.
2. Measure:
   • Inner-rotor-to-outer-rotor-tip clearance “a”
   • Outer-rotor-to-oil-pump-housing clearance “b”

CHECKING THE OIL STRAINER
1. Check:
   • Oil strainer
     Damage → Replace the oil pump.
     Contaminants → Clean with solvent.

CHECKING THE RELIEF VALVE
1. Check:
   • Steel ball “1”
   • Spring “2”
     Damage/wear → Replace the defective part(s).

Crankcase separating tool
90890-01135
Crankcase separator
YU-01135-B

Inner-rotor-to-outer-rotor-tip clearance limit
0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance limit
0.240 mm (0.0094 in)
CHECKING THE CRANKSHAFT
1. Measure:
   • Crankshaft width “a”
     Out of specification → Replace the crankshaft.

   **Crank assembly width**
   65.68–65.76 mm (2.586–2.589 in)

2. Measure:
   • Crankshaft runout “b”
     Out of specification → Replace the crankshaft.

   **Runout limit**
   0.030 mm (0.0012 in)

3. Measure:
   • Big end side clearance “c”
     Out of specification → Replace the crankshaft.

   **Big end side clearance**
   0.090–0.500 mm (0.0035–0.0197 in)

4. Check:
   • Crankshaft sprocket
     Damage/wear → Replace the crankshaft.
   • Bearing
     Cracks/damage/wear → Replace.

5. Check:
   • Crankshaft journal
     Scratches/wear → Replace the crankshaft.
   • Crankshaft journal oil passage
     Obstruction → Blow out with compressed air.

ASSEMBLING THE OIL PUMP
1. Lubricate:
   • Inner rotor
   • Outer rotor
   • Oil pump shaft
     (with the recommended lubricant)

   **Recommended lubricant**
   Engine oil

2. Install:
   • Oil pump housing “1”
   • Oil pump outer rotor “2”
   • Oil pump inner rotor “3”
   • Oil pump shaft “4”
   • Pin “5”

   **TIP**
   To install the oil pump shaft “4”, align the pin “5” with the groove “a” in the inner rotor “3”.

3. Check:
   • Oil pump operation
     Refer to “CHECKING THE OIL PUMP” on page 5-72.

INSTALLING THE CRANKSHAFT
1. Install:
   • Balancer “1”
   • Crankshaft “2”

   **NOTICE**
   Apply engine oil to each bearing to protect the crankshaft against scratches and to make installation easier.

   **TIP**
   • Install the balancer “1” and crankshaft “2” at the same time.
   • Align the hole “a” in the balancer with the punch mark “b” on the crankshaft.
   • Install the crankshaft with the crankshaft installer pot “3”, crankshaft installer bolt “4”, adapter (M16) “5”, and spacer (crankshaft installer) “6”.
   • Hold the connecting rod at top dead center (TDC) with one hand while turning the nut of the crankshaft installer bolt with the other. Turn the crankshaft installer bolt until the crankshaft assembly bottoms against the bearing.
INSTALLING THE OIL PUMP

1. Install:
   - Oil pump

**Oil pump bolt**

10 Nm (1.0 m-kgf, 7.2 ft-lbf)

**TIP**

Tighten the bolts to specification in the proper tightening sequence as shown.
Removing the transmission, shift drum and shift forks

<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, Refer to “CRANKCASE” on page 5-64.</td>
</tr>
<tr>
<td></td>
<td>Middle driven gear</td>
<td></td>
<td>Refer to “MIDDLE GEAR” on page 5-81.</td>
</tr>
<tr>
<td>1</td>
<td>Shift drum stopper bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ball</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Shift drum</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Shift fork assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Shift fork “R”</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Shift fork &quot;L&quot;</td>
<td>1</td>
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</tr>
<tr>
<td>9</td>
<td>Shift fork guide bar</td>
<td>1</td>
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18 Nm (1.8 m-kgf, 13 ft-lbf)
Removing the transmission, shift drum and shift forks

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Secondary shaft</td>
<td>1</td>
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</tr>
<tr>
<td>11</td>
<td>Drive axle assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Reverse idle gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Reverse idle gear shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Stopper lever</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Stopper lever shaft</td>
<td>1</td>
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</table>
Disassembling the drive axle 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>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>High wheel gear</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>Clutch dog</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Circlip</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>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Low wheel gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Middle drive gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Circlip</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>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Reverse wheel gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Stopper wheel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Drive axle</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
REMOVING THE TRANSMISSION
1. Remove:
   • Shift drum “1”
   • Shift fork assembly “2”

a. Pull out the guide bar from the left crankcase, and then remove the shift fork cam followers.
b. Remove the shift drum.
c. Remove the shift fork assembly.

DISASSEMBLING THE DRIVE AXLE
1. Remove:
   • Stopper wheel “1”
   • Drive axle “2”

TIP
Press the drive axle end and remove the stopper wheel.

CHECKING THE SHIFT FORKS
The following procedure applies to both of the shift forks.
1. Check:
   • Shift fork cam follower “1”
   • Shift fork pawl “2”
   Bends/damage/scoring/wear → Replace the shift fork.

2. Check:
   • Shift fork guide bar
   Roll the shift fork guide bar on a flat surface.
   Bends → Replace.

WARNING
Do not attempt to straighten a bent shift fork guide bar.

3. Check:
   • Shift fork movement
     (along the shift fork guide bar)
   Rough movement → Replace the shift forks and shift fork guide bar as a set.

4. Check:
   • Spring
   Cracks/damage → Replace.

CHECKING THE SHIFT DRUM
1. Check:
   • Shift drum grooves
   Damage/scratches/wear → Replace the shift drum.
CHECKING THE TRANSMISSION

1. Measure:
   - Drive axle runout (with a centering device and dial gauge “1”)
     Out of specification → Replace the drive axle.

   Drive axle runout limit
   0.06 mm (0.0024 in)

2. Check:
   - Transmission gears
     Blue discoloration/pitting/wear → Replace the defective gear(s).
   - Transmission gear dogs
     Cracks/damage/rounded edges → Replace the defective gear(s).

3. Check:
   - Transmission gear engagement
     (each pinion gear to its respective wheel gear)
     Incorrect → Reassemble the transmission axle assemblies.

4. Check:
   - Transmission gear movement
     Rough movement → Replace the defective part(s).

CHECKING THE SECONDARY SHAFT

1. Check:
   - Gear teeth
     Blue discoloration/pitting/wear → Replace.

CHECKING THE STOPPER LEVER AND STOPPER WHEEL

1. Check:
   - Stopper lever pawl “1”
     Bends/damage/wear → Replace the stopper lever and stopper wheel as a set.
   - Stopper wheel “2”
     Damage/wear → Replace the stopper wheel and stopper lever as a set.
   - Stopper lever shaft “3”
     Bends/damage/wear → Replace.

ASSEMBLING THE DRIVE AXLE

1. Install:
   - Washer “1”
   - Circlip “2” New

   TIP
   - Be sure the circlip sharp-edged corner “a” is positioned opposite side to the washer and gear.
   - Be sure the circlip ends “b” are positioned at axle spline groove “c”.

ASSEMBLING THE SHIFT FORK

1. Install:
   - Shift fork guide bar “1”
TRANSMISSION

- Shift fork “L” “2”
- Spring “3”
- Shift fork “R” “4”
- Circlips “5” New

TIP
Install the shift forks with the “R” mark “a” and “L” mark “b” facing away from each other.

INSTALLING THE SHIFT FORKS AND SHIFT DRUM

1. Install:
   - Reverse idle gear “1”
   - Drive axle assembly “2”
   - Secondary shaft “3”
   - Shift fork assembly “4”
   - Shift drum “5”

TIP
Install the shift fork assembly “4” with the “L” mark “a” facing the left crankcase.

2. Check:
   - Shift operation
     Rough operation → Repair.

TIP
- Oil each gear and bearing thoroughly.
- Before assembling the crankcase, make sure that the transmission is in neutral and that the gears turn freely.
Removing the middle drive shaft

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
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<tbody>
<tr>
<td></td>
<td>Crankcase</td>
<td></td>
<td>Separate. Refer to “CRANKCASE” on page 5-64.</td>
</tr>
<tr>
<td>1</td>
<td>Middle drive shaft/Bearing housing assembly</td>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>Middle drive pinion gear nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Middle drive pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Middle drive pinion gear shim</td>
<td>1</td>
<td>Refer to “ALIGNING THE MIDDLE GEAR” on page 5-89.</td>
</tr>
<tr>
<td>5</td>
<td>Middle drive shaft assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Middle driven gear</td>
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</tr>
<tr>
<td>7</td>
<td>Circlip</td>
<td>1</td>
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<tr>
<td>8</td>
<td>Middle drive shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Middle drive shaft bearing housing assembly</td>
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<tr>
<td>10</td>
<td>Bearing retainer</td>
<td>2</td>
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<tr>
<td>11</td>
<td>Bearing</td>
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<tr>
<td>12</td>
<td>Bearing housing</td>
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</table>
Removing the middle driven shaft

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>Front drive shaft coupling gear (middle gear side)</td>
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<tr>
<td>3</td>
<td>Rear drive shaft coupling gear nut (middle gear side)</td>
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<td>4</td>
<td>Rear drive shaft coupling gear (middle gear side)</td>
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<td>5</td>
<td>Middle driven pinion gear assembly</td>
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<tr>
<td>6</td>
<td>Middle driven pinion gear shim</td>
<td></td>
<td>Refer to “ALIGNING THE MIDDLE GEAR” on page 5-89.</td>
</tr>
<tr>
<td>7</td>
<td>Middle driven pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bearing</td>
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<td></td>
</tr>
<tr>
<td>9</td>
<td>Oil seal</td>
<td>1</td>
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</tbody>
</table>
Removing the middle driven shaft

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>10</td>
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<td>Left-hand thread</td>
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<td>11</td>
<td>Bearing</td>
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</tr>
<tr>
<td>12</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Bearing housing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Middle driven shaft bearing retainer</td>
<td>1</td>
<td>Left-hand thread</td>
</tr>
<tr>
<td>16</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Middle driven shaft</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
REMOVING THE MIDDLE DRIVE SHAFT
1. Straighten:
   • Punched portion of the middle drive pinion gear nut
2. Loosen:
   • Middle drive pinion gear nut “1”

TIP
Wrap the middle drive shaft in a folded rag, and then secure it in a vise.

3. Remove:
   • Middle drive pinion gear nut
   • Middle drive pinion gear
   • Shim (s)
4. Remove:
   • Middle driven gear “1”
   • Circlip
   • Middle drive shaft “2”

TIP
Press the middle drive shaft end and remove the middle driven gear.

REMOVING THE MIDDLE DRIVEN SHAFT
1. Remove:
   • Front drive shaft coupling gear nut “1”
   • Washer
   • Front drive shaft coupling gear “2”

TIP
Use the coupling gear/middle shaft tool “3” to hold the front drive shaft coupling gear.

2. Remove:
   • Rear drive shaft coupling gear nut “1”
   • Washer
   • Rear drive shaft coupling gear “2”

TIP
Use the coupling gear/middle shaft tool “3” to hold the rear drive shaft coupling gear.

3. Remove:
   • Bearing housing assembly “1”

\[\text{NOTICE}\]
ECB01900
• Never directly press the middle driven pinion gear end with a hydraulic press, this will result in damage to the middle driven pinion gear thread.
Install a suitable socket “2” on the middle driven pinion gear end to protect the thread from damage.

c. Press the middle driven pinion gear end and remove the bearing housing.

4. Remove:
   - Middle driven pinion gear bearing retainer
   - Bearing

   a. Wrap the bearing housing in a folded rag “1”, and then secure the bearing housing edge in a vise.
   b. Attach the bearing retainer wrench “2”.

   ![Diagram of bearing retainer wrench]

   Bearing retainer wrench
   90890-04128
   Middle gear bearing retainer
   YM-04128

   ECM0170

   NOTICE
   The middle driven pinion gear bearing retainer has left-hand threads. To loosen the retainer, turn it clockwise.

5. Remove:
   - Oil seal “1”
   - Middle driven shaft bearing retainer “2”

   ![Diagram of oil seal and bearing retainer]

   TIP
   Attach the ring nut wrench “3”.

6. Remove:
   - Middle driven shaft “1” (with bearing)

   ![Diagram of middle driven shaft]

   ECM0200

   NOTICE
   The middle driven shaft bearing retainer has left-hand threads. To loosen the retainer turn it clockwise.

CHECKING THE PINION GEARS

1. Check:
   - Drive pinion gear teeth
   - Driven pinion gear teeth
     Pitting/galling/wear → Replace.

2. Check:
   - Bearings
     Pitting/damage → Replace.
INSTALLING THE BEARING AND OIL SEALS

1. Install:
   - Bearing “1”
   - Oil seal “2” New (into the bearing housing “3”)

   ![Diagram of bearing installation]

   **Installed depth “a” of bearing**
   0.9–1.4 mm (0.035–0.055 in)

   **Installed depth “b” of oil seal**
   1.0–1.5 mm (0.039–0.059 in)

2. Install:
   - Oil seal “1” New (into the crankcase “2”)

   ![Diagram of oil seal installation]

   **Installed depth “a” of oil seal**
   1.0–1.5 mm (0.039–0.059 in)

INSTALLING THE MIDDLE DRIVEN SHAFT

1. Install:
   - Middle driven shaft bearing retainer “1”

   ![Diagram of middle driven shaft installation]

   **Middle driven shaft bearing retainer**
   80 Nm (8.0 m·kgf, 58 ft·lbf)
   LOCTITE®

TIP

Attach the ring nut wrench “2”.

RING NUT WRENCH

- Ring nut wrench
  90890-01430
- Ring nut wrench
  YM-38404

**NOTICE**

The middle driven shaft bearing retainer has left-hand threads. To tighten the retainer turn it counterclockwise.

2. Install:
   - Middle driven pinion gear bearing retainer “1”

   ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼

   a. Wrap the bearing housing in a folded rag, and then secure the bearing housing edge in a vise.
   b. Attach the bearing retainer wrench “2”.
   c. Tighten the bearing retainer.

   ![Diagram of middle driven pinion gear bearing retainer installation]

   **Bearing retainer wrench**
   90890-04128
   **Middle gear bearing retainer**
   YM-04128

   **Middle driven pinion gear bearing retainer**
   130 Nm (13 m·kgf, 94 ft·lbf)
   LOCTITE®
**NOTICE**

The middle driven pinion gear bearing retainer has left-hand threads. To tighten the retainer turn it counterclockwise.

3. Install:
   - Middle driven pinion gear shim(s) “1”
   - Bearing housing “2”

**TIP**

- Install the shim(s) so that the tabs are positioned as shown in the illustration.
- Make sure that the arrow “a” on the bearing housing points upward.

4. Install:
   - Rear drive shaft yoke “1”
   - Washer
   - Rear drive shaft yoke nut “2”

**TIP**

Use the coupling gear/middle shaft tool “3” to hold the rear drive shaft coupling gear.

---

**INSTALLING THE MIDDLE DRIVE SHAFT**

1. Install:
   - Circlip
   - Middle driven gear “1”
     (onto the middle drive shaft “2”)

**TIP**

Use the coupling gear/middle shaft tool “3” to hold the front drive shaft coupling gear.

---

**Rear drive shaft coupling gear nut (middle gear side)**

150 Nm (15 m·kgf, 108 ft·lbf)

**LOCTITE®**

**Front drive shaft coupling gear nut (middle gear side)**

115 Nm (11.5 m·kgf, 83 ft·lbf)

**LOCTITE®**

**Coupling gear/middle shaft tool**

90890-01229

Gear holder

YM-01229

**Installed depth “a” of middle driven gear**

24.7–24.9 mm (0.972–0.980 in)
2. Install:
- Bearing
- Bearing retainers “1”
- Bearing retainer bolts “2” New

TIP
Stake the bearing retainer bolts at the cutouts “a” in the bearing retainers “1”.

Middle drive shaft bearing retainer bolt
29 Nm (2.9 m-kgf, 21 ft-lbf)
LOCTITE®

3. Tighten:
- Middle drive pinion gear nut “1” New

Middle drive pinion gear nut
190 Nm (19 m-kgf, 137 ft-lbf)

TIP
- Wrap the middle drive shaft in a folded rag, and then secure it in a vise.
- Lock the threads with a drift punch.

MEASURING THE MIDDLE GEAR BACKLASH
1. Measure:
- Middle gear backlash
  Out of specification → Adjust.
  Refer to “ALIGNING THE MIDDLE GEAR” on page 5-89.

Middle gear backlash
0.10–0.30 mm (0.004–0.012 in)

▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼
a. Temporarily install the left crankcase.
b. Wrap a rag “1” around a screwdriver “2”, and then insert it into the installation hole “a” of the left crankcase speed sensor to hold the middle driven gear.
c. Attach the final gear backlash band “3” and dial gauge “4”.

Final gear backlash band
90890-01511
Middle drive gear lash tool
YM-01230
**ALIGNING THE MIDDLE GEAR**

**TIP**
Aligning the middle gear is necessary when any of the following parts are replaced:
- Crankcase
- Middle drive pinion gear
- Middle driven pinion gear
- Middle driven shaft bearing housing
- Middle drive shaft bearing housing

1. Select:
   - Middle drive pinion gear shim(s) “1”
   - Middle driven pinion gear shim(s) “2”

**Middle drive pinion gear shim thickness**

\[ A = e + d - b - c - a \]

“a” = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from “0.6”

“b” = 17.0

“c” = 55.0

“d” = a numeral (usually a decimal number) on the crankcase (right) specifies a thickness of “65.0”

“e” = a numeral (usually a decimal number) on the crankcase (left) specifies a thickness of “9.0”

Example:
If the bearing housing is marked “-02”,
“a” is 0.58
“b” is 17.0
“c” is 55.0
If the crankcase (right) is marked “64.96”, “d” is 64.96

If the crankcase (left) is marked “9.01”, “e” is 9.01

Therefore, “A” is 1.39.
“A” = 9.01 + 64.96 - 17.0 - 55.0 - 0.58
= 1.39
Round off hundredths digit and select appropriate shim(s).
In the above example, the calculated shim thickness is 1.39 mm. The following chart instructs you, however, to round off 9 to 10.

<table>
<thead>
<tr>
<th>Hundredth</th>
<th>Rounded value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 1, 2</td>
<td>0</td>
</tr>
<tr>
<td>3, 4, 5, 6, 7</td>
<td>5</td>
</tr>
<tr>
<td>8, 9</td>
<td>10</td>
</tr>
</tbody>
</table>

Shims are supplied in the following thicknesses.

c. To find middle driven pinion gear shim thickness “B”, use the following formula.

Middle driven pinion gear shim thickness
“B” = “f” - “g” + “h” - “i” - “j”

“f” = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from “77.5”

TIP
After replacing any part in the middle driven pinion gear assembly, the overall length of the assembly will change. Therefore, be sure to measure distance “f” to select the correct middle driven pinion gear shim thickness.

“g” = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from “49.0”

“h” = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from “80.5”

“i” = a numeral (usually a decimal number) on the left crankcase specifies a thickness of “99.98”

“j” = a numeral (usually a decimal number) on the right crankcase specifies a thickness of “8.12”

Example:
If the bearing housing is marked “+03”, “f” is 77.53
If the driven pinion gear is marked “+02”, “g” is 49.02

If the driven pinion gear is marked “-10”, “h” is 80.40

If the left crankcase is marked “99.98”, “i” is 99.98

If the right crankcase is marked “8.12”, “j” is 8.12

Therefore, “B” is 0.81.

\[
B = 77.53 - 49.02 + 80.40 - 99.98 - 8.12 = 0.81
\]

Round off hundredth digit and select appropriate shim(s).

In the above example, the calculated shim thickness is 0.81 mm. The chart instructs you, however, to round off 1 to 0.

<table>
<thead>
<tr>
<th>Hundredth</th>
<th>Rounded value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 1, 2</td>
<td>0</td>
</tr>
<tr>
<td>3, 4, 5, 6, 7</td>
<td>5</td>
</tr>
<tr>
<td>8, 9</td>
<td>10</td>
</tr>
</tbody>
</table>

Shims are supplied in the following thicknesses.

![Shim Thickness Chart]

**TIP**

- If the specified middle gear backlash cannot be obtained with a calculated shim thickness, increase or decrease the shim thickness.
- If the shim thickness is increased, the actual middle gear backlash will increase and, if the shim thickness is decreased, the actual middle gear backlash will decrease.
COOLING SYSTEM

OIL COOLER...........................................................................................................6-1
   CHECKING THE OIL COOLER ...........................................................................6-3
   INSTALLING THE OIL COOLER .........................................................................6-3

RADIATOR .............................................................................................................6-4
   CHECKING THE RADIATOR .............................................................................6-6
   INSTALLING THE RADIATOR .............................................................................6-6

THERMOSTAT ........................................................................................................6-7
   CHECKING THE THERMOSTAT ........................................................................6-8
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WATER PUMP .......................................................................................................6-10
   DISASSEMBLING THE WATER PUMP ..............................................................6-12
   CHECKING THE WATER PUMP .................................................................6-12
   ASSEMBLING THE WATER PUMP ...............................................................6-12
   INSTALLING THE WATER PUMP HOUSING ............................................6-13
   INSTALLING THE WATER JACKET JOINT ..................................................6-13
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>Front skid plate/Center skid plate/Top cover/Side panel (left)</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (1)” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Front fender inner panel (left)</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (3)” on page 4-8.</td>
</tr>
<tr>
<td></td>
<td>Footrest board (left)</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (4)” on page 4-11.</td>
</tr>
<tr>
<td></td>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-29.</td>
</tr>
<tr>
<td></td>
<td>Oil cooler outlet hose/Oil cooler inlet hose</td>
<td></td>
<td>Refer to “WATER PUMP” on page 6-10.</td>
</tr>
</tbody>
</table>
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>1</td>
<td>Oil filter cartridge</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Oil filter cartridge union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oil cooler</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Oil pipe (crankcase)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Oil hose (crankcase to cylinder head)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oil hose joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oil pipe (AC magneto cover)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
CHECKING THE OIL COOLER
1. Check:
   • Oil cooler
     Cracks/damage → Replace.
2. Check:
   • Oil hose joint
   • Oil pipe (crankcase)
   • Oil pipe (AC magneto cover)
     Cracks/damage/wear → Replace.
3. Check:
   • Oil hose (crankcase to cylinder head)
     Cracks/damage → Replace.

INSTALLING THE OIL COOLER
1. Install:
   • Oil hose (crankcase to cylinder)
   • Clamps
   • Oil hose joint
   • Gaskets New
   • Oil hose bolt (crankcase to cylinder)
     Refer to “INSTALLING THE CYLINDER HEAD” on page 5-26.
2. Clean:
   • Mating surfaces of the oil cooler and the crankcase
     (with a cloth dampened with lacquer thinner)
3. Install:
   • Gasket New
   • Oil cooler “1”
   • Oil filter cartridge union bolt “2”

TIP
Make sure the projection “a” on the oil cooler touches the projection “b” on the crankcase.

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

Refer to “CHANGING THE COOLANT” on page 3-29.
• Crankcase
  (with the specified amount of the recommended engine oil)
  Refer to “CHANGING THE ENGINE OIL” on page 3-24.
5. Check:
   • Cooling system
     Leaks → Repair or replace any faulty part.
6. Measure:
   • Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR” on page 6-6.

Oil filter cartridge union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)
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></td>
<td>Front skid plate/Center skid plate/Top cover/Side panels</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (1)” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Front guard</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (2)” on page 4-6.</td>
</tr>
<tr>
<td></td>
<td>Front fenders</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (3)” on page 4-6.</td>
</tr>
<tr>
<td></td>
<td>Footrest board (left)</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (4)” on page 4-11.</td>
</tr>
<tr>
<td></td>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-29.</td>
</tr>
<tr>
<td>1</td>
<td>Radiator fan motor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Radiator fan motor breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Coolant reservoir hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Coolant reservoir breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Coolant reservoir cap</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
## 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>6</td>
<td>Coolant reservoir</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Radiator outlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Radiator inlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Radiator</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Radiator fan</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

7 Nm (0.7 m-kgf, 5.1 ft-lbf)
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
     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 (1.1–1.4 kgf/cm², 15.6–19.9 psi)

   a. Install the radiator cap tester “1” and radiator cap tester adapter “2” to the radiator cap “3”.

   b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.

4. Check:
   • Radiator fan
     Damage → Replace.
     Malfunction → Check and repair.
     Refer to “COOLING SYSTEM” on page 9-25.

INSTALLING THE RADIATOR

1. Fill:
   • Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-29.

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 6-6.

   Radiator cap tester
   90890-01325

   Mityvac cooling system tester kit
   YU-24460-A

   Radiator cap tester adapter
   90890-01352

   Pressure tester adapter
   YU-33984
# 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>Top cover/Side panel (right)</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (1)” on page 4-1.</td>
<td></td>
</tr>
<tr>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-29”.</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Radiator inlet hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Thermostat cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Thermostat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Coolant temperature sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Coolant temperature sensor</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
**CHECKING THE THERMOSTAT**

1. Check:
   - Thermostat
     Does not open at 69–73 °C (156.2–163.4 °F) → Replace.

---

**INSTALLING THE THERMOSTAT**

1. Install:
   - Copper washer New
   - Coolant temperature sensor

2. Check:
   - Thermostat housing cover
   - Thermostat housing (cylinder head)
     Cracks/damage → Replace.

---

**NOTICE**

Use extreme care when handling the coolant temperature sensor. Replace any part that was dropped or subjected to a strong impact.

---

2. Install:
   - Thermostat “1”
   - Gasket “2” New
   - Thermostat cover “3”

---

**TIP**

Install the thermostat with its breather hole “a” facing up.

---

3. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-29.

4. Check:
   - Cooling system
     Leaks → Repair or replace any faulty part.
5. Measure:
- Radiator cap opening pressure
  Below the specified pressure → Replace the radiator cap.
  Refer to “CHECKING THE RADIATOR” on page 6-6.
### Removing the water pump

#### Order

<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>Radiator outlet hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Water jacket joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Water pump outlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Water pump outlet pipe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Oil cooler outlet hose</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

#### Remarks

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

Refer to “GENERAL CHASSIS (3)” on page 4-8.

Refer to “GENERAL CHASSIS (4)” on page 4-11.

Refer to “AC MAGNETO AND STARTER CLUTCH” on page 5-35.

Drain. Refer to “CHANGING THE COOLANT” on page 3-29.

10 Nm (1.0 m-kgf, 7.2 ft-lbf)

8 Nm (0.8 m-kgf, 5.8 ft-lbf)
### Removing the Water Pump

Below is a diagram showing the removal of the water pump along with the necessary parts and their quantities.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Water pump inlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Cooling water hose joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Oil cooler inlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Water pump breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Water pump housing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Impeller</td>
<td>1</td>
<td>Left-hand thread</td>
</tr>
<tr>
<td>13</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Impeller shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Water pump seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

---

T.R.: Torque Required

N.m: Newton meter

kgf: Kilogram force

lbf: Pound force

**Mechanical Specifications**

- **Water Pump Inlet Hose**
  - Torque: 10 Nm (1.0 m-kgf, 7.2 ft-lbf)

- **Cooling Water Hose Joint**
  - Torque: 10 Nm (1.0 m-kgf, 7.2 ft-lbf)

- **Oil Cooler Inlet Hose**
  - Torque: 10 Nm (1.0 m-kgf, 7.2 ft-lbf)

- **Water Pump Breather Hose**
  - Torque: 10 Nm (1.0 m-kgf, 7.2 ft-lbf)

- **Water Pump Housing**
  - Torque: 10 Nm (1.0 m-kgf, 7.2 ft-lbf)

- **Water Pump Seal**
  - Torque: 8 Nm (0.8 m-kgf, 5.8 ft-lbf)
DISASSEMBLING THE WATER PUMP
1. Remove:
   • Mechanical seal “1”

TIP
Remove the mechanical seal from the inside of the AC magneto cover.

2. Remove:
   • Bearing “1”
   • Oil seal “2”

TIP
Remove the bearing and oil seal from the inside of the AC magneto cover.

CHECKING THE WATER PUMP
1. Check:
   • Water pump housing cover
   • AC magneto cover
   • Impeller
   • Impeller shaft
   • Water pump outlet pipe
   • Water pump outlet hose
   Cracks/damage/wear → Replace.

2. Check:
   • Bearing
   Rough movement → Replace.

ASSEMBLING THE WATER PUMP
1. Install:
   • Bearing “1”
   • Oil seal “2” New
   (into the AC magneto cover)

TIP
Install the oil seal with a socket that matches its outside diameter.

Installed depth of oil seal “a”
0 mm (0 in)

2. Install:
   • Mechanical seal “1” New

NOTICE
Never lubricate the mechanical seal surface with oil or grease.

TIP
Use the special tools and a press to press the mechanical seal straight in until its flange “a” touches the AC magneto cover.

A. Push down
2. Mechanical seal installer
3. Middle driven shaft bearing driver
3. Install:
   - Impeller “1”

   **Impeller**
   10 Nm (1.0 m·kgf, 7.2 ft·lbf)

**TIP**

After installation, check that the impeller shaft rotates smoothly.

4. Install:
   - AC magneto cover
     Refer to “AC MAGNETO AND STARTER CLUTCH” on page 5-35.

**EBS30569**

**INSTALLING THE WATER PUMP HOUSING**

1. Install:
   - Water pump inlet hose “1”
   - Clamps “2”
   - Cooling water hose joint “3”

**TIP**

Tighten the clamp screw of each clamp “1” until 9 slots are visible in the area “a” of the clamp as shown in the illustration. Position the screw head of each clamp within the range shown in the illustration.

**EBS30589**

**INSTALLING THE WATER JACKET JOINT**

1. Install:
   - Clamps “1” (onto the water pump outlet hose)
   - Water pump outlet hose “2” (onto the water jacket joint)
   - Water jacket joint “3”

**TIP**

Tighten the clamp screw of each clamp “1” until 4 slots remain in the area “a” of the clamp as shown in the illustration.

**EBS30471**

**Water jacket joint bolt**
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

b. Upward
FUEL SYSTEM

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  REMOVING THE FUEL PUMP ................................................................. 7-2
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<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seat/Side panels</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (1)” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Rear fender</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (3)” on page 4-8.</td>
</tr>
<tr>
<td>1</td>
<td>Fuel tank breather hose</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Fuel tank breather hose joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fuel tank shield</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fuel pump coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Fuel hose connector holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Fuel hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fuel tank</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Fuel pump assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Damper</td>
<td>1</td>
<td></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 hose connector holder
   • Fuel hose

WARNING
Cover fuel hose connections with a cloth when disconnecting them. Residual pressure in the fuel lines could cause fuel to spurt out when removing the hose.

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.

TIP
• When removing the fuel hose from the fuel pump, remove the fuel hose connector holder first, and next, insert a slotted head screwdriver etc. in the slot part “a” of the fuel hose connector cover “1”, then slide it in the direction of the arrow, and remove the fuel hose.
• To remove the fuel hose from the throttle body, slide the fuel hose connector cover “2” on the end of the hose in direction of the arrow shown, press the two buttons “3” on the sides of the connector, and then remove the hose.
• Before removing the hose, place a few rags in the area under where it will be removed.

3. Remove:
   • Fuel tank

TIP
Do not set the fuel tank down on the installation surface of the fuel pump. Be sure to lean the fuel tank in an upright position.

REMOVING THE FUEL PUMP
1. Remove:
   • Fuel pump bracket
   • Fuel pump
   • Fuel pump gasket

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 FUEL TANK BREATHER HOSE JOINT
1. Check:
   • Fuel tank breather hose joint
     Damage/faulty → Replace.

INSTALLING THE FUEL PUMP
1. Install:
   • Fuel pump gasket New
   • Fuel pump
   • Fuel pump bracket

Fuel pump nut
7 Nm (0.7 m·kgf, 5.1 ft·lbf)
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 in the direction shown in the illustration.
- Install the fuel pump bracket by aligning the projections “a” on the fuel pump with the projections on the fuel tank.
- Tighten the fuel pump nuts in the proper tightening sequence as shown.

INSTALLING THE FUEL TANK
1. Install:
   - Damper “1”

TIP
- Fit the projections “a” on the damper into the 1st and 2nd holes on the right side of the frame.
- Make sure that the shorter end of the damper is facing outward as shown in the illustration.

2. Install:
   - Fuel hose
   - Fuel hose connector holder “1”
   - Fuel pump coupler

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

TIP
- Install the fuel hose connector holder “1” securely onto the fuel pump until a distinct “click” is heard, and then make sure that it does not come loose.
- To install the fuel hose onto the throttle body, slide the fuel hose connector cover “2” on the end of the hose in direction of the arrow shown.
Removing the throttle body

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seat/Side panels</td>
<td></td>
<td>Refer to &quot;GENERAL CHASSIS (1)&quot; on page 4-1.</td>
<td></td>
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<tr>
<td>Storage compartment/Air filter case/Air filter case joint</td>
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<td>Refer to &quot;GENERAL CHASSIS (5)&quot; on page 4-17.</td>
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<tr>
<td>1</td>
<td>Intake air pressure sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Throttle position sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>ISC (Idle Speed Control) unit coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Fuel hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Throttle cable housing cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Throttle cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Fuel injector coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>Throttle body joint clamp screw</td>
<td>2</td>
<td>Loosen.</td>
</tr>
<tr>
<td>9</td>
<td>Throttle body assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Throttle body breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Throttle body joint</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Disassembling the throttle body assembly

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Intake air pressure sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Intake air pressure sensor hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Throttle position sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fuel rail</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fuel injector</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Throttle body</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
THROTTLE BODY

REMOVING THE THROTTLE BODY ASSEMBLY

1. Disconnect:
   • Fuel hose

**WARNING**
Cover fuel hose connections with a cloth when disconnecting them. Residual pressure in the fuel lines could cause fuel to spurt out when removing the hose.

**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 disconnecting the fuel hose, since there may be fuel remaining in it.

**TIP**
- To disconnect the fuel hose from the throttle body, slide the fuel hose connector cover “1” on the end of the hose in direction of the arrow shown, press the two buttons “2” on the sides of the connector, and then disconnect the hose.
- Before disconnecting the hose, place a few rags in the area under where it will be disconnected.

CHECKING THE INJECTOR

1. Check:
   • Injector
     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.

INSTALLING THE THROTTLE BODY ASSEMBLY

1. Install:
   • Throttle body joint “1”

**TIP**
Fit the ribs “a” on the throttle body joint between the projections “b” on the cylinder head.

2. Install:
   • Throttle body assembly “1”

**TIP**
Fit the rib “a” on the throttle body assembly with the projections “b” on the throttle body joint.

3. Connect:
   • Fuel hose
When connecting 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 connected.

TIP

To connect the fuel hose onto the throttle body, slide the fuel hose connector cover “1” on the end of the hose in direction of the arrow shown.

---

**CHECKING THE FUEL PRESSURE**

1. Check:
   - Fuel pressure

   1. Remove the rear fender. Refer to “GENERAL CHASSIS (3)” on page 4-8.
   2. Remove the fuel hose connector holder.
   3. Disconnect the fuel hose “1” from the fuel pump.

TIP

- When removing the fuel hose from the fuel pump, remove the fuel hose connector holder first, and next, insert a slotted head screwdriver etc. in the slot part “a” of the fuel hose connector cover “2”, then slide it in the direction of the arrow, and remove the fuel hose.
- Before removing the hose, place a few rags in the area under where it will be removed.

---

**ADJUSTING THE THROTTLE POSITION SENSOR**

1. Check:
   - Throttle position sensor
     - Handle the throttle position sensor with special care.
     - Never subject the throttle position sensor to strong shocks. If the throttle position sensor is dropped, replace it.

2. Adjust:
   - Throttle position sensor angle
     - Connect the test harness– TPS (3P) “1” to the throttle position sensor and wire harness as shown.
     - Connect the digital circuit tester to the test harness– TPS (3P).
c. Turn the main switch to “ ” (on).
d. Measure the throttle position sensor voltage.
e. Adjust the throttle position sensor angle so that the voltage is within the specified range.

f. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws “2” to specification.
AIR INDUCTION SYSTEM
1. Air induction system hose (air filter case to air cut-off valve)
2. Air cut-off valve
3. Air induction system hose (air cut-off valve to reed valve assembly)
4. Reed valve assembly
Removing the air cut-off valve

<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>Seat/Side panels</td>
<td></td>
<td>Refer to “GENERAL CHASSIS (1)” on page 4-1.</td>
</tr>
<tr>
<td>1</td>
<td>Air cut-off valve coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Air induction system hose (air filter case to air cut-off valve)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Air induction system hose (air cut-off valve to reed valve assembly)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Air cut-off valve</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Air cut-off valve bracket</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the reed valve

<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>Reed valve cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Reed valve assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Reed valve plate</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

10 Nm (1.0 m-kgf, 7.2 ft-lbf)
CHECKING THE AIR INDUCTION SYSTEM

Air injection
The air induction system burns unburned exhaust gases by injecting fresh air (secondary air) into the exhaust port, reducing the emission of hydrocarbons. When there is negative pressure at the exhaust port, the reed valve opens, allowing secondary air to flow into the exhaust port. The required temperature for burning the unburned exhaust gases is approximately 600 to 700 °C (1112 to 1292 °F).

Air cut-off valve
The air cut-off valve is controlled by the signals from the ECU in accordance with the combustion conditions. Ordinarily, the air cut-off valve opens to allow the air to flow during idle and closes to cut-off the flow when the vehicle is being driven. However, if the coolant temperature is below the specified value, the air cut-off valve remains open and allows the air to flow into the exhaust pipe until the temperature becomes higher than the specified value.

INSTALLING THE AIR INDUCTION SYSTEM

1. Install:
   • Reed valve plate “1”

TIP
Align the notch “a” in the reed valve plate with the projection “b” of the reed valve seat on the cylinder head.

1. Check:
   • Hoses
     Loose connections → Connect properly.
     Cracks/damage → Replace.

2. Check:
   • Reed valve
   • Reed valve stopper
   • Reed valve seat
     Cracks/damage → Replace the reed valve assembly.

3. Check:
   • Air cut-off valve
     Cracks/damage → Replace.

4. Check:
   • Air induction system solenoid
     Refer to “CHECKING THE AIR INDUCTION SYSTEM SOLENOID” on page 9-96.
DRIVE TRAIN

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<th>Symptoms</th>
<th>Possible Causes</th>
</tr>
</thead>
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<tr>
<td>1. A pronounced hesitation or “jerky” movement during acceleration,</td>
<td>A. Bearing damage.</td>
</tr>
<tr>
<td>deceleration, or sustained speed. (This must not be confused with engine</td>
<td>B. Improper gear backlash.</td>
</tr>
<tr>
<td>surging or transmission characteristics.)</td>
<td>C. Gear tooth damage.</td>
</tr>
<tr>
<td>2. A “rolling rumble” noticeable at low speed; a high-pitched whine;</td>
<td>D. Broken drive shaft.</td>
</tr>
<tr>
<td>a “clunk” from a shaft drive component or area.</td>
<td>E. Broken gear teeth.</td>
</tr>
<tr>
<td>3. A locked-up condition of the shaft drive train mechanism, no power</td>
<td>F. Seizure due to lack of lubrication.</td>
</tr>
<tr>
<td>transmitted from the engine to the front and/or rear wheels.</td>
<td>G. Small foreign objects lodged between the moving parts.</td>
</tr>
</tbody>
</table>

**TIP**

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.
CHECKING NOISES
1. Investigate any unusual noises.

The following “noises” may indicate a mechanical defect:

a. A “rolling rumble” noise during coasting, acceleration, or deceleration. The noise increases with front and/or rear wheel speed, but it does not increase with higher engine or transmission speeds.
   Diagnosis: Possible wheel bearing damage.
   Refer to “TROUBLESHOOTING CHART” on page 8-3.

b. A “whining” noise that varies with acceleration and deceleration.
   Diagnosis: Possible incorrect reassembly, too little gear backlash.
   Refer to “TROUBLESHOOTING CHART” on page 8-3.

WARNING
Insufficient gear backlash is extremely destructive to the gear teeth. If a test ride, following reassembly, indicates these symptoms, stop riding immediately to minimize gear damage.

 c. A slight “thunk” evident at low speed operation. This noise must be distinguished from normal vehicle operation.
   Diagnosis: Possible broken gear teeth.

WARNING
Stop riding immediately if broken gear teeth are suspected. This condition could result in the shaft drive assembly locking up, causing a loss of control and possible injury to the rider.

2. Check:
   • Drained oil
     Drained oil shows large amounts of metal particles → Check the bearing for seizure.
   TIP
   A small amount of metal particles in the oil is normal.

3. Check:
   • Oil leakage

a. Clean the entire vehicle thoroughly, then dry it.
### TROUBLESHOOTING CHART

When basic conditions (a) and (b) exist, check the following points:

1. Elevate and spin both wheels. Feel for wheel bearing damage.
   - **YES**: Replace the wheel bearing. (Refer to “TIE-RODS AND STEERING KNUCKLES” on page 4-61 and “REAR KNUCKLES AND STABILIZER” on page 4-70.)
   - **NO**: Torque to specification. (Refer to “FRONT WHEELS” on page 4-20 and “REAR WHEELS” on page 4-23.)

2. Check the wheel nuts and axle nuts for tightness.
   - **YES**: Constant velocity shaft bearings and differential bearings are probably not damaged. Repeat the test or remove the individual components.
   - **NO**: Adjust per instructions. (Refer to “ADJUSTING THE REAR DISC BRAKE” on page 3-12.)

3. Check the front constant velocity shaft assemblies. Feel for bearing damage.
   - **YES**: Constant velocity shaft bearings and final gear bearings are probably not damaged. Repeat the test or remove the individual components.
   - **NO**: Repeat the test or remove the individual components.

4. Check the rear brake adjustment.
   - **YES**: Constant velocity shaft bearings and final gear bearings are probably not damaged. Repeat the test or remove the individual components.
   - **NO**: Remove the shaft drive components.
Removing the front constant velocity shaft assemblies, differential assembly and front drive shaft

<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 skid plate</td>
<td>1</td>
<td>Refer to “GENERAL CHASSIS (1)” on page 4-1.</td>
</tr>
<tr>
<td>2</td>
<td>Steering knuckles</td>
<td>1</td>
<td>Refer to “TIE-RODS AND STEERING KNUCKLES” on page 4-61.</td>
</tr>
<tr>
<td>3</td>
<td>Front arms</td>
<td>1</td>
<td>Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” on page 4-65.</td>
</tr>
<tr>
<td>4</td>
<td>Differential gear oil</td>
<td>1</td>
<td>Drain. Refer to “CHANGING THE DIFFERENTIAL GEAR OIL” on page 3-26.</td>
</tr>
<tr>
<td>5</td>
<td>Front constant velocity shaft assembly</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Differential motor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Differential case breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>Differential assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Front drive shaft</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the front constant velocity shaft assemblies, differential assembly and front drive shaft

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Damper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Front drive shaft coupling sleeve</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

Disassembling the front constant velocity shaft assemblies

A: Wheel side
B: Differential side

<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>Clip</td>
<td>1</td>
<td>The following procedure applies to both of the front constant velocity shaft assemblies.</td>
</tr>
<tr>
<td>2</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Double offset joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Ball bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Constant velocity joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Constant velocity shaft</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Disassembling the differential 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>Differential motor</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>Front drive shaft yoke nut (differential case side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Front drive shaft yoke (differential case side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Differential case cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Differential gear assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Differential gear assembly shim</td>
<td>—</td>
<td>Refer to “ADJUSTING THE DIFFERENTIAL GEAR BACKLASH” on page 8-13.</td>
</tr>
<tr>
<td>9</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**TIP**

Do not disassemble the differential motor or remove the differential motor pinion gear.
Disassembling the differential 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>10</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Differential pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Oil seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Differential case</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
DISASSEMBLING THE FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the front constant velocity shaft assemblies.

1. Remove:
   - Boot bands
   - Clip “1”
   - Double offset joint “2”
   - Circlip “3”
   - Ball bearing “4”
   - Dust boot “5”

**TIP**

Before removing the clip, slide the dust boot away from the double offset joint.

2. Remove:
   - Boot band “1”
   - Use the boot band installation tool “2”.

3. Remove:
   - Dust boot
   - Constant velocity joint
   - Clip

**TIP**

Secure the constant velocity shaft in a vise, and then remove the constant velocity joint using hammers.

CHECKING THE FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the front constant velocity shaft assemblies.

1. Check:
   - Double offset joint splines
   - Constant velocity joint splines
   - Constant velocity shaft splines
   - Wear/damage → Replace.

2. Check:
   - Dust boots
   - Cracks/damage → Replace.

**NOTICE**

Always use a new boot band.

3. Check:
   - Balls and ball races
   - Inner surface of double offset joint
   - Pitting/wear/damage → Replace.
ASSEMBLING THE FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the front constant velocity shaft assemblies.

1. Install:
   - Clip “1” New
   - Constant velocity joint “2”
   - Constant velocity shaft “3”
   - Dust boot

   a. Install the clip.
   b. Install the constant velocity joint.

   **TIP**
   - Install the clip into the groove in the constant velocity shaft as shown.
   - Secure the constant velocity joint in a vise, and then fit the constant velocity shaft into the constant velocity joint using a hammer.

2. Install:
   - Dust boot
   - Ball bearing “1”
   - Circlip “2” New
   - Double offset joint “3”
   - Clip “4” New

   **TIP**
   - Securely install the circlip into the groove in the constant velocity shaft.
   - Securely install the clip into the groove in the double offset joint.

3. Apply:
   - Molybdenum disulfide grease
     (into the double offset joint, constant velocity joint, and dust boots)

   **TIP**
   - Molybdenum disulfide grease is included in the repair kit.

4. Install:
   - Dust boots “1”
   - Boot bands “2”, “3”, “4”, “5” New

---

Molybdenum disulfide grease
70 g (2.5 oz) per dust boot (wheel side)
55 g (1.9 oz) per dust boot (differential side)

---

A. Wheel side

B. Differential side

---
FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

**TIP**
- The new boot bands may differ from the original ones.
- The dust boots should be fastened with the boot bands “3” and “5” at the grooves in the constant velocity shaft.

---

**REMOVING THE DIFFERENTIAL GEAR ASSEMBLY**

1. Remove:
   - Differential gear assembly “1”

**NOTICE**

The ring gear and differential gear are assembled into a proper unit at the factory by means of specialized equipment. Do not attempt to disassemble this unit. Disassembly will result in the malfunction of the unit.

---

**CHECKING THE DIFFERENTIAL ASSEMBLY**

1. Check:
   - Gear teeth
     - Pitting/galling/wear → Replace differential pinion gear and differential gear assembly as a set.
   - Bearings
     - Pitting/damage → Replace.
   - Oil seals
   - O-rings
     - Damage → Replace.

2. Check:
   - Drive shaft splines
   - Pinion gear splines
     - Wear/damage → Replace.
   - Spring
     - Fatigue → Replace.

3. Check:
   - Front drive shaft
     - Bends → Replace.

**WARNING**

Do not attempt to straighten a bent shaft; this may dangerously weaken it.

---

**CHECKING THE DIFFERENTIAL MOTOR OPERATION**

1. Check:
   - Differential motor
     - Does not operate → Replace.
Do not disassemble the differential motor or remove the differential motor pinion gear.

a. Connect two C-size batteries to the differential motor terminals “1” (as shown in the illustrations).

Do not use a 12 V battery to operate the differential motor pinion gear.

Do not connect the batteries to the differential motor when it is installed in the differential case. The differential motor should be checked when it is removed from the differential case.

a. Slide the shift fork sliding gear “1”, which is installed to the differential case cover, to the left as shown in the illustration to put it into the 2WD mode.

b. Connect two C-size batteries to the differential motor terminal “2” to operate the differential motor pinion gear “3”. Operate the differential motor pinion gear until the mark “4” on the differential motor pinion gear is aligned with the mark “5” on the differential motor case.

Do not use a 12 V battery to operate the differential motor pinion gear.

c. Insert 6 mm bolts “6” into the differential motor “7” and use them as a guide to set the motor on the differential case cover “8” so that the shift fork sliding gear “9” does not move.

If the position of the shift fork sliding gear is moved, the position of the differential gear assembly and the indicator light display may differ, and the 2WD or differential lock mode may not be activated.

ASSEMBLING THE DIFFERENTIAL ASSEMBLY
1. Measure:
   • Gear backlash
     Refer to “MEASURING THE DIFFERENTIAL GEAR BACKLASH” on page 8-13.
2. Install:
   • Differential motor
d. Remove the 6 mm bolts, and then install the motor with the differential motor bolts.

### Differential motor bolt
11 Nm (1.1 m-kgf, 8.0 ft-lbf)

3. Check:
   - Differential assembly operation
     Unsmooth operation → Replace the differential assembly.
     Insert the double offset joint into the differential assembly, and turn the gears back and forth.

### MEASURING THE DIFFERENTIAL GEAR BACKLASH
1. Secure the differential case in a vise or another supporting device.
2. Remove:
   - Drain plug
   - Gasket
3. Install:
   - Ring gear fix bolt (M10) “1”
     (into the drain plug hole)

### Gear lash measurement tool
90890-01475
Middle drive gear lash tool
YM-01475

4. Attach:
   - Gear lash measurement tool “2”
   - Dial gauge “3”

### ADJUSTING THE DIFFERENTIAL GEAR BACKLASH
1. Remove:
   - Differential gear assembly shim(s) “1”
   - Differential gear assembly “2”

- Measuring point is 22.5 mm (0.86 in)
- Measuring point is 28 mm (1.10 in)

### TIP
Measure the gear backlash at four positions. Rotate the differential pinion gear 90° each time.
2. Adjust:
   • Gear backlash

\[\text{Thinner shim} \quad \text{Differential gear backlash is increased.}\]
\[\text{Thicker shim} \quad \text{Differential gear backlash is decreased.}\]

---

a. Select the suitable shims using the following chart.

<table>
<thead>
<tr>
<th>Thickness (mm)</th>
<th>Shims</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>Thinner shim</td>
</tr>
<tr>
<td>0.2</td>
<td>Differential gear backlash is increased.</td>
</tr>
<tr>
<td>0.3</td>
<td>Thicker shim</td>
</tr>
<tr>
<td>0.4</td>
<td>Differential gear backlash is decreased.</td>
</tr>
</tbody>
</table>

---

b. Measure the differential gear backlash again.
Removing the rear constant velocity shaft assemblies, final drive assembly and rear drive shaft

A: For panel wheel models
B: For cast wheel models

<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 constant velocity shaft assembly</td>
<td>2</td>
<td>Refer to “GENERAL CHASSIS (1)” on page 4-1.</td>
</tr>
<tr>
<td>2</td>
<td>Final drive case breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Trailer hitch</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

55 Nm (5.5 m-kgf, 40 ft-lbf)

66 Nm (6.6 m-kgf, 48 ft-lbf)
Removing the rear constant velocity shaft assemblies, final drive assembly and rear drive shaft

A: For panel wheel models
B: For cast wheel models

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Final drive assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear drive shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Damper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Rear drive shaft coupling sleeve</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

55 Nm (5.5 m-kgf, 40 ft-lbf)

66 Nm (6.6 m-kgf, 48 ft-lbf)
Disassembling the rear constant velocity shaft assemblies

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Double offset joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ball bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constant velocity joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constant velocity shaft</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

The following procedure applies to both of the rear constant velocity shaft assemblies.
Disassembling the final 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>Final drive pinion gear assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Final drive pinion gear shim</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Final drive case cover</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>Gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Wheel gear shim</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

**TIP**: Working in a crisscross pattern, loosen each bolt 1/4 of a turn. After all the bolts are loosened, remove them.

Refer to “SELECTING THE FINAL DRIVE PINION GEAR SHIM(S)” on page 8-25.

Refer to “SELECTING THE WHEEL GEAR SHIM(S)” on page 8-28.
**Disassembling the final 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>10</td>
<td>Wheel gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Final driven pinion gear shim (final drive case cover side)</td>
<td>—</td>
<td>Refer to “SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE COVER SIDE)” on page 8-27.</td>
</tr>
<tr>
<td>12</td>
<td>Pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Final driven pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Thrust washer</td>
<td>—</td>
<td>Refer to “SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE SIDE) AND THRUST WASHER” on page 8-26.</td>
</tr>
<tr>
<td>15</td>
<td>Final driven pinion gear shim (final drive case side)</td>
<td>—</td>
<td>Refer to “SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE SIDE) AND THRUST WASHER” on page 8-26.</td>
</tr>
<tr>
<td>16</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Final drive case</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Disassembling the final 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>20</td>
<td>Rear drive shaft yoke nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Rear drive shaft yoke (final drive case side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Final drive pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Expander</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Final drive pinion gear bearing housing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
DISASSEMBLING THE REAR CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the rear constant velocity shaft assemblies.

1. Remove:
   • Boot band “1”
   Use the boot band installation tool “2”.

2. Remove:
   • Clip “1”
   • Double offset joint “2”
   • Circlip “3”
   • Ball bearing “4”
   • Dust boot “5”

   **TIP**
   Before removing the clip, slide the dust boot away from the double offset joint.

3. Remove:
   • Boot band “1”
   Use the boot band installation tool “2”.

4. Remove:
   • Dust boot
   • Constant velocity joint
   • Clip

   **TIP**
   Secure the constant velocity shaft in a vise, and then remove the constant velocity joint using hammers.
CHECKING THE REAR CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the rear constant velocity shaft assemblies.

1. Check:
   - Double offset joint splines
   - Constant velocity joint splines
   - Constant velocity shaft splines
     Wear/damage → Replace.

2. Check:
   - Dust boots
     Cracks/damage → Replace.

**NOTICE**

Always use a new boot band.

3. Check:
   - Balls and ball races
   - Inner surface of double offset joint
     Pitting/wear/damage → Replace.

ASSEMBLING THE REAR CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the rear constant velocity shaft assemblies.

1. Install:
   - Clip “1”  
   - Constant velocity joint “2”  
   - Constant velocity shaft “3”  
   - Dust boot

2. Install:
   - Dust boot  
   - Ball bearing “1”  
   - Circlip “2”  
   - Double offset joint “3”  
   - Clip “4”

**TIP**

- Securely install the circlip into the groove in the constant velocity shaft.
- Securely install the clip into the groove in the double offset joint.
REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

3. Apply:
   • Molybdenum disulfide grease
     (into the double offset joint, constant velocity joint, and dust boots)

   **TIP**
   Molybdenum disulfide grease is included in the repair kit.

4. Install:
   • Dust boots “1”
   • Boot bands “2”, “3”, “4”, “5”  **New**

   **TIP**
   • The new boot bands may differ from the original ones.
   • The dust boots should be fastened with the boot bands “3” and “5” at the grooves in the constant velocity shaft.

5. Check:
   • Thrust movement free play
     Excessive play → Replace the constant velocity shaft assembly.

---

B. Final drive side

3. Apply:
   • Molybdenum disulfide grease
     (into the double offset joint, constant velocity joint, and dust boots)

   **TIP**
   Molybdenum disulfide grease is included in the repair kit.

4. Install:
   • Dust boots “1”
   • Boot bands “2”, “3”, “4”, “5”  **New**

   **TIP**
   • The new boot bands may differ from the original ones.
   • The dust boots should be fastened with the boot bands “3” and “5” at the grooves in the constant velocity shaft.

---

**B. Final drive side**

Molybdenum disulfide grease
60 g (2.1 oz) per dust boot (wheel side)
70 g (2.5 oz) per dust boot (final drive side)

---

**TIP**
Molybdenum disulfide grease is included in the repair kit.

4. Install:
   • Dust boots “1”
   • Boot bands “2”, “3”, “4”, “5”  **New**

   **TIP**
   • The new boot bands may differ from the original ones.
   • The dust boots should be fastened with the boot bands “3” and “5” at the grooves in the constant velocity shaft.

---

**DISASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY**

1. Remove:
   • Rear drive shaft yoke nut “1”

   **a.** Place a folded rag as shown.
   **b.** Secure the final drive pinion gear in the vise.
   **c.** Remove the rear drive shaft yoke nut.

---

**B. Final drive side**

Molybdenum disulfide grease
60 g (2.1 oz) per dust boot (wheel side)
70 g (2.5 oz) per dust boot (final drive side)

---

**TIP**
Molybdenum disulfide grease is included in the repair kit.

4. Install:
   • Dust boots “1”
   • Boot bands “2”, “3”, “4”, “5”  **New**

   **TIP**
   • The new boot bands may differ from the original ones.
   • The dust boots should be fastened with the boot bands “3” and “5” at the grooves in the constant velocity shaft.

---

**DISASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY**

1. Remove:
   • Rear drive shaft yoke nut “1”

   **a.** Place a folded rag as shown.
   **b.** Secure the final drive pinion gear in the vise.
   **c.** Remove the rear drive shaft yoke nut.

---

**B. Final drive side**

Molybdenum disulfide grease
60 g (2.1 oz) per dust boot (wheel side)
70 g (2.5 oz) per dust boot (final drive side)

---

**TIP**
Molybdenum disulfide grease is included in the repair kit.

4. Install:
   • Dust boots “1”
   • Boot bands “2”, “3”, “4”, “5”  **New**

   **TIP**
   • The new boot bands may differ from the original ones.
   • The dust boots should be fastened with the boot bands “3” and “5” at the grooves in the constant velocity shaft.

---

**DISASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY**

1. Remove:
   • Rear drive shaft yoke nut “1”

   **a.** Place a folded rag as shown.
   **b.** Secure the final drive pinion gear in the vise.
   **c.** Remove the rear drive shaft yoke nut.

---

**B. Final drive side**

Molybdenum disulfide grease
60 g (2.1 oz) per dust boot (wheel side)
70 g (2.5 oz) per dust boot (final drive side)

---

**TIP**
Molybdenum disulfide grease is included in the repair kit.

4. Install:
   • Dust boots “1”
   • Boot bands “2”, “3”, “4”, “5”  **New**

   **TIP**
   • The new boot bands may differ from the original ones.
   • The dust boots should be fastened with the boot bands “3” and “5” at the grooves in the constant velocity shaft.

---

**DISASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY**

1. Remove:
   • Rear drive shaft yoke nut “1”

   **a.** Place a folded rag as shown.
   **b.** Secure the final drive pinion gear in the vise.
   **c.** Remove the rear drive shaft yoke nut.

---

8-23
CHECKING THE REAR DRIVE SHAFT
1. Check:
   • Drive shaft splines
   • Coupling sleeve splines
     Wear/damage → Replace.

CHECKING THE FINAL DRIVE ASSEMBLY
1. Check:
   • Final drive case
   • Final drive case cover
     Cracks/damage → Replace.

TIP
When the final drive case and/or the final drive case cover are replaced, be sure to adjust the shim of the final drive pinion gear and/or final driven pinion gear.

2. Check:
   • Gear teeth
     Pitting/galling/wear → Replace the final drive pinion gear and final driven pinion gear as a set.

TIP
When the final drive pinion gear, final driven pinion gear and/or wheel gear are replaced, be sure to adjust the shim of the final drive pinion gear, final driven pinion gear and/or wheel gear.

   • Oil seals
   • O-ring
     Damage → Replace.

3. Check:
   • Bearings
     Damage → Replace.

ASSEMBLING THE FINAL DRIVE CASE
1. Install:
   • Oil seals “1”

   Installed depth of oil seal “a”
   5.5 mm (0.22 in)

ASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY
1. Install:
   • Rear drive shaft yoke nut “1”

   Place a folded rag as shown.
b. Secure the final drive pinion gear in the vise.

c. Tighten the rear drive shaft yoke nut.
   (temporarily)

   Rear drive shaft yoke nut (temporarily)
   82 Nm (8.2 m·kgf, 59 ft·lbf)
   LOCTITE®

d. Secure the final drive pinion gear bearing housing in a vice, and then turn the nut with a torque wrench to check the starting torque.

   Final drive pinion gear starting torque (final drive pinion gear preload)
   0.8–1.3 Nm (0.08–0.13 m·kgf, 0.58–0.94 ft·lbf)

e. Out of specification → Tighten the nut further.

f. Repeat steps (d) and (e) until the starting torque is within specification.

TIP
• Be careful not to exceed the specified starting torque.
• If the specified starting torque is exceeded, replace the expander with a new one and reassemble the final drive pinion gear assembly.
• Make sure that the distance “a” is 67.5–68.1 mm (2.66–2.68 in) as shown.
2. Check:
- Final drive assembly operation
  Unsmooth operation → Replace the final drive assembly.
  Insert the double offset joint into the final drive assembly, and turn the gears back and forth.

SELECTING THE FINAL DRIVE PINION GEAR SHIM(S)

1. Select:
- Final drive pinion gear shim(s) "1"

a. To find the final drive pinion gear shim thickness “A”, use the following formula.

  Final drive pinion gear shim thickness
  “A” = “a” + (“c” - “b”) - “d”

  “a” = 55 mm
  “b” = a numeral (usually a decimal number) on the final drive pinion gear either added to or subtracted from “22.2”
  “c” = a numeral (usually a decimal number) on the final drive pinion gear bearing housing either added to or subtracted from “67.8”
  “d” = a numeral (usually a decimal number) on the final drive case either added to or subtracted from “100”

Example:
“a” = 55
If “-.02” is stamped on the final drive pinion gear,
“b” = 22.2 - 0.02 = 22.18

If “-.05” is stamped on the final drive pinion gear bearing housing,
“c” = 67.8 - 0.05 = 67.75
If “-01” is stamped on the final drive case, 
“d” = 100 - 0.01
= 99.99

Therefore, “A” is 0.58.
“A” = 55 + (67.75 - 22.18) - 99.99
= 0.58
Round off the hundredth digit and select the appropriate shim(s).
In the example above, the calculated number is 0.58. The chart instructs you to round off 8 to 10 at the hundredth place. Thus, the shim thickness is 0.60 mm (0.024 in).

<table>
<thead>
<tr>
<th>Hundredth</th>
<th>Rounded value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 1, 2</td>
<td>0</td>
</tr>
<tr>
<td>3, 4, 5, 6, 7</td>
<td>5</td>
</tr>
<tr>
<td>8, 9</td>
<td>10</td>
</tr>
</tbody>
</table>

Shims are supplied in the following thicknesses.

Final drive pinion gear shims
Thickness (mm)
0.25 0.30 0.35 0.40 0.45 0.50

---

**SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE SIDE) AND THRUST WASHER**

1. Select:
   - Final driven pinion gear shim (final drive case side) “1”
   - Thrust washer “2”

To find the final driven pinion gear shim (final drive case side) and thrust washer thickness “B”, use the following formula.

Final driven pinion gear shim (final drive case side) and thrust washer thickness
“B” = “h” - (“e” - “f” + “g”)

Example:
If “-03” is stamped on the final drive case,
“e” = 71.6 - 0.03
= 71.57
If “-12” is stamped on the outside of the final driven pinion gear, 
\[ f = 51.0 - 0.12 \]
\[ = 50.88 \]

If “-05” is stamped on the outside of the final driven pinion gear, 
\[ g = 24.0 - 0.05 \]
\[ = 23.95 \]

“h” = 49.8 
Therefore, shim and thrust washer thickness “B” is 5.16. 
\[ B = 49.8 - (71.57 - 50.88 + 23.95) \]
\[ = 5.16 \]

Round off the hundredth digit and select the appropriate shim(s). 
In the example above, the calculated number is 5.16. The chart instructs you to round off 6 to 5 at the hundredth place. 
Thus, the shim and thrust washer thickness is 5.15 mm.

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

Shim and thrust washer are supplied in the following thicknesses.

<table>
<thead>
<tr>
<th>Final driven pinion gear shims (final drive case side) “1”</th>
<th>Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness (mm)</td>
<td>0.25 0.30 0.35 0.40 0.45 0.50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thrust washer “2”</th>
<th>Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness (mm)</td>
<td>4.50 4.80 5.10 5.40</td>
</tr>
</tbody>
</table>

**TIP**
Be sure to use one of each of the final driven pinion gear shim (final drive case side) “1” and thrust washer “2” to obtain the shim and thrust washer thickness.
REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

a. Place four pieces of Plastigauge® between the originally fitted shim(s) and the final driven pinion gear assembly.
b. Install the final driven pinion gear assembly, final driven pinion gear shim (final drive case side) and thrust washer, and tighten the bolts to specification.

**Final drive case cover bolt**
23 Nm (2.3 m-kgf, 17 ft-lbf)

**TIP**  
Do not turn the final drive pinion gear, wheel gear, and driven pinion gear when measuring the clearance with Plastigauge®.

c. Remove the final driven pinion gear assembly.
d. Measure the thrust clearance. Calculate the width of the flattened Plastigauge® “1”.

**Final driven pinion gear thrust clearance**
0.08–0.12 mm (0.0031–0.0047 in)

e. If out of specification, remove the originally fitted shim(s), and then select the correct shim(s).

**SELECTING THE WHEEL GEAR SHIM(S)**

1. Measure:
- Wheel gear thrust clearance “D”

**Final drive case cover bolt**
23 Nm (2.3 m-kgf, 17 ft-lbf)

**TIP**  
Do not turn the drive pinion gear, wheel gear, or driven pinion gear when measuring the clearance with Plastigauge®.

c. Remove the wheel gear.
d. Measure the thrust clearance. Calculate the width of the flattened Plastigauge® “1”.

\[
\begin{array}{c|cccccc}
\text{Thickness (mm)} & 0.25 & 0.30 & 0.35 & 0.40 & 0.45 & 0.50 \\
\end{array}
\]
REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

Wheel gear thrust clearance
0.03–0.07 mm (0.0012–0.0028 in)

2. Select:
• Wheel gear shim(s)

Select suitable wheel gear shims using the following chart.

a. Measuring point is 31.5 mm (1.24 in)
b. Measuring point is 32.1 mm (1.26 in)

5. Measure:
• Gear backlash
  Gently rotate the final drive pinion gear from engagement to engagement.

Final gear backlash
0.10–0.20 mm (0.004–0.008 in)

TIP
• When measuring the gear backlash, be sure the right side (gear oil level check bolt side) of the final drive case assembly is facing downward.
• Measure the gear backlash at four positions. Rotate the final drive pinion gear 90° each time.

ADJUSTING THE FINAL GEAR BACKLASH
1. Remove:
• Final driven pinion gear assembly “1”
• Final driven pinion gear shim (final drive case side) “2”
• Thrust washer “3”
• Final driven pinion gear shim (final drive case cover side) “4”

Wheel gear shims
Thickness (mm)
0.25 0.30 0.35 0.40 0.45 0.50

Ring gear fix bolt (M14)
90890-01524
Ring gear fix bolt (M14)
YM-01524

NOTICE
Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.

4. Attach:
• Final gear backlash band “2”
• Dial gauge “3”

Final gear backlash band
90890-01511
Middle drive gear lash tool
YM-01230

MEASURING THE FINAL GEAR BACKLASH
1. Secure the final drive case in a vise or another supporting device.
2. Remove:
• Drain plug
• Gasket
3. Install:
• Ring gear fix bolt (M14) “1”
  (into the drain plug hole)

TIP
Measure the thickness of the originally fitted shim(s), and then calculate the required new shim thickness to bring the wheel gear thrust clearance within the specified limits.

b. Repeat the measurement steps until the wheel gear thrust clearance is within the specified limits.

ECB01250

ECB01251
2. Adjust:
   • Gear backlash

   a. Select a suitable shim(s) and thrust washer(s) using the following chart.

   | Thinner shim | Final gear backlash is increased. |
   | Thicker shim | Final gear backlash is decreased. |

   b. If increased by more than 0.2 mm (0.008 in):
      Reduce the final driven pinion gear shim (final drive case cover side) “4” thickness by 0.2 mm (0.008 in) for every 0.2 mm (0.008 in) that the final driven pinion gear shim (final drive case side) “2” and thrust washer “3” are increased.

   c. If reduced by more than 0.2 mm (0.008 in):
      Increase the final driven pinion gear shim (final drive case cover side) “4” thickness by 0.2 mm (0.008 in) for every 0.2 mm (0.008 in) that the final driven pinion gear shim (final drive case side) “2” and thrust washer “3” are decreased.

   "4" Thickness (mm) 0.25 0.30 0.35 0.40 0.45 0.50
   "2" Thickness (mm) 0.25 0.30 0.35 0.40 0.45 0.50
   "3" Thickness (mm) 4.50 4.80 5.10 5.40

   TIP
   Be sure to use one of each of the final driven pinion gear shim (final drive case side) “2” and thrust washer “3” to obtain the shim and thrust washer thickness.
REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT
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4. Main switch
5. Main fuse
6. Battery
9. Engine ground
11. Joint coupler
16. ECU (Engine Control Unit)
17. Ignition coil
18. Spark plug
25. Lean angle sensor
46. Engine stop switch
61. Ignition fuse
66. Frame ground 1
A. Wire harness
B. Negative battery sub-wire harness
**IGNITION SYSTEM**

### TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

**TIP**

- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Top cover
  4. Side panels (left and right)
  5. Storage compartment
  6. V-belt cooling exhaust duct

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</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 9-84.</td>
<td>NG → Replace the fuse(s).</td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-85.</td>
<td>NG → • Clean the battery terminals. • Recharge or replace the battery.</td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Check the spark plug. Refer to “CHECKING THE SPARK PLUG” on page 3-4.</td>
<td>NG → Re-gap, clean, or replace the spark plug.</td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Check the spark plug cap. Refer to “CHECKING THE SPARK PLUG CAP” on page 9-90.</td>
<td>NG → Replace the spark plug cap.</td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Check the ignition coil. Refer to “CHECKING THE IGNITION COIL” on page 9-91.</td>
<td>NG → Replace the ignition coil.</td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Check the crankshaft position sensor. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 9-91.</td>
<td>NG → The crankshaft position sensor is faulty. Replace the crankshaft position sensor/stator assembly.</td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Check the main switch. Refer to “CHECKING THE SWITCHES” on page 9-81.</td>
<td>NG → Replace the main switch.</td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8. Check the engine stop switch.
Refer to “CHECKING THE SWITCHES” on page 9-81.

NG → The engine stop switch is faulty. Replace the handlebar switch (left).

OK ↓

9. Check the lean angle sensor.
Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 9-92.

NG → Replace the lean angle sensor.

OK ↓

10. Check the entire ignition system wiring.
Refer to “CIRCUIT DIAGRAM” on page 9-1.

NG → Properly connect or repair the ignition system wiring.

OK ↓

Replace the ECU.
4. Main switch
5. Main fuse
6. Battery
8. Starter relay
9. Engine ground
10. Starter motor
11. Joint coupler
16. ECU (Engine Control Unit)
27. Gear position switch
45. Start switch
46. Engine stop switch
54. Rear brake light switch
60. Signaling system fuse
61. Ignition fuse
66. Frame ground 1
A. Wire harness
B. Negative battery sub-wire harness
STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to "O" and the main switch is set to "I" (on) (both switch circuits are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch circuit of the gear position switch is closed).
- The transmission is in park (the park switch circuit of the gear position switch is closed).
- The rear brake lever is pulled to the handlebar or the brake pedal is pushed down (the rear brake light switch circuit is closed).

1. Battery
2. Main fuse
3. Main switch
4. Ignition fuse
5. Engine stop switch
6. Start switch
7. Signaling system fuse
8. Rear brake light switch
9. ECU (Engine Control Unit)
10. Park switch (gear position switch)
11. Neutral switch (gear position switch)
12. Starter relay
13. Starter motor
TROUBLESHOOTING

The starter motor fails to turn.

TIP

- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Top cover
  4. Side panels (left and right)
  5. V-belt cooling exhaust duct

1. Check the fuses.
   (Main, ignition and signaling system)
   Refer to "CHECKING THE FUSES" on page 9-84.

   NG → Replace the fuse(s).

2. Check the battery.
   Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-85.

   NG →
   • Clean the battery terminals.
   • Recharge or replace the battery.

3. Check the starter motor operation.
   Refer to "CHECKING THE STARTER MOTOR OPERATION" on page 9-92.

   OK → Starter motor is OK. Perform the electric starting system troubleshooting, starting with step 5.

4. Check the starter motor.
   Refer to "CHECKING THE STARTER MOTOR" on page 5-42.

   NG → Repair or replace the starter motor.

5. Check the starter relay.
   Refer to "CHECKING THE RELAYS" on page 9-88.

   NG → Replace the starter relay.

6. Check the main switch.
   Refer to "CHECKING THE SWITCHES" on page 9-81.

   NG → Replace the main switch.

7. Check the engine stop switch.
   Refer to "CHECKING THE SWITCHES" on page 9-81.

   NG → The engine stop switch is faulty. Replace the handlebar switch (left).
### 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 start switch. Refer to “CHECKING THE SWITCHES” on page 9-81.</td>
<td>NG → The start switch is faulty. Replace the handlebar switch (left).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OK ↓</td>
</tr>
<tr>
<td>9.</td>
<td>Check the rear brake light switch. Refer to “CHECKING THE SWITCHES” on page 9-81.</td>
<td>NG → Replace the rear brake light switch.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OK ↓</td>
</tr>
<tr>
<td>10.</td>
<td>Check the gear position switch. Refer to “CHECKING THE SWITCHES” on page 9-81.</td>
<td>NG → Replace the gear position switch.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OK ↓</td>
</tr>
<tr>
<td>11.</td>
<td>Check the entire starting system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-5.</td>
<td>NG → Properly connect or repair the starting system wiring.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OK ↓</td>
</tr>
<tr>
<td></td>
<td>Replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>
2. AC magneto
3. Rectifier/regulator
5. Main fuse
6. Battery
9. Engine ground
66. Frame ground 1
67. Frame ground 2
A. Wire harness
B. Negative battery sub-wire harness
# TROUBLESHOOTING

The battery is not being charged.

**TIP**

- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Top cover
  4. Side panel (right)
  5. V-belt cooling exhaust duct

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1.   | Check the fuse. (Main)  
      | Refer to “CHECKING THE FUSES” on page 9-84.  
      | NG → Replace the fuse. |
|      | OK ↓ |
| 2.   | Check the battery.  
      | Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-85.  
      | NG → • Clean the battery terminals.  
      |   • Recharge or replace the battery. |
|      | OK ↓ |
| 3.   | Check the stator coil.  
      | Refer to “CHECKING THE STATOR COIL” on page 9-93.  
      | NG → The stator coil is faulty. Replace the crankshaft position sensor/stator assembly. |
|      | OK ↓ |
| 4.   | Check the rectifier/regulator.  
      | Refer to “CHECKING THE RECTIFIER/REGULATOR” on page 9-93.  
      | NG → Replace the rectifier/regulator. |
|      | OK ↓ |
| 5.   | Check the entire charging system wiring.  
      | Refer to “CIRCUIT DIAGRAM” on page 9-11.  
      | NG → Properly connect or repair the charging system wiring. |
|      | OK ↓ |

The charging system circuit is OK.
4. Main switch
5. Main fuse
6. Battery
9. Engine ground
11. Joint coupler
47. Light switch
48. Handle mounted light
49. Headlight
50. Headlight relay 2
51. Headlight relay 1
52. Tail/brake light
59. Headlight fuse
66. Frame ground 1
A. Wire harness
B. Negative battery sub-wire harness
**TROUBLESHOOTING**

Any of the following fail to light: Handle mounted light, headlight or taillight.

**TIP**

- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Handle mounted light cover

1. Check the condition of handle mounted light bulb and bulb socket. Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 9-83.
   - NG → Replace the bulb and bulb socket.

2. Check the fuses. (Main and headlight) Refer to “CHECKING THE FUSES” on page 9-84.
   - NG → Replace the fuse(s).

3. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-85.
   - NG →
     - Clean the battery terminals.
     - Recharge or replace the battery.

4. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 9-81.
   - NG → Replace the main switch.

5. Check the light switch. Refer to “CHECKING THE SWITCHES” on page 9-81.
   - NG → The light switch is faulty. Replace the handlebar switch (left).

6. Check the headlight relay 1. Refer to “CHECKING THE RELAYS” on page 9-88.
   - NG → Replace the headlight relay 1.

7. Check the headlight relay 2. Refer to “CHECKING THE RELAYS” on page 9-88.
   - NG → Replace the headlight relay 2.
8. Check the entire lighting system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-15.

NG →

Properly connect or repair the lighting system wiring.

OK ↓

Replace the headlight unit or tail/brake light unit.
4. Main switch
5. Main fuse
6. Battery
9. Engine ground
11. Joint coupler
14. Reverse switch
16. ECU (Engine Control Unit)
21. Coolant temperature sensor
22. Speed sensor
27. Gear position switch
29. Multi-function meter
31. Coolant temperature warning light
32. Park indicator light
33. Reverse indicator light
34. Neutral indicator light
35. High-range indicator light
36. Low-range indicator light
38. Differential motor
39. Fuel sender
44. Override switch
52. Tail/brake light
53. Diode
54. Rear brake light switch
55. Front brake light switch
60. Signaling system fuse
61. Ignition fuse
66. Frame ground 1
68. Horn switch (except for CDN)
69. Horn (except for CDN)
A. Wire harness
B. Negative battery sub-wire harness
**TROUBLESHOOTING**

- Any of the following fail to light: warning light, brake light or an indicator light.
- The fuel meter fails to come on.
- The speedometer fails to operate.
- The horn fails to sound. (except for CDN)

**TIP**

- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Top cover
  4. Side panels (left and right)
  5. V-belt cooling exhaust duct
  6. Rear fender

---

### Checking the signaling system

**The tail/brake light fails to come on.**

1. Check the front brake light switch.
   - Refer to “CHECKING THE SWITCHES” on page 9-81.
   - NG → Replace the front brake light switch.

---

2. Check the battery.
   - Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-85.
   - NG → Clean the battery terminals.
   - NG → Recharge or replace the battery.

---

3. Check the main switch.
   - Refer to “CHECKING THE SWITCHES” on page 9-81.
   - OK ↓
   - NG → Replace the main switch.

---

4. Check the entire signaling system wiring.
   - Refer to “CIRCUIT DIAGRAM” on page 9-19.
   - OK ↓
   - NG → Properly connect or repair the signaling system wiring.

---

Check the condition of each of the signaling system circuits. Refer to “Checking the signaling system”.

---

**NOTE**

Replace the fuse(s).
The neutral, park, high-range, and/or low-range indicator light fails to come on.

1. Check the gear position switch. Refer to “CHECKING THE SWITCHES” on page 9-81.
   NG → Replace the gear position switch.
   OK ↓

2. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-19.
   NG → Properly connect or repair the signaling system wiring.
   OK ↓

Replace the meter assembly or ECU.

The reverse indicator light fails to come on.

1. Check the reverse switch. Refer to “CHECKING THE SWITCHES” on page 9-81.
   NG → Replace the reverse switch.
   OK ↓

2. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-19.
   NG → Properly connect or repair the signaling system wiring.
   OK ↓

Replace the meter assembly or ECU.

2. Check the rear brake light switch. Refer to “CHECKING THE SWITCHES” on page 9-81.
   NG → Replace the rear brake light switch.
   OK ↓

3. Check the diode. Refer to “CHECKING THE DIODE” on page 9-90.
   NG → Replace the diode.
   OK ↓

4. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-19.
   NG → Properly connect or repair the signaling system wiring.
   OK ↓

Replace the tail/brake light unit or ECU.
### SIGNALING SYSTEM

The differential gear lock indicator light and/or four-wheel-drive indicator light fails to come on.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG → Replace the differential motor.</td>
<td></td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>2. Check the entire signaling system wiring.</td>
<td>Refer to “CIRCUIT DIAGRAM” on page 9-19.</td>
</tr>
<tr>
<td>NG → Properly connect or repair the signaling system wiring.</td>
<td></td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>Replace the meter assembly or ECU.</td>
<td></td>
</tr>
</tbody>
</table>

While the override switch is pushed, the segments of the speedometer digits will not appear as shown in the illustration.

![Speedometer illustration](image_url)

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check the override switch. Refer to “CHECKING THE SWITCHES” on</td>
<td>The override switch is faulty. Replace the handlebar switch (left).</td>
</tr>
<tr>
<td>page 9-81.</td>
<td></td>
</tr>
<tr>
<td>NG →</td>
<td></td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>2. Check the entire signaling system wiring. Refer to “CIRCUIT</td>
<td>Properly connect or repair the signaling system wiring.</td>
</tr>
<tr>
<td>DIAGRAM” on page 9-19.</td>
<td></td>
</tr>
<tr>
<td>NG →</td>
<td></td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>Replace the meter assembly or ECU.</td>
<td></td>
</tr>
</tbody>
</table>

The coolant temperature warning light fails to come on.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check the coolant temperature sensor. Refer to “CHECKING THE</td>
<td>Replace the coolant temperature sensor.</td>
</tr>
<tr>
<td>COOLANT TEMPERATURE SENSOR” on page 9-95.</td>
<td></td>
</tr>
<tr>
<td>NG →</td>
<td></td>
</tr>
<tr>
<td>OK ↓</td>
<td></td>
</tr>
</tbody>
</table>
2. Check the entire signaling system wiring.  
   Refer to "CIRCUIT DIAGRAM" on page 9-19.

   NG → Properly connect or repair the signaling system wiring.

   OK ↓
   Replace the meter assembly or ECU.

   The fuel level indicator fails to come on.

   1. Check the fuel sender.
      Refer to "CHECKING THE FUEL SENDER" on page 9-93.

      NG → Replace the fuel pump assembly.

      OK ↓

      2. Check the entire signaling system wiring.
         Refer to "CIRCUIT DIAGRAM" on page 9-19.

      NG → Properly connect or repair the signaling system wiring.

      OK ↓
   Replace the meter assembly.

   The speedometer fails to operate.

   1. Check the speed sensor.
      Refer to "CHECKING THE SPEED SENSOR" on page 9-94.

      NG → Replace the speed sensor.

      OK ↓

      2. Check the entire signaling system wiring.
         Refer to "CIRCUIT DIAGRAM" on page 9-19.

      NG → Properly connect or repair the signaling system wiring.

      OK ↓
   Replace the meter assembly or ECU.

   The horn fails to sound (except for CDN).

   1. Check the horn switch.
      Refer to "CHECKING THE SWITCHES" on page 9-81.

      NG → Replace the horn switch.

      OK ↓

      2. Check the entire signaling system wiring.
         Refer to "CIRCUIT DIAGRAM" on page 9-19.

      NG → Properly connect or replace the wire harness.

      OK ↓
   Replace the horn.
4. Main switch
5. Main fuse
6. Battery
9. Engine ground
11. Joint coupler
16. ECU (Engine Control Unit)
21. Coolant temperature sensor
56. Radiator fan motor
57. Radiator fan motor circuit breaker
58. Radiator fan motor relay
61. Ignition fuse
64. Radiator fan motor fuse
66. Frame ground 1
A. Wire harness
B. Negative battery sub-wire harness
TROUBLESHOOTING
The radiator fan motor fails to turn.

TIP
• Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Top cover
  4. Side panels (left and right)
  5. Front fenders

1. Check the fuses.
   (Main, ignition and radiator fan motor)
   Refer to “CHECKING THE FUSES” on page 9-84.
   NG → Replace the fuse(s).

2. Check the battery.
   Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-85.
   NG → • Clean the battery terminals.
   • Recharge or replace the battery.

3. Check the main switch.
   Refer to “CHECKING THE SWITCHES” on page 9-81.
   NG → Replace the main switch.

4. Check the radiator fan motor.
   Refer to “CHECKING THE RADIATOR FAN MOTOR” on page 9-94.
   NG → The radiator fan motor is faulty and must be replaced.

5. Check the radiator fan motor relay.
   Refer to “CHECKING THE RELAYS” on page 9-88.
   NG → Replace the radiator fan motor relay.

6. Check the radiator fan motor circuit breaker.
   Refer to “CHECKING THE RADIATOR FAN MOTOR CIRCUIT BREAKER” on page 9-95.
   NG → Replace the radiator fan motor circuit breaker.

7. Check the coolant temperature sensor.
   Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 9-95.
   NG → Replace the coolant temperature sensor.
8. Check the entire cooling system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-25.

NG →
Properly connect or repair the cooling system wiring.

OK ↓
Replace the ECU.
1. Crankshaft position sensor
2. Main switch
3. Main fuse
4. Battery
5. Fuel injection system fuse
6. Engine ground
7. Joint coupler
8. Fuel injection system relay
9. Yamaha diagnostic tool coupler
10. ISC (Idle Speed Control) unit
11. ECU (Engine Control Unit)
12. Ignition coil
13. Spark plug
14. Fuel injector
15. Intake air temperature sensor
16. Coolant temperature sensor
17. Speed sensor
18. TPS (throttle position sensor)
19. Intake air pressure sensor
20. Lean angle sensor
21. Air induction system solenoid
22. Gear position switch
23. Multi-function meter
24. Engine trouble warning light
25. Fuel pump
26. Engine stop switch
27. Ignition fuse
28. Radiator fan motor relay
29. Frame ground
30. Wire harness
31. Negative battery sub-wire harness
ECU SELF-DIAGNOSTIC FUNCTION
The ECU 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.

- To inform the rider that the fuel injection system is not functioning, the engine trouble warning light comes on or 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 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 multi-function meter display. Once a fault code has been displayed, it remains stored in the memory of the ECU until it is deleted.

Engine trouble warning light indication and fuel injection system operation

<table>
<thead>
<tr>
<th>Warning light indication</th>
<th>ECU 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
39: Fuel injector (open or short-circuit)
30: Lean angle sensor (latch up detected)
41: Lean angle sensor (open or short-circuit)
33: Faulty ignition
50: ECU internal malfunction (faulty ECU memory)

Checking for a defective engine trouble warning light bulb
The engine trouble warning light comes on for around 2 seconds after the main switch has been turned to “ ” (on). If the warning light does not come on under these conditions, the warning light (LED) may be defective.

ECU detects an abnormal signal from a sensor
If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU 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 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.

TROUBLESHOOTING METHOD

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 or Yamaha diagnostic tool.
   b. Identify the faulty system with the fault code.
   c. Identify the probable cause of the malfunction.

2. Check and repair the probable cause of malfunction.

<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 (FUEL INJECTION SYSTEM)” on page 9-35. Monitor the operation of the sensors and actuators in the diagnostic mode. Refer to “TROUBLESHOOTING DETAILS (FUEL INJECTION SYSTEM)” on page 9-35 and “SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE” on page 10-7.</td>
<td>Check and repair.</td>
</tr>
</tbody>
</table>

3. Perform the reinstatement action for the fuel injection system.
   Refer to “Confirmation of service completion” of table in “TROUBLESHOOTING DETAILS (FUEL INJECTION SYSTEM)” on page 9-35.

4. Turn the main switch to “ ” (off) and back to “ ” (on), then check that no fault code number is displayed.

   **TIP**

   If another fault code are displayed, repeat steps (1) to (4) until no fault code number is displayed.

5. Erase the malfunction history in the diagnostic mode (code No. 62). Refer to “SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE” on page 10-7.

   **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 the following sensors and actuators in the diagnostic mode.
   Refer to “TROUBLESHOOTING DETAILS (FUEL INJECTION SYSTEM)” on page 9-35 and “SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE” on page 10-7.

   01: Throttle position sensor signal (throttle angle)
   30: Ignition coil
   36: Fuel injector
   48: Air induction system solenoid

   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 inner parts of the engine.

YAMAHA DIAGNOSTIC TOOL

This model uses the Yamaha diagnostic tool to identify malfunctions.
For information about using the Yamaha diagnostic tool, refer to the operation manual that is included with the tool.

**Features of the Yamaha diagnostic tool**

You can use the Yamaha diagnostic tool to identify malfunctions quicker than with conventional methods.

By connecting the adapter interface, which is connected to the USB port of a computer, to a vehicle’s ECU using the communication cable, you can display information that is necessary for identifying malfunctions and for maintenance to display on the computer. The displayed information includes the sensor output data and information recorded in the ECU.

**Functions of the Yamaha diagnostic tool**

- **Fault diagnosis mode:** Fault codes recorded on the ECU are read, and the contents are displayed.
- **Function diagnostic mode:** Check the operation of the output value of each sensor and actuator.
- **Inspection mode:** Determine whether each sensor or actuator is functioning properly.
- **Monitoring mode:** Displays a graph of sensor output values for actual operating conditions.
- **Logging mode:** Records and saves the sensor output value in actual driving conditions.
- **View log:** Displays the logging data.
- **ECU rewrite:** If necessary, the ECU is rewritten using ECU rewrite data provided by Yamaha. Ignition timing adjustment, etc. cannot be changed from the vehicle’s original state.

However, the diagnostic tool cannot be used to freely change the basic vehicle functions, such as adjusting the ignition timing.

**Connecting the Yamaha diagnostic tool**

Remove the protective cap, and then connect the Yamaha diagnostic tool to the coupler “1”.

---

**TIP**

When the Yamaha diagnostic tool is connected to the vehicle, the operation of the multi-function meter and indicators will be different from the normal operation.
Operation of the Yamaha diagnostic tool (Malfunction mode)

Malfunction results are displayed in the top part of the window area.

1. Recovered
   - The item list of the malfunction detected in the past (already recovered) are displayed.

2. Detected
   - The item list of the malfunction currently occurred are displayed.

3. Code
   - The following icons and the fault code numbers for the detected malfunctions are displayed.

   A. Detected malfunction
   B. Recovered malfunction

4. ECU
   - The types of the control units are displayed.
5. **Item**
   The item names of the detected malfunction are displayed.

6. **Condition**
   The current conditions are displayed. (Detected/Recovered)

7. **Symptom**
   The symptoms of the detected malfunction are displayed.

8. **Diagnosis code**
   The diagnosis codes related to the detected malfunction are displayed.

9. **FFD (only for models that can display freeze frame data)**
   The mark “□” is displayed when the freeze frame data is available.

10. **ECU conduction time (hour: minute: second)**
    The total ECU conduction time (total hours the vehicle’s main switch was ON) when the malfunction was detected is displayed.

11. **Number of main switch operation after detection**
    The number of times the main switch was turned on between the malfunction detection and code reading is displayed.

12. **Number of occurrences**
    The number of malfunction occurrences between the malfunction detection and code reading is displayed.

---

**TROUBLESHOOTING DETAILS (FUEL INJECTION SYSTEM)**

This section describes the measures per fault code number displayed on the Yamaha diagnostic tool or multi-function meter display. 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 has been completed, reset the Yamaha diagnostic tool or multi-function meter display according to the “Confirmation of service completion”.

**Fault code No.:**
Fault code number displayed on the Yamaha diagnostic tool or multi-function meter when the engine failed to work normally.

**Diagnostic code No.:**
Diagnostic code number to be used when the diagnostic mode is operated.

Refer to “SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE” on page 10-7.

### Fault code No. 12

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
<td>Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.</td>
</tr>
<tr>
<td><strong>Fail-safe system</strong></td>
<td>Unable to start engine</td>
</tr>
<tr>
<td></td>
<td>Unable to drive vehicle</td>
</tr>
<tr>
<td><strong>Diagnostic code No.</strong></td>
<td>—</td>
</tr>
<tr>
<td><strong>Indicated</strong></td>
<td>—</td>
</tr>
<tr>
<td><strong>Procedure</strong></td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
</table>

---

9-35
### FUEL INJECTION SYSTEM

#### Fault code No. 12

<table>
<thead>
<tr>
<th>Item</th>
<th>Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connection of crankshaft position sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins). Improperly connected → Connect the coupler securely or replace the wire harness. Crack the engine. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.</td>
</tr>
<tr>
<td>2</td>
<td>Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins). Improperly connected → Connect the coupler securely or replace the wire harness. Crack the engine. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.</td>
</tr>
<tr>
<td>3</td>
<td>Wire harness continuity. Open or short circuit → Replace the wire harness. Between crankshaft position sensor coupler and ECU coupler. gray–gray Between crankshaft position sensor coupler and joint coupler. black/blue–black/blue Between joint coupler and ECU coupler. black/blue–black/blue Crack the engine. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.</td>
</tr>
<tr>
<td>4</td>
<td>Installed condition of crankshaft position sensor. Check for looseness or pinching. Improperly installed sensor → Reinstall or replace the sensor. Crack the engine. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.</td>
</tr>
<tr>
<td>5</td>
<td>Defective crankshaft position sensor. Check the crankshaft position sensor. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 9-91. Replace if defective. Crack the engine. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 6.</td>
</tr>
<tr>
<td>6</td>
<td>Malfunction in ECU. Replace the ECU.</td>
</tr>
</tbody>
</table>

#### Fault code No. 13

**TIP**

If fault code numbers “13” and “14” are both indicated, take the actions specified for fault code number “13” first.

<table>
<thead>
<tr>
<th>Item</th>
<th>Intake air pressure sensor: open or short circuit detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail-safe system</td>
<td>Able to start engine</td>
</tr>
<tr>
<td></td>
<td>Able to drive vehicle</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>03</td>
</tr>
</tbody>
</table>
### Fault code No. 13

#### Item
Intake air pressure sensor: open or short circuit detected.

#### Indicated
Displays the intake air pressure.

#### Procedure
Set the engine stop switch to “( )”, and then operate the throttle while pushing the start switch “( )”. (If the display value changes, the performance is OK.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connection of intake air pressure sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to “( )” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.</td>
</tr>
<tr>
<td>2</td>
<td>Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to “( )” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.</td>
</tr>
<tr>
<td>3</td>
<td>Wire harness continuity.</td>
<td>Open or short circuit → Replace the wire harness. Between intake air pressure sensor coupler and ECU coupler. pink–pink Between intake air pressure sensor coupler and joint coupler. blue–blue black/blue–black/blue Between joint coupler and ECU coupler. blue–blue black/blue–black/blue</td>
<td>Turn the main switch to “( )” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.</td>
</tr>
<tr>
<td>4</td>
<td>Installed condition of intake air pressure sensor. Check for looseness or pinching.</td>
<td>Improperly installed sensor → Reinstall or replace the sensor.</td>
<td>Turn the main switch to “( )” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.</td>
</tr>
</tbody>
</table>
### Fault code No. 13

<table>
<thead>
<tr>
<th>Item</th>
<th>Intake air pressure sensor: open or short circuit detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Defective intake air pressure sensor.</td>
</tr>
<tr>
<td></td>
<td>Execute the diagnostic mode.</td>
</tr>
<tr>
<td></td>
<td>(Code No. 03)</td>
</tr>
<tr>
<td></td>
<td>When engine is stopped:</td>
</tr>
<tr>
<td></td>
<td>Atmospheric pressure at the current altitude and weather</td>
</tr>
<tr>
<td></td>
<td>conditions is indicated.</td>
</tr>
<tr>
<td></td>
<td>At sea level: Approx. 101 kPa (757.6 mmHg, 29.8 inHg)</td>
</tr>
<tr>
<td></td>
<td>1000 m (3300 ft) above sea level: Approx. 90 kPa (675.1</td>
</tr>
<tr>
<td></td>
<td>mmHg, 26.6 inHg)</td>
</tr>
<tr>
<td></td>
<td>2000 m (6700 ft) above sea level: Approx. 80 kPa (600.0</td>
</tr>
<tr>
<td></td>
<td>mmHg, 23.6 inHg)</td>
</tr>
<tr>
<td></td>
<td>3000 m (9800 ft) above sea level: Approx. 70 kPa (525.0</td>
</tr>
<tr>
<td></td>
<td>mmHg, 20.7 inHg)</td>
</tr>
<tr>
<td></td>
<td>When engine is cranking: Make sure that the indication</td>
</tr>
<tr>
<td></td>
<td>value changes.</td>
</tr>
<tr>
<td></td>
<td>The value does not change when engine is cranking.</td>
</tr>
<tr>
<td></td>
<td>Check the intake air pressure sensor.</td>
</tr>
<tr>
<td></td>
<td>Replace if defective.</td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on</td>
</tr>
<tr>
<td></td>
<td>page 9-97.</td>
</tr>
</tbody>
</table>

### Fault code No. 14

**TIP**

If fault code numbers “13” and “14” are both indicated, take the actions specified for fault code number “13” first.

<table>
<thead>
<tr>
<th>Item</th>
<th>Intake air pressure sensor: hose system malfunction (clogged or detached hose).</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Malfunction in ECU.</td>
</tr>
<tr>
<td></td>
<td>Replace the ECU.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Intake air pressure sensor: hose system malfunction (clogged or detached hose).</td>
</tr>
<tr>
<td>Fail-safe system</td>
<td>Able to start engine</td>
</tr>
<tr>
<td></td>
<td>Able to drive vehicle</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>03</td>
</tr>
<tr>
<td>Indicated</td>
<td>Displays the intake air pressure.</td>
</tr>
</tbody>
</table>
| Procedure       | Set the engine stop switch to “
|                 | ””, and then operate the throttle while |
|                 | pushing the start switch “(●)”. (If the display value changes, the performance is OK.) |
| Item            | Probable cause of malfunction and check |
| Maintenance job | |
| Confirmation of service completion | |
### Fault code No. 15

**TIP**
If fault code numbers “15” and “16” are both indicated, take the actions specified for fault code number “15” first.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Throttle position sensor: open or short circuit detected.</td>
</tr>
<tr>
<td>Fail-safe system</td>
<td>Able to start engine</td>
</tr>
<tr>
<td></td>
<td>Able to drive vehicle</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>01</td>
</tr>
<tr>
<td>Indicated</td>
<td>Throttle position sensor signal</td>
</tr>
<tr>
<td></td>
<td>• 14–20 (fully closed position)</td>
</tr>
<tr>
<td>Procedure</td>
<td>Check with throttle valve fully closed.</td>
</tr>
<tr>
<td>Item</td>
<td>Probable cause of malfunction and check</td>
</tr>
<tr>
<td>Maintenance job</td>
<td></td>
</tr>
<tr>
<td>Confirmation of service completion</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Throttle position sensor: open or short circuit detected.</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
</tr>
<tr>
<td>2</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
</tr>
<tr>
<td>3</td>
<td>Open or short circuit → Replace the wire harness. Between throttle position sensor coupler and ECU coupler. yellow–yellow Between throttle position sensor coupler and joint coupler. blue–blue Between joint coupler and ECU coupler. blue–blue black/blue–black/blue</td>
</tr>
<tr>
<td>4</td>
<td>Improperly installed sensor → Reinstall or adjust the sensor. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-7.</td>
</tr>
<tr>
<td>5</td>
<td>Measure the throttle position sensor resistance. Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 9-96.</td>
</tr>
<tr>
<td>6</td>
<td>Check throttle position sensor signal. Execute the diagnostic mode. (Code No. 01) When the throttle valve is fully closed: A value of 14–20 is indicated. An indicated value is out of the specified range → Replace the throttle position sensor.</td>
</tr>
<tr>
<td>7</td>
<td>Replace the ECU.</td>
</tr>
</tbody>
</table>

**Fault code No. 15**

<table>
<thead>
<tr>
<th>Item</th>
<th>Throttle position sensor: open or short circuit detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connection of throttle position sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
</tr>
<tr>
<td>2</td>
<td>Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
</tr>
<tr>
<td>3</td>
<td>Wire harness continuity.</td>
</tr>
<tr>
<td>4</td>
<td>Installed condition of throttle position sensor. Check for looseness or pinching.</td>
</tr>
<tr>
<td>5</td>
<td>Throttle position sensor resistance.</td>
</tr>
<tr>
<td>6</td>
<td>Defective throttle position sensor.</td>
</tr>
<tr>
<td>7</td>
<td>Malfunction in ECU.</td>
</tr>
</tbody>
</table>
### Fault code No. 16

**TIP**
- If fault code numbers “15” and “16” are both indicated, take the actions specified for fault code number “15” first.
- If fault code numbers “16” and “37” are both indicated, take the actions specified for fault code number “16” first.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throttle position sensor: stuck throttle position sensor is detected.</td>
<td></td>
</tr>
<tr>
<td><strong>Fail-safe system</strong></td>
<td></td>
</tr>
<tr>
<td>Able to start engine</td>
<td></td>
</tr>
<tr>
<td>Able to drive vehicle</td>
<td></td>
</tr>
<tr>
<td><strong>Diagnostic code No.</strong></td>
<td>01</td>
</tr>
<tr>
<td>Throttle position sensor signal</td>
<td></td>
</tr>
<tr>
<td>• 14–20 (fully closed position)</td>
<td></td>
</tr>
<tr>
<td><strong>Procedure</strong></td>
<td>Check with throttle valve fully closed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Installed condition of throttle position sensor. Check for looseness or pinch- ing.</td>
<td>Improperly installed sensor → Reinstall or adjust the sensor. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-7.</td>
<td>Turn the main switch to &quot; &quot; (on), then push the throttle le- ver. Fault code number is not dis- played → Service is finished. Fault code number is displayed → Go to item 2.</td>
</tr>
<tr>
<td>2</td>
<td>Defective throttle position sensor.</td>
<td>Check throttle position sensor signal. Execute the diagnostic mode. (Code No. 01) When the throttle valve is fully closed: A value of 14–20 is indicated. An indicated value is out of the specified range → Replace the throttle position sensor.</td>
<td>Turn the main switch to &quot; &quot; (on), then operate the throttle. Fault code number is not dis- played → Service is finished. Fault code number is displayed → Go to item 3.</td>
</tr>
<tr>
<td>3</td>
<td>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>

### Fault code No. 21

**TIP**
If fault code numbers “21” and “37” are both indicated, take the actions specified for fault code number “21” first.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coolant temper- ature sensor: open or short circuit detected.</td>
<td></td>
</tr>
<tr>
<td><strong>Fail-safe system</strong></td>
<td></td>
</tr>
<tr>
<td>Able to start engine</td>
<td></td>
</tr>
<tr>
<td>Able to drive vehicle</td>
<td></td>
</tr>
<tr>
<td><strong>Diagnostic code No.</strong></td>
<td>06</td>
</tr>
<tr>
<td>Displays the coolant temperature.</td>
<td></td>
</tr>
<tr>
<td><strong>Procedure</strong></td>
<td>Compare the actually measured coolant temperature with the indicated value.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
</table>
Fault code No. 22

TIP

If fault code numbers “22” and “37” are both indicated, take the actions specified for fault code number “22” first.

---

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Coolant temperature sensor: open or short circuit detected.</td>
</tr>
<tr>
<td>1</td>
<td>Connection of coolant temperature sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins). Improperly connected → Connect the coupler securely or replace the wire harness. Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.</td>
</tr>
<tr>
<td>2</td>
<td>Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins). Improperly connected → Connect the coupler securely or replace the wire harness. Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.</td>
</tr>
<tr>
<td>3</td>
<td>Wire harness continuity. Open or short circuit → Replace the wire harness. Between coolant temperature sensor coupler and ECU coupler. green/yellow–green/yellow Between coolant temperature sensor coupler and joint coupler. black/blue–black/blue Between joint coupler and ECU coupler. black/blue–black/blue Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.</td>
</tr>
<tr>
<td>4</td>
<td>Installed condition of coolant temperature sensor. Check for looseness or pinching. Improperly installed sensor → Reinstall or replace the sensor. Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.</td>
</tr>
<tr>
<td>5</td>
<td>Defective coolant temperature sensor. Execute the diagnostic mode. (Code No. 06) When engine is cold: Displayed temperature is close to the ambient temperature. The displayed temperature is not close to the ambient temperature → Check the coolant temperature sensor. Replace if defective. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 9-95. Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 6.</td>
</tr>
<tr>
<td>6</td>
<td>Malfunction in ECU. Replace the ECU.</td>
</tr>
<tr>
<td>Fault code No.</td>
<td>22</td>
</tr>
<tr>
<td>---------------</td>
<td>--</td>
</tr>
<tr>
<td>Item</td>
<td>Intake air temperature sensor: open or short circuit detected.</td>
</tr>
<tr>
<td>Fail-safe system</td>
<td>Able to start engine</td>
</tr>
<tr>
<td></td>
<td>Able to drive vehicle</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>05</td>
</tr>
<tr>
<td>Indicated</td>
<td>Displays the intake air temperature.</td>
</tr>
<tr>
<td>Procedure</td>
<td>Compare the actually measured intake air temperature with the indicated value.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connection of intake air temperature sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.</td>
</tr>
<tr>
<td>2</td>
<td>Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.</td>
</tr>
<tr>
<td>3</td>
<td>Wire harness continuity.</td>
<td>Open or short circuit → Replace the wire harness. Between intake air temperature sensor coupler and ECU coupler. brown/white–brown/white Between intake air temperature sensor coupler and joint coupler. black/blue–black/blue Between joint coupler and ECU coupler. black/blue–black/blue</td>
<td>Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.</td>
</tr>
<tr>
<td>4</td>
<td>Installed condition of intake air temperature sensor. Check for looseness or pinching.</td>
<td>Improperly installed sensor → Reinstall or replace the sensor.</td>
<td>Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.</td>
</tr>
</tbody>
</table>
**Fault code No. 22**

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Intake air temperature sensor: open or short circuit detected.</td>
</tr>
<tr>
<td>5</td>
<td>Defective intake air temperature sensor. Execute the diagnostic mode. (Code No. 05) When engine is cold: Displayed temperature is close to the ambient temperature. The displayed temperature is not close to the ambient temperature. → Check the intake air temperature sensor. Replace if defective. Refer to “CHECKING THE INTAKE AIR TEMPERATURE SENSOR” on page 9-97.</td>
</tr>
</tbody>
</table>

**Fault code No. 30**

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Latch up detected.</td>
</tr>
<tr>
<td>Fail-safe system</td>
<td>Unable to start engine</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>08</td>
</tr>
<tr>
<td>Indicated</td>
<td>Lean angle sensor output voltage</td>
</tr>
<tr>
<td>Procedure</td>
<td>Remove the lean angle sensor and incline it more than 65 degrees.</td>
</tr>
<tr>
<td>Item</td>
<td>Probable cause of malfunction and check</td>
</tr>
<tr>
<td>1</td>
<td>The vehicle has overturned.</td>
</tr>
<tr>
<td>2</td>
<td>Installed condition of lean angle sensor.</td>
</tr>
<tr>
<td>3</td>
<td>Defective lean angle sensor. Execute the diagnostic mode. (Code No. 08) An indicated value is out of the specified range → Check the lean angle sensor. Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 9-92.</td>
</tr>
<tr>
<td>4</td>
<td>Malfunction in ECU.</td>
</tr>
</tbody>
</table>
### Fault code No. 33

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connection of ignition coil connector. Check the locking condition of the connector. Disconnect the connector and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the connector securely or replace the wire harness.</td>
<td>Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.</td>
</tr>
<tr>
<td>2</td>
<td>Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.</td>
</tr>
<tr>
<td>3</td>
<td>Wire harness continuity.</td>
<td>Open or short circuit → Replace the wire harness. Between ignition coil connector and ECU coupler. orange–orange</td>
<td>Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.</td>
</tr>
<tr>
<td>4</td>
<td>Installed condition of ignition coil. Check for looseness or pinching.</td>
<td>Improperly installed ignition coil → Reinstall or replace the igni- tion coil.</td>
<td>Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.</td>
</tr>
<tr>
<td>5</td>
<td>Defective ignition coil.</td>
<td>Measure the primary coil resistance of the ignition coil. Replace if out of specification. Refer to “CHECKING THE IGNITION COIL” on page 9-91.</td>
<td>Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 6.</td>
</tr>
<tr>
<td>6</td>
<td>Malfunction in ECU.</td>
<td>Execute the diagnostic mode. (Code No. 30) No spark → Replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>
Fault code No. 37

TIP
- If fault code numbers “16” and “37” are both indicated, take the actions specified for fault code number “16” first.
- If fault code numbers “21” and “37” are both indicated, take the actions specified for fault code number “21” first.
- If fault code numbers “22” and “37” are both indicated, take the actions specified for fault code number “22” first.
- If fault code numbers “37” and “46” are both indicated, take the actions specified for fault code number “46” first.
- If fault code numbers “37” and “42” are both indicated, take the actions specified for fault code number “42” first.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>37</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item A</td>
<td>Component other than ISC (Idle Speed Control) unit is defective (ISC operating sound is heard).</td>
</tr>
<tr>
<td>Item B</td>
<td>Defective ISC (Idle Speed Control) unit (ISC operating sound is not heard).</td>
</tr>
<tr>
<td>Fail-safe system</td>
<td>Able to start engine</td>
</tr>
<tr>
<td></td>
<td>Able to drive vehicle</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>54</td>
</tr>
<tr>
<td>Actuation</td>
<td>Fully closes the ISC valve, and then opens the valve. This operation takes approximately 3 seconds. The “CHECK” indicator and “nesday” on the Yamaha diagnostic tool screen come on during the operation.</td>
</tr>
<tr>
<td>Procedure</td>
<td>The operating sound can be heard when ISC valve operates.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>Locate the malfunction.</td>
<td>Execute the diagnostic mode. (Code No. 54) Fully closes the ISC (Idle Speed Control) valve, and then fully opens the valve.</td>
<td>ISC operating sound is heard → Go to item A-2. ISC operating sound is not heard → Go to item B-2 for the defective ISC (Idle Speed Control) unit.</td>
</tr>
<tr>
<td>A-2</td>
<td>Incorrect speed sensor signal.</td>
<td>Check the speed sensor. Execute the diagnostic mode. (Code No. 07) Rotate the rear wheel by hand and check that the indicated value increases. Value does not increase → Go to fault code No. 42.</td>
<td>Start the engine and let it idle for approximately 10 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item A-3.</td>
</tr>
<tr>
<td>A-3</td>
<td>Throttle valve does not fully close.</td>
<td>Check the throttle body. Refer to “THROTTLE BODY” on page 7-4. Check the throttle cable. Refer to “ADJUSTING THE THROTTLE LEVER FREE PLAY” on page 3-33.</td>
<td>Start the engine and let it idle for approximately 10 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item A-4.</td>
</tr>
</tbody>
</table>
FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>37</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
<td></td>
</tr>
<tr>
<td><strong>A-4</strong></td>
<td>ISC valve is not moving correctly.</td>
</tr>
<tr>
<td><strong>A-5</strong></td>
<td>Malfunction in ECU.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>37</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
<td></td>
</tr>
<tr>
<td><strong>A</strong></td>
<td>Component other than ISC (Idle Speed Control) unit is defective (ISC operating sound is heard).</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Defective ISC (Idle Speed Control) unit (ISC operating sound is not heard).</td>
</tr>
</tbody>
</table>

### Fail-safe system

- Able to start engine
- Able to drive vehicle

### Diagnostic code No.

- 54

### Actuation

- Fully closes the ISC valve, and then opens the valve. This operation takes approximately 3 seconds. The “CHECK” indicator and “O” on the Yamaha diagnostic tool screen come on during the operation.

### Procedure

The operating sound can be heard when ISC valve operates.

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B-1</strong></td>
<td>Locate the malfunction.</td>
<td>Execute the diagnostic mode. (Code No. 54) Fully closes the ISC (Idle Speed Control) valve, and then fully opens the valve.</td>
<td>ISC operating sound is heard → Go to item A-2 for the component other than ISC (Idle Speed Control) unit is defective. ISC operating sound is not heard → Go to item B-2.</td>
</tr>
<tr>
<td><strong>B-2</strong></td>
<td>Connection of ISC (Idle Speed Control) unit coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-3.</td>
</tr>
<tr>
<td><strong>B-3</strong></td>
<td>Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-4.</td>
</tr>
</tbody>
</table>
### FUEL INJECTION SYSTEM

**Fault code No.** 37

<table>
<thead>
<tr>
<th>Item</th>
<th>Component other than ISC (Idle Speed Control) unit is defective (ISC operating sound is heard).</th>
<th>B-4 Wire harness continuity.</th>
<th>Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-5.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td>Open or short circuit → Replace the wire harness. Between ISC (Idle Speed Control) unit coupler and ECU coupler. red/green–red/green pink/blue–pink/blue white/green–white/green brown/blue–brown/blue</td>
<td>Execute the diagnostic mode.</td>
</tr>
<tr>
<td>B</td>
<td>Defective ISC (Idle Speed Control) unit (ISC operating sound is not heard).</td>
<td>Between ISC (Idle Speed Control) unit coupler and joint coupler. red/white–red/white red/white–red/white</td>
<td>Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-6.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-6.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Installed condition of ISC (Idle Speed Control) unit. Check for looseness or pinching.</th>
<th>B-5 Improperly installed ISC (Idle Speed Control) unit → Reinstall the ISC (Idle Speed Control) unit.</th>
<th>Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-6.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-5</td>
<td></td>
<td>Replace the throttle body assembly.</td>
<td>Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-6.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item B-8. ISC operating sound is not heard → Go to item B-6.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Malfunction in ECU.</th>
<th>Replace the ECU.</th>
<th>Start the engine and let it idle for approximately 10 seconds. Check that the fault code number is not displayed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Item | Delete the fault code. | | |
|------|------------------------| | |
| B-8  |                        | | |

**Fault code No. 39**

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>39</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Fuel injector: open or short circuit detected.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fail-safe system</th>
<th>Unable to start engine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unable to drive vehicle</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuation</td>
<td>Actuates fuel injector five times at one-second intervals. The “CHECK” indicator and “🔥” on the Yamaha diagnostic tool screen come on each time the fuel injector is actuated.</td>
</tr>
</tbody>
</table>

| Procedure | Disconnect the fuel pump coupler, and then check that fuel injector is actuated five times by listening for the operating sound. |

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fault code No. 41

Fault code No. 41

<table>
<thead>
<tr>
<th>Item</th>
<th>Lean angle sensor: open or short circuit detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail-safe system</td>
<td>Unable to start engine</td>
</tr>
<tr>
<td></td>
<td>Unable to drive vehicle</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>08</td>
</tr>
<tr>
<td>Indicated</td>
<td>Lean angle sensor output voltage</td>
</tr>
<tr>
<td></td>
<td>• 3.6–4.4 (upright)</td>
</tr>
<tr>
<td></td>
<td>• 0.7–1.3 (overturned)</td>
</tr>
<tr>
<td>Procedure</td>
<td>Remove the lean angle sensor and incline it more than 65 degrees.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Lean angle sensor output voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 3.6–4.4 (upright)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 0.7–1.3 (overturned)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Fault code No. 41

<table>
<thead>
<tr>
<th>Item</th>
<th>Lean angle sensor: open or short circuit detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connection of lean angle sensor coupler.</td>
</tr>
<tr>
<td></td>
<td>Check the locking condition of the coupler.</td>
</tr>
<tr>
<td></td>
<td>Disconnect the coupler and check the pins</td>
</tr>
<tr>
<td></td>
<td>(bent or broken terminals and locking condition of the pins).</td>
</tr>
<tr>
<td></td>
<td>Turn the main switch to “ ” (on), then to “ ” (off), and then back to “ ” (on).</td>
</tr>
<tr>
<td></td>
<td>Fault code number is not displayed → Service is finished.</td>
</tr>
<tr>
<td></td>
<td>Fault code number is displayed → Go to item 2.</td>
</tr>
<tr>
<td>2</td>
<td>Connection of ECU coupler.</td>
</tr>
<tr>
<td></td>
<td>Check the locking condition of the coupler.</td>
</tr>
<tr>
<td></td>
<td>Disconnect the coupler and check the pins</td>
</tr>
<tr>
<td></td>
<td>(bent or broken terminals and locking condition of the pins).</td>
</tr>
<tr>
<td></td>
<td>Turn the main switch to “ ” (on), then to “ ” (off), and then back to “ ” (on).</td>
</tr>
<tr>
<td></td>
<td>Fault code number is not displayed → Service is finished.</td>
</tr>
<tr>
<td></td>
<td>Fault code number is displayed → Go to item 3.</td>
</tr>
<tr>
<td>3</td>
<td>Wire harness continuity.</td>
</tr>
<tr>
<td></td>
<td>Open or short circuit → Replace the wire harness.</td>
</tr>
<tr>
<td></td>
<td>Between lean angle sensor coupler and ECU coupler.</td>
</tr>
<tr>
<td></td>
<td>yellow/green–yellow/green</td>
</tr>
<tr>
<td></td>
<td>Between lean angle sensor coupler and joint coupler.</td>
</tr>
<tr>
<td></td>
<td>blue–blue</td>
</tr>
<tr>
<td></td>
<td>black/blue–black/blue</td>
</tr>
<tr>
<td></td>
<td>Between joint coupler and ECU coupler.</td>
</tr>
<tr>
<td></td>
<td>blue–blue</td>
</tr>
<tr>
<td></td>
<td>black/blue–black/blue</td>
</tr>
<tr>
<td></td>
<td>Turn the main switch to “ ” (on), then to “ ” (off), and then back to “ ” (on).</td>
</tr>
<tr>
<td></td>
<td>Fault code number is not displayed → Service is finished.</td>
</tr>
<tr>
<td></td>
<td>Fault code number is displayed → Go to item 4.</td>
</tr>
<tr>
<td>4</td>
<td>Defective lean angle sensor.</td>
</tr>
<tr>
<td></td>
<td>Execute the diagnostic mode.</td>
</tr>
<tr>
<td></td>
<td>(Code No. 08)</td>
</tr>
<tr>
<td></td>
<td>An indicated value is out of the specified range → Check the lean angle sensor.</td>
</tr>
<tr>
<td></td>
<td>Replace if defective.</td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 9-92.</td>
</tr>
<tr>
<td></td>
<td>Turn the main switch to “ ” (on), then to “ ” (off), and then back to “ ” (on).</td>
</tr>
<tr>
<td></td>
<td>Fault code number is not displayed → Service is finished.</td>
</tr>
<tr>
<td></td>
<td>Fault code number is displayed → Go to item 5.</td>
</tr>
<tr>
<td>5</td>
<td>Malfunction in ECU.</td>
</tr>
<tr>
<td></td>
<td>Replace the ECU.</td>
</tr>
</tbody>
</table>

**Fault code No. 42**

**TIP**

If fault code numbers “37” and “42” are both indicated, take the actions specified for fault code number “42” first.
### FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Speed sensor: no normal signals are received from the speed sensor.</td>
</tr>
<tr>
<td>Procedure</td>
<td>Check that the number increases when the rear wheels are rotated. The number is cumulative and does not reset each time the wheel is stopped.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connection of speed sensor coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to “[]” (on), and then rotate the rear wheel by hand. Fault code number is not displayed → Go to item 6. Fault code number is displayed → Go to item 2.</td>
</tr>
<tr>
<td>2</td>
<td>Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to “[]” (on), and then rotate the rear wheel by hand. Fault code number is not displayed → Go to item 6. Fault code number is displayed → Go to item 3.</td>
</tr>
<tr>
<td>3</td>
<td>Wire harness continuity. Open or short circuit → Replace the wire harness. Between speed sensor coupler and joint coupler. white–white Between joint coupler and ECU coupler. white–white Between speed sensor coupler and joint coupler. blue–blue black/blue–black/blue Between joint coupler and ECU coupler. blue–blue black/blue–black/blue</td>
<td></td>
<td>Turn the main switch to “[]” (on), and then rotate the rear wheel by hand. Fault code number is not displayed → Go to item 6. Fault code number is displayed → Go to item 4.</td>
</tr>
<tr>
<td>4</td>
<td>Defective speed sensor. Execute the diagnostic mode. (Code No. 07) While the rear wheels and stopped, check that the indicated value does not change. Rotate the rear wheel by hand and check that the indicated value increases. Malfunction → Replace the speed sensor.</td>
<td></td>
<td>Turn the main switch to “[]” (on), and then rotate the rear wheel by hand. Fault code number is not displayed → Go to item 6. Fault code number is displayed → Go to item 5.</td>
</tr>
<tr>
<td>5</td>
<td>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Delete the fault code.</td>
<td></td>
<td>Start the engine, and input the vehicle speed signals by operating the vehicle at 20 to 30 km/h (12 to 19 mph). Check that the fault code number is not displayed.</td>
</tr>
</tbody>
</table>
### Fault code No. 43

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>43</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
<td>Fuel system voltage: incorrect voltage supplied to the fuel injector and fuel pump.</td>
</tr>
<tr>
<td></td>
<td>Fail-safe system: Able to start engine and able to drive vehicle</td>
</tr>
<tr>
<td><strong>Diagnostic code No.</strong></td>
<td>09, 50</td>
</tr>
<tr>
<td>09</td>
<td>Indicated: Fuel system voltage (battery voltage) Approximately 12.0</td>
</tr>
<tr>
<td><strong>Procedure</strong></td>
<td>Turn the main switch to ” ” (on), and then compare the actually measured battery voltage with the display value. (If the actually measured battery voltage is low, recharge the battery.)</td>
</tr>
<tr>
<td></td>
<td>Actuation: Actuates the fuel injection system relay five times at one-second intervals. The “CHECK” indicator and “ ” on the Yamaha diagnostic tool screen come on each time the relay is actuated. (When the relay is on, the “CHECK” indicator and “ ” on the Yamaha diagnostic tool screen go off. When the relay is off, the “CHECK” indicator and “ ” on the Yamaha diagnostic tool screen come on.)</td>
</tr>
<tr>
<td><strong>Procedure</strong></td>
<td>Check that the fuel injection system relay is actuated five times by listening for the operating sound.</td>
</tr>
<tr>
<td><strong>Item</strong></td>
<td>Probable cause of malfunction and check</td>
</tr>
<tr>
<td>1</td>
<td>Connection of fuel injection system relay coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
</tr>
</tbody>
</table>
| 2             | Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely or replace the wire harness. | Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.
### Fault code No. 43

<table>
<thead>
<tr>
<th>Item</th>
<th>Fuel system voltage: incorrect voltage supplied to the fuel injector and fuel pump.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Wire harness continuity. Open or short circuit → Replace the wire harness. Between fuel injection system relay coupler and ECU coupler. blue/red–blue/red Between fuel injection system relay coupler and joint coupler. red/blue–red/blue Between joint coupler and ECU coupler. red/blue–red/blue Between fuel injection system relay coupler and starter relay coupler. brown/black–brown/black Between fuel injection system relay coupler and joint coupler. red/black–red/black Between joint coupler and handlebar switch (left). red/black–red/black</td>
</tr>
<tr>
<td></td>
<td>Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.</td>
</tr>
</tbody>
</table>

### Fault code No. 44

<table>
<thead>
<tr>
<th>Item</th>
<th>EEPROM fault code number: an error is detected while reading or writing on EEPROM.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Able to start engine</td>
</tr>
<tr>
<td></td>
<td>Able to drive vehicle</td>
</tr>
<tr>
<td></td>
<td>The fault code No. 44 detected EEPROM errors are indicated. 00 indication: Normal status</td>
</tr>
</tbody>
</table>

### Procedure

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Locate the malfunction.</td>
<td>Execute the diagnostic mode. (Code No. 60)</td>
<td>—</td>
</tr>
<tr>
<td>2</td>
<td>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td>—</td>
</tr>
</tbody>
</table>
Fault code No. 46

**TIP**

If fault code numbers “37” and “46” are both indicated, take the actions specified for fault code number “46” first.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>46</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Charging voltage is abnormal.</td>
</tr>
<tr>
<td>Fail-safe system</td>
<td>Able to start engine</td>
</tr>
<tr>
<td></td>
<td>Able to drive vehicle</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>—</td>
</tr>
<tr>
<td>Indicated</td>
<td>—</td>
</tr>
<tr>
<td>Procedure</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Malfunction in charging system.</td>
<td>Check the charging system. Refer to “CHARGING SYSTEM” on page 9-11. Defective rectifier/regulator or AC magneto → Replace. Defective connection in the charging system circuit → Properly connect or replace the wire harness.</td>
<td>Start the engine and let it idle for approximately 5 seconds. Fault code number is not displayed → Service is finished. Fault code number is displayed → Repeat the maintenance job.</td>
</tr>
</tbody>
</table>

Fault code No. 50

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Faulty ECU (Engine Control Unit) memory. (When this malfunction is detected in the ECU, the fault code number might not appear.)</td>
</tr>
<tr>
<td>Fail-safe system</td>
<td>Unable to start engine</td>
</tr>
<tr>
<td></td>
<td>Unable to drive vehicle</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>—</td>
</tr>
<tr>
<td>Indicated</td>
<td>—</td>
</tr>
<tr>
<td>Procedure</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td>Turn the main switch to “▌” (on). Check that the fault code number is not displayed.</td>
</tr>
</tbody>
</table>

Fault code No. Er-1

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Er-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>ECU (Engine Control Unit) internal malfunction (output signal error): signals cannot be transmitted between the ECU and the multi-function meter.</td>
</tr>
<tr>
<td>Fail-safe system</td>
<td>Able to start engine (unable when ECU is malfunctioning)</td>
</tr>
<tr>
<td></td>
<td>Able to drive vehicle (unable when ECU is malfunctioning)</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>—</td>
</tr>
</tbody>
</table>
### Fault code No. Er-1

**Fault code No.** Er-1

**Item**
- ECU (Engine Control Unit) internal malfunction (output signal error): signals cannot be transmitted between the ECU and the multi-function meter.

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to “” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to “” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Open or short circuit → Replace the wire harness. Between meter assembly coupler and ECU coupler. yellow/blue–yellow/blue</td>
<td>Turn the main switch to “” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Replace the meter assembly.</td>
<td>Turn the main switch to “” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Replace the ECU.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Fault code No. Er-2

**Fault code No.** Er-2

**Item**
- ECU (Engine Control Unit) internal malfunction (output signal error): no signals are received from the ECU within the specified duration.

<table>
<thead>
<tr>
<th>Fail-safe system</th>
<th>Able to start engine</th>
<th>Able to drive vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diagnostic code No.</strong></td>
<td>—</td>
<td></td>
</tr>
<tr>
<td><strong>Indicated</strong></td>
<td>—</td>
<td></td>
</tr>
<tr>
<td><strong>Procedure</strong></td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
## FUEL INJECTION SYSTEM

### Fault code No. Er-2

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connection of meter assembly coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Wire harness continuity.</td>
<td>Open or short circuit → Replace the wire harness. Between meter assembly coupler and ECU coupler. yellow/blue–yellow/blue</td>
<td>Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Defective meter assembly.</td>
<td>Replace the meter assembly.</td>
<td>Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Fault code No. Er-3

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connection of meter assembly coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to “ ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.</td>
<td></td>
</tr>
</tbody>
</table>
## FUEL INJECTION SYSTEM

### Fault code No. Er-3

<table>
<thead>
<tr>
<th>Item</th>
<th>ECU (Engine Control Unit) internal malfunction (output signal error): data from the ECU cannot be received correctly.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
</tr>
<tr>
<td></td>
<td>Turn the main switch to “ı” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.</td>
</tr>
<tr>
<td>3</td>
<td>Wire harness continuity.</td>
</tr>
<tr>
<td></td>
<td>Turn the main switch to “ı” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.</td>
</tr>
<tr>
<td>4</td>
<td>Defective meter assembly.</td>
</tr>
<tr>
<td></td>
<td>Turn the main switch to “ı” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.</td>
</tr>
<tr>
<td>5</td>
<td>Malfunction in ECU.</td>
</tr>
</tbody>
</table>

### Fault code No. Er-4

<table>
<thead>
<tr>
<th>Item</th>
<th>ECU (Engine Control Unit) internal malfunction (input signal error): non-registered data has been received from the meter assembly.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail-safe system</td>
<td>Able to start engine</td>
</tr>
<tr>
<td></td>
<td>Able to drive vehicle</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>—</td>
</tr>
<tr>
<td>Indicated</td>
<td>—</td>
</tr>
<tr>
<td>Procedure</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Probable cause of malfunction and check</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connection of meter assembly coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to “ı” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.</td>
</tr>
<tr>
<td>2</td>
<td>Connection of ECU coupler. Check the locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to “ı” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3.</td>
</tr>
</tbody>
</table>
### Fault Code No. Er-4

<table>
<thead>
<tr>
<th>Item</th>
<th>ECU (Engine Control Unit) internal malfunction (input signal error): non-registered data has been received from the meter assembly.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Wire harness continuity.</td>
<td>Open or short circuit → Replace the wire harness. Between meter assembly coupler and ECU coupler. yellow/blue–yellow/blue</td>
</tr>
<tr>
<td></td>
<td>Turn the main switch to “ [] ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4.</td>
</tr>
<tr>
<td>4 Defective meter assembly.</td>
<td>Replace the meter assembly.</td>
</tr>
<tr>
<td></td>
<td>Turn the main switch to “ [] ” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 5.</td>
</tr>
<tr>
<td>5 Malfunction in ECU.</td>
<td>Replace the ECU.</td>
</tr>
</tbody>
</table>
4. Main switch
5. Main fuse
6. Battery
7. Fuel injection system fuse
9. Engine ground
11. Joint coupler
12. Fuel injection system relay
16. ECU (Engine Control Unit)
40. Fuel pump
46. Engine stop switch
61. Ignition fuse
66. Frame ground 1
A. Wire harness
B. Negative battery sub-wire harness
### FUEL PUMP SYSTEM

**TROUBLESHOOTING**

If the fuel pump fails to operate.

**TIP**

- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Top cover
  4. Side panels (left and right)
  5. Rear fender

<table>
<thead>
<tr>
<th>Step</th>
<th>NG →</th>
<th>OK ↓</th>
<th>NG →</th>
<th>OK ↓</th>
<th>NG →</th>
<th>OK ↓</th>
<th>NG →</th>
<th>OK ↓</th>
<th>NG →</th>
<th>OK ↓</th>
<th>NG →</th>
<th>OK ↓</th>
<th>NG →</th>
<th>OK ↓</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check the fuses. (Main, ignition and fuel injection system) Refer to &quot;CHECKING THE FUSES&quot; on page 9-84.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Replace the fuse(s).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Check the battery. Refer to &quot;CHECKING AND CHARGING THE BATTERY&quot; on page 9-85.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Clean the battery terminals. • Recharge or replace the battery.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Check the main switch. Refer to &quot;CHECKING THE SWITCHES&quot; on page 9-81.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Replace the main switch.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Check the engine stop switch. Refer to &quot;CHECKING THE SWITCHES&quot; on page 9-81.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The engine stop switch is faulty. Replace the handlebar switch (left).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Check the fuel injection system relay. Refer to &quot;CHECKING THE RELAYS&quot; on page 9-88.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Replace the fuel injection system relay.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Check the fuel pump. Refer to &quot;CHECKING THE FUEL PUMP BODY&quot; on page 7-2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Replace the fuel pump.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Check the entire fuel pump system wiring. Refer to &quot;CIRCUIT DIAGRAM&quot; on page 9-59.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Properly connect or repair the fuel pump system wiring.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Replace the ECU.
2WD/4WD SELECTING SYSTEM

4. Main switch
5. Main fuse
6. Battery
9. Engine ground
11. Joint coupler
16. ECU (Engine Control Unit)
37. On-Command four-wheel-drive motor switch and differential lock switch
38. Differential motor
41. Four-wheel-drive motor relay 1
42. Four-wheel-drive motor relay 2
61. Ignition fuse
62. Four-wheel-drive motor fuse
66. Frame ground 1
A. Wire harness
B. Negative battery sub-wire harness
# TROUBLESHOOTING

The four-wheel-drive motor indicator light fails to come on.

**TIP**

- Before troubleshooting, remove the following part(s):
  1. Battery cover

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>NG →</th>
<th>OK ↓</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuses. (Main, Ignition and four-wheel-drive motor)</td>
<td>Replace the fuse(s).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE FUSES” on page 9-84.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check the battery.</td>
<td>• Clean the battery terminals.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-85.</td>
<td>• Recharge or replace the battery.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Check the main switch.</td>
<td>Replace the main switch.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE SWITCHES” on page 9-81.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Check the On-Command four-wheel-drive motor switch and differential lock switch.</td>
<td>Replace the On-Command four-wheel-drive motor switch and differential lock switch.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE SWITCHES” on page 9-81.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Check the four-wheel-drive motor relay 1.</td>
<td>Replace the four-wheel-drive motor relay 1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE RELAYS” on page 9-88.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Check the four-wheel-drive motor relay 2.</td>
<td>Replace the four-wheel-drive motor relay 2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE RELAYS” on page 9-88.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Check the differential motor.</td>
<td>Replace the differential motor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE DIFFERENTIAL MOTOR OPERATION” on page 8-11.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9-65
8. Check the entire 2WD/4WD selecting system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-63.

NG → Properly connect or repair the 2WD/4WD selecting system wiring.

OK ↓

Replace the ECU.
EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)

4. Main switch
5. EPS fuse
6. Main fuse
7. Battery
10. Engine ground
12. Joint coupler
13. EPS torque sensor
14. EPS motor
15. EPS (electric power steering) control unit
16. EPS self-diagnosis signal connector
21. ECU (Engine Control Unit)
27. Speed sensor
42. EPS warning light
67. Ignition fuse
72. Frame ground 1
A. Wire harness
B. Negative battery sub-wire harness
C. EPS (electric power steering) control unit
The EPS control unit is equipped with a self-diagnostic function. If this function detects a malfunction in the EPS system, it lights the EPS warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, it becomes stored in the EPS control unit memory in the form of a fault code.

- The EPS warning light comes on when the main switch is turned to “ ” (on), and then goes off once the engine is started. If the warning light remains on or comes on after the engine is started, the EPS system may be defective.

The electrical circuit of the warning light can be checked by turning the main switch to “ ” (on). If the warning light does not come on, the electrical circuit may be defective.

**TIP**

- If the engine is stopped using the engine stop switch and the main switch is in the “ ” (on) position, the EPS warning light comes on to indicate that the power assistance for the steering is not functioning.
- If the steering usage is too heavy (i.e., excessive steering use when the vehicle is traveling at a slow speed), the power assist is reduced to protect the EPS motor from overheating.

The EPS warning light comes on initially for 2 seconds after the main switch is turned to “ ” (on). However, the warning light remains on until the engine is started.

In addition, if a malfunction is detected while the warning light comes on initially, the warning light remains on.

Furthermore, the warning light comes on whenever a malfunction has occurred.

**TIP**

The EPS system does not operate while the EPS warning light is on.

---

1. EPS warning light

---

### EPS WARNING LIGHT DURING NORMAL OPERATION

The EPS warning light comes on initially for 2 seconds after the main switch is turned to “ ” (on). However, the warning light remains on until the engine is started.

In addition, if a malfunction is detected while the warning light comes on initially, the warning light remains on.

Furthermore, the warning light comes on whenever a malfunction has occurred.

**TIP**

The EPS system does not operate while the EPS warning light is on.
EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)

e. “ ” (on)
f. Off
g. Comes on.
h. Initial on: 2 seconds
i. Goes off.

DIAGNOSTIC MODE

Setting the diagnostic mode (present and past malfunctions)
1. Disconnect the EPS self-diagnosis signal connector “1”.
2. Set the main switch to “ ” (on).
3. Select the signaling mode by grounding the EPS self-diagnosis signal connector (male side) to the EPS control unit “2” or disconnecting it from the unit as follows.

- Present malfunction signaling mode
  Ground the connector “1” quickly* to the EPS control unit “2” over 2 times.
  * Quickly = from 20 to 76 ms interval

TIP
- Because the “quickly” intervals are approximately the same as the intervals when sliding the connector “1” across the area “a” of the EPS control unit “2”, this method can also be used to set the diagnostic mode.
- To set the diagnostic mode, this step should be started within 5 seconds and completed within 10 seconds after the main switch is turned to “ ” (on).

The EPS warning light starts to show present fault codes.
- Past malfunction signaling mode
  While the present malfunction mode is activated, briefly disconnect the connector “1”, ground it again, and leave it grounded. The signaling mode is activated after 5 seconds.
  The EPS warning light starts to show past fault codes.
4. Turn the main switch to “ ” (off) to cancel the diagnostic mode.

TIP
- The diagnostic mode can also be canceled by riding the vehicle at speeds above 2 km/h (1.2 mi/h).
- When the diagnostic mode is selected and during the initial lighting of the EPS warning light, the EPS control unit does not receive input from the EPS self-diagnosis signal connector.

5. Connect the EPS self-diagnosis signal connector.

Identifying fault codes
When the diagnostic mode is activated, the fault codes determined by the fail-safe specifications are signaled by the EPS warning light as follows.
- Present malfunction signaling mode: Currently detected fault codes are signaled.
- Past malfunction signaling mode: Both previously detected fault codes and currently detected fault codes are signaled.

Signaling method
Example 1: Fault code No. 23

![Diagram showing fault code signaling process]

- a. EPS self-diagnosis signal connector
- b. Diagnostic mode
- c. EPS warning light
- d. Disconnected
- e. On
- f. Off
- g. Grounded
- h. Normal mode (diagnostic mode not activated)
- i. Mode selection judgment
- j. Present malfunction signaling mode
- k. Past malfunction signaling mode

**A.** The EPS warning light comes on for 5 seconds during the diagnostic mode selection judgment.

**B.** Display of the present malfunctions stops when the past malfunction display mode is selected.

After the mode selection judgment is completed (present or past malfunction mode), the current fault code signaling stops immediately, and then the first code of the mode is signaled 2 seconds later. When a fault code is signaled, the EPS warning light goes off for 1 second between the units of 10 and the units of 1 for the code. After a fault code is signaled, the warning light goes off for 3 seconds, and then the next code is signaled.

Example 2: No malfunctions are detected

![Diagram showing normal mode]

- a. EPS self-diagnosis signal connector
- b. EPS warning light
- c. Disconnected
- d. Comes on.
- e. Goes off.
- f. Grounded
- g. Mode selection judgment

**A.** The EPS warning light comes on for 5 seconds during the diagnostic mode selection judgment.
EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)

After the mode selection judgment is completed (present display or past malfunction mode), the current fault code signaling stops immediately, and then the EPS warning light starts flashing at 1.5-second intervals.

Deleting fault codes
To delete fault codes, ground the EPS self-diagnosis signal connector 3 or more times within 5 seconds while the present or past malfunction mode is activated. The currently selected mode remains active after the fault codes of that mode are deleted.

![Diagram]

a. EPS self-diagnosis signal connector
b. Disconnected
c. Grounded

T1: Connector grounded - - - - 0.1 ≤ T1 ≤ 1.6 seconds
T2: Fault codes deleted - - - - - Maximum 1.5 seconds required

---

SELF-DIAGNOSTIC FUNCTION TABLE (EPS SYSTEM)

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
<th>Symptom</th>
<th>Probable cause of malfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 13 15 16</td>
<td>EPS torque sensor</td>
<td>No normal signals are received from the torque sensor.</td>
<td>• Open or short circuit in wire harness.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Malfunction in torque sensor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Malfunction in EPS control unit.</td>
</tr>
<tr>
<td>21</td>
<td>Speed sensor</td>
<td>No normal signals are received from the speed sensor.</td>
<td>• Open or short circuit in wire harness.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Malfunction in speed sensor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Malfunction in EPS control unit.</td>
</tr>
<tr>
<td>22</td>
<td>Engine speed signal</td>
<td>No normal signals are received from the ECU.</td>
<td>• Open or short circuit in wire harness.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Malfunction in ECU.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Malfunction in EPS control unit.</td>
</tr>
<tr>
<td>41 42 43 45</td>
<td>EPS motor</td>
<td>No normal signals are received from the EPS motor.</td>
<td>• Open or short circuit in wire harness.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Malfunction in EPS motor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Malfunction in EPS control unit.</td>
</tr>
<tr>
<td>52</td>
<td>EPS control unit</td>
<td>Relay contacts in the EPS control unit are welded together.</td>
<td>Malfunction in EPS control unit.</td>
</tr>
</tbody>
</table>
The malfunction history is stored even if the main switch is turned to “ ” (off), therefore, be sure to erase the history (present and past malfunction signaling modes) after repairing the cause of the EPS system malfunction. The malfunction history must be erased in the diagnostic mode. Refer to “DIAGNOSTIC MODE” on page 9-70.

## Fault code No. 11, 13, 15, 16

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
<th>Symptom</th>
<th>Probable cause of malfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>11, 13, 15, 16</td>
<td>EPS torque sensor</td>
<td>EPS torque sensor: no normal signals are received from the EPS torque sensor.</td>
<td></td>
</tr>
<tr>
<td><strong>Order</strong></td>
<td><strong>Item/components and probable cause</strong></td>
<td><strong>Check or maintenance job</strong></td>
<td><strong>Reinstatement method</strong></td>
</tr>
<tr>
<td>1</td>
<td>Connections • EPS torque sensor coupler</td>
<td>• Check the locking condition of the coupler. • Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins). • If there is a malfunction, connect the coupler securely or replace the wire harness.</td>
<td>Turning the main switch to “ ” (off).</td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in EPS torque sensor lead.</td>
<td>• Replace if there is an open or short circuit. • Between EPS torque sensor coupler and EPS control unit coupler. white–white red–red green–green black–black</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective EPS torque sensor.</td>
<td>• Replace if defective. Refer to “CHECKING THE EPS TORQUE SENSOR (for EPS models)” on page 9-98.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Malfunction in EPS control unit.</td>
<td>Replace the EPS control unit.</td>
<td></td>
</tr>
</tbody>
</table>
### Fault code No. 21

<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 locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins). If there is a malfunction, connect the coupler securely or replace the wire harness.</td>
<td>Starting the engine and activating the vehicle speed sensor by operating the vehicle above 5 km/h (3 mi/h), or turning the main switch to “ ” (off), then to “ ” (on), and then deleting the fault codes. Refer to “DIAGNOSTIC MODE” on page 9-70.</td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness.</td>
<td>Replace if there is an open or short circuit. Between speed sensor coupler and joint coupler. white–white Between joint coupler and EPS control unit coupler. white–white</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective speed sensor.</td>
<td>Replace if defective. Refer to “CHECKING THE SPEED SENSOR” on page 9-94.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Malfunction in EPS control unit.</td>
<td>Replace the EPS control unit.</td>
<td></td>
</tr>
</tbody>
</table>

### Fault code No. 22

<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 locking condition of the coupler. Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins). If there is a malfunction, connect the coupler securely or replace the wire harness.</td>
<td>Turning the main switch to “ ” (off).</td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness.</td>
<td>Replace if there is an open or short circuit. Between ECU coupler and EPS control unit coupler. orange/white–orange/white</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Malfunction in EPS control unit.</td>
<td>Replace the EPS control unit.</td>
<td></td>
</tr>
</tbody>
</table>
# EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)

## Fault code No. 41, 42, 43, 45

<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 locking condition of the coupler.</td>
<td>Turning the main switch to “ ” (off).</td>
</tr>
<tr>
<td></td>
<td>• EPS motor coupler</td>
<td>Disconnect the coupler and check the pins (bent or broken terminals and locking condition of the pins).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If there is a malfunction, connect the coupler securely or replace the wire harness.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in EPS motor lead.</td>
<td>Replace if there is an open or short circuit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Between EPS motor and EPS control unit coupler. red–red black–black</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective EPS motor.</td>
<td>Replace if defective. Refer to “CHECKING THE EPS MOTOR (for EPS models)” on page 9-98.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Malfunction in EPS control unit.</td>
<td>Replace the EPS control unit.</td>
<td></td>
</tr>
</tbody>
</table>

## Fault code No. 52

<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 EPS control unit.</td>
<td>Replace the EPS control unit.</td>
<td>Turning the main switch to “ ” (off).</td>
</tr>
</tbody>
</table>

## Fault code No. 53

<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>Faulty battery.</td>
<td>Replace or charge the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-85.</td>
<td>Turning the main switch to “ ” (off).</td>
</tr>
<tr>
<td>2</td>
<td>Malfunction in rectifier/regulator or charging system.</td>
<td>Replace if defective. Refer to “CHECKING THE RECTIFIER/REGULATOR” on page 9-93.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Malfunction in EPS control unit.</td>
<td>Replace the EPS control unit.</td>
<td></td>
</tr>
</tbody>
</table>
## EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)

### Fault code No. 54

<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 EPS control unit.</td>
<td>Replace the EPS control unit.</td>
<td>Turning the main switch to “ ” (off).</td>
</tr>
</tbody>
</table>

### Fault code No. 55

<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>Faulty battery.</td>
<td>Replace the battery.</td>
<td>Turning the main switch to “ ” (off).</td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-85.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Malfunction in rectifier/regulator.</td>
<td>Replace if defective.</td>
<td>Turning the main switch to “ ” (off).</td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE RECTIFIER/REGULATOR” on page 9-93.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Malfunction in EPS control unit.</td>
<td>Replace the EPS control unit.</td>
<td></td>
</tr>
</tbody>
</table>
1. Four-wheel-drive motor relay 1
2. Four-wheel-drive motor relay 2
3. Headlight relay 1
4. Fuel injection system fuse
5. Starter relay
6. EPS fuse (for EPS models)
7. Main fuse
8. Fuse box (ignition, headlights, four-wheel-drive motor, radiator fan motor, signaling system, auxiliary DC jack)
9. Radiator fan motor circuit breaker
10. Rectifier/regulator
11. Reverse switch
12. Gear position switch
13. Auxiliary DC jack
14. Main switch
15. Differential motor
16. EPS torque sensor (for EPS models)
17. EPS motor (for EPS models)
18. Horn (except for CDN)
19. Radiator fan motor
1. Lean angle sensor
2. Radiator fan motor relay
3. Fuel injection system relay
4. Headlight relay 2
5. Front brake light switch
6. Rear brake light switch
7. Intake air temperature sensor
8. Intake air pressure sensor
9. TPS (throttle position sensor)
10. ISC (Idle Speed Control) unit
11. Fuel pump
12. Speed sensor
13. Crankshaft position sensor
14. Coolant temperature sensor
15. Ignition coil
16. Air induction system solenoid
17. Battery
18. ECU (Engine Control Unit)
19. EPS control unit (for EPS models)
1. Main switch
2. Light switch
3. Engine stop switch
4. Start switch
5. Override switch
6. On-Command four-wheel-drive motor switch and differential gear lock switch
7. Four-wheel-drive motor switch (differential motor)
8. Gear position switch
9. Reverse switch
10. Rear brake light switch
11. Front brake light switch
12. Horn switch (except for CDN)
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.

**TIP**

- Before checking for continuity, set the pocket tester to “0” and to the “Ω × 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 when the switch is set to “ON”.

**Pocket tester**
90890-03112
Analog pocket tester
YU-03112-C
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.

- Bulb “a” is used for the handle mounted light 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 sockets by turning them counterclockwise.

Checking the condition of the bulbs
The following procedure applies to all of the bulbs.

1. Remove:
   - Bulb

   WARNING

   Since the handle mounted light bulb gets extremely hot, keep flammable products and your hands away from it until it has 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.

   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 × 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 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.
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.

▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲

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 (1)” on page 4-1.
2. Check:
   • Fuse

▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼

a. Connect the pocket tester to the fuse and check the continuity.

TIP
Set the pocket tester selector to “Ω × 1”.

b. If the pocket tester indicates “∞”, replace the fuse.

▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲ ▲ ▲▲▲▲▲ ▲ ▲

3. Replace:
   • Blown fuse

▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼

a. Set the main switch to “ ” (off).
b. Install a new fuse of the correct amperage rating.
c. Set the switch(es) to on to verify if the electrical circuit is operational.
d. If the fuse immediately blows again, check the electrical circuit.

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 electri-
CAL SYSTEM, CAUSE THE LIGHTING AND IGINITION SYSTEMS TO MALFUNCTION AND COULD POSSIBLY CAUSE A FIRE.

4. INSTALL:
   • Battery cover
     Refer to “GENERAL CHASSIS (1)” 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.

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 (1)” on page 4-1.
   • Front carrier
   • Battery holding bracket
     Refer to “GENERAL CHASSIS (2)” on page 4-6.

2. DISCONNECT:
   • Battery leads
     (from the battery terminals)

NOTICE

First, disconnect the negative battery lead “1”, and then positive battery lead “2”.

3. REMOVE:
   • Battery

4. CHECK:
   • Battery charge

a. Connect a pocket tester to the battery terminals.

• Positive tester probe → positive battery terminal
• Negative tester probe → negative battery terminal
The charge state of a VRLA (Valve Regulated Lead Acid) battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive battery terminal is disconnected).

*No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.*

b. Check the charge of the battery, as shown in the charts and the following example.

<table>
<thead>
<tr>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open-circuit voltage = 12.0 V</td>
</tr>
<tr>
<td>Charging time = 6.5 hours</td>
</tr>
<tr>
<td>Charge of the battery = 20–30%</td>
</tr>
</tbody>
</table>

**WARNING**

**EWB03650**

Do not quick charge a battery.

**NOTICE**

**ECB02580**

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.
**ELECTRICAL COMPONENTS**

B. Time (minutes)
C. Charging
D. Ambient temperature 20 °C (68 °F)
E. Check the open-circuit voltage.

---

**Charging method using a variable-current (voltage) charger**

a. Measure the open-circuit voltage prior to charging.

**TIP**

Voltage should be measured 30 minutes after the engine is stopped.

b. Connect a charger and ammeter to the battery and start charging.

**TIP**

Set the charging voltage at 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, set the charging voltage adjust dial at 20–24 V and monitor the amperage for 3–5 minutes to check the battery.

d. Adjust the voltage so that the current is at the standard charging level.

e. Set the time according to the charging time suitable for the open-circuit voltage.

f. If charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging current.

g. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

- Reaches the standard charging current → Battery is good.
- Does not reach the standard charging current → Replace the battery.

---

**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 stopped.

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 its charging voltage is 15 V.

**TIP**

Set the charging time at 20 hours (maximum).

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–12.0 V --- 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”, and 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 holding bracket
   • Front carrier
     Refer to “GENERAL CHASSIS (2)” on page 4-6.
   • Battery cover
     Refer to “GENERAL CHASSIS (1)” 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 x 1) and battery (12 V) to the relay terminal as shown.
   Check the relay operation.
   Out of specification → Replace.

---

**Headlight relay 1**

- **Result**
  Continuity (between “3” and “4”)

---

**Headlight relay 2**

- **Result**
  Continuity (between “3” and “4”)

---

**Starter relay**

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe
ELECTRICAL COMPONENTS

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”)

Fuel injection system relay

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity (between “3” and “4”)

Four-wheel-drive motor relay 1

First step:

1. Positive tester probe
2. Negative tester probe
3. Negative tester probe

Result
Continuity (between “1” and “2”) No continuity (between “1” and “3”)

Second step:

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe
5. Negative tester probe

Result
No continuity (between “3” and “4”) Continuity (between “3” and “5”)
**Four-wheel-drive motor relay 2**

**First step:**

1. Positive tester probe
2. Negative tester probe
3. Negative tester probe

**Result**

- **Continuity** (between “1” and “2”)
- **No continuity** (between “1” and “3”)

**Second step:**

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe
5. Negative tester probe

**Result**

- **No continuity** (between “3” and “4”)
- **Continuity** (between “3” and “5”)

---

**CHECKING THE DIODE**

1. Check:
   - Diode
     - Out of specification → Replace.

---

**Pocket tester**

- **90890-03112**
- **Analog pocket tester**
  - **YU-03112-C**

**TIP**

The pocket tester or the analog pocket tester readings are shown in the following table.

- **No continuity**
  - Positive tester probe → black/yellow “1”
  - Negative tester probe → yellow “2”

- **Continuity**
  - Positive tester probe → yellow “2”
  - Negative tester probe → black/yellow “1”

---

**CHECKING THE SPARK PLUG CAP**

1. Check:
   - Spark plug cap resistance
     - Out of specification → Replace.

---

**Resistance**

- **10.0 kΩ**

---

**CHECKING THE SPARK PLUG CAP**

1. a. Disconnect the diode from the wire harness.
   b. Connect the pocket tester \((Ω × 1)\) to the diode coupler as shown.
   c. Check the diode for continuity.
   d. Check the diode for no continuity.

---

**Pocket tester**

- **90890-03112**
- **Analog pocket tester**
  - **YU-03112-C**

**TIP**

The pocket tester or the analog pocket tester readings are shown in the following table.

- **No continuity**
  - Positive tester probe → black/yellow “1”
  - Negative tester probe → yellow “2”

- **Continuity**
  - Positive tester probe → yellow “2”
  - Negative tester probe → black/yellow “1”

---

**CHECKING THE SPARK PLUG CAP**

1. a. Disconnect the diode from the wire harness.
   b. Connect the pocket tester \((Ω × 1k)\) to the spark plug cap as shown.

---

**Result**

- **Continuity** (between “1” and “2”)
- **No continuity** (between “1” and “3”)

---

**CHECKING THE SPARK PLUG CAP**

1. a. Disconnect the diode from the wire harness.
   b. Connect the pocket tester \((Ω × 1k)\) to the spark plug cap as shown.
ELECTRICAL COMPONENTS

CHECKING THE IGNITION COIL
1. Check:
   • Primary coil resistance
     Out of specification → Replace.

   ![Diagram of ignition coil connections]

   **Primary coil resistance**
   2.16–2.64 Ω

   ![Diagram of ignition coil connections]

   a. Disconnect the ignition coil connectors from
      the ignition coil terminals.
   b. Connect the pocket tester (Ω × 1) to the igni-
      tion coil as shown.

   ![Diagram of pocket tester connections]

   Pocket tester
   90890-03112
   Analog pocket tester
   YU-03112-C

   • Positive tester probe
     orange "1"
   • Negative tester probe
     red/black "2"

   c. Measure the secondary coil resistance.

   **Secondary coil resistance**
   8.64–12.96 kΩ

   a. Disconnect the spark plug cap from the igni-
      tion coil.
   b. Connect the pocket tester (Ω × 1) to the igni-
      tion coil as shown.

   ![Diagram of pocket tester connections]

   Pocket tester
   90890-03112
   Analog pocket tester
   YU-03112-C

   • Positive tester probe
     red/black “1”
   • Negative tester probe
     Spark plug lead “2”

   c. Measure the primary coil resistance.

   **Crankshaft position sensor resistance**
   152–228 Ω

   a. Connect the pocket tester (Ω × 100) to the
      crankshaft position sensor coupler as shown.

   ![Diagram of pocket tester connections]
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.

Lean angle sensor output voltage
Less than 65°: 3.55–4.45 V
More than 65°: 0.65–1.35 V

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. Tilt the lean angle sensor to 65°.
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 10-1.

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.
ELECTRICAL COMPONENTS

CHECKING THE STATOR COIL
1. Disconnect:
   • AC magneto coupler
     (from the wire harness)
2. Check:
   • Stator coil resistance
     Out of specification → Replace the crankshaft position sensor/stator assembly.

<table>
<thead>
<tr>
<th>Stator coil resistance</th>
<th>0.15–0.22 Ω</th>
</tr>
</thead>
</table>

a. Connect the pocket tester (Ω × 1) to the AC magneto coupler as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

b. Measure the stator coil resistance.

CHECKING THE RECTIFIER/REGULATOR
1. Check:
   • Charging voltage
     Out of specification → Replace the rectifier/regulator.

CHARGING VOLTAGE
above 14 V at 5000 r/min

a. Connect the engine tachometer to the spark plug lead.
b. Connect the pocket tester (DC 20 V) to the rectifier/regulator coupler as shown.

c. Start the engine and let it run at approximately 5000 r/min.
d. Measure the charging voltage.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

• Positive tester probe red “1”
• Negative tester probe black “2”

Sender unit resistance (full)
19.00–21.00 Ω
Sender unit resistance (empty)
138.50–141.50 Ω

a. Connect the pocket tester (Ω × 10) to the fuel sender terminal as shown.

Sender unit resistance (full)
19.00–21.00 Ω
Sender unit resistance (empty)
138.50–141.50 Ω
b. Move the fuel sender float to the minimum “3” and maximum “4” level positions.

c. Measure the fuel sender resistance.

CHECKING THE SPEED SENSOR
1. Check:
   • Speed sensor output voltage
     Out of specification → Replace.

Output voltage reading cycle
0.6 V–4.8 V–0.6 V–4.8 V–0.6 V

a. Connect the pocket tester (DC 20 V) to the speed sensor coupler as shown.

CHECKING THE RADIATOR FAN MOTOR
1. Check:
   • Radiator fan motor
     Faulty/rough movement → Replace.

a. Disconnect the radiator fan motor coupler from the wire harness.
b. Connect the battery (DC 12 V) as shown.
c. Measure the radiator fan motor movement.

CHECKING THE RADIATOR FAN MOTOR CIRCUIT BREAKER
1. Remove:
   • Radiator fan motor circuit breaker (from the wire harness)

TIP
The radiator fan motor circuit breaker “1” is attached to the wire harness with black tape as shown in the illustration.

2. Check:
   • Radiator fan motor circuit breaker resistance

Out of specification → Replace the radiator fan motor circuit breaker.

CHECKING THE COOLANT TEMPERATURE SENSOR
1. Remove:
   • Coolant temperature sensor

WARNING
• Handle the coolant temperature sensor with special care.
• Never subject the coolant temperature sensor to strong shocks. If the coolant temperature sensor is dropped, replace it.

2. Check:
   • Coolant temperature sensor resistance

Out of specification → Replace.

Pocket tester 90890-03112
Analog pocket tester YU-03112-C

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.
ELECTRICAL COMPONENTS

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.

   ![Pocket tester](image)
   Resistance
   2.64–6.16 kΩ

   ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼
   a. Connect the pocket tester (Ω × 1k) to the throttle position sensor terminal as shown.

   ![Pocket tester](image)

   • Positive tester probe
     blue “1”
   • Negative tester probe
     black/blue “2”

   b. Measure the throttle position sensor 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 7-7.

CHECKING THE FUEL INJECTOR
1. Check:
   • Fuel injector resistance
     Out of specification → Replace the fuel injector.
   ![Resistance](image)
   Resistance
   12.0 Ω

   ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼
   a. Disconnect the fuel injector coupler from wire harness.
   b. Connect the pocket tester (Ω × 1) to the fuel injector terminals as shown.

   ![Pocket tester](image)
   Pocket tester
   90890-03112
   Analog pocket tester
   YU-03112-C

   • Positive tester probe
     Fuel injector terminal “1”
   • Negative tester probe
     Fuel injector terminal “2”

   c. Measure the fuel injector resistance.

CHECKING THE AIR INDUCTION SYSTEM SOLENOID
1. Check:
   • Air induction system solenoid resistance
     Out of specification → Replace.
   ![Solenoid resistance](image)
   Solenoid resistance
   18–22 Ω

   ▼▼▼▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼ ▼▼▼▼ ▼▼▼
   a. Disconnect the air induction system solenoid coupler from the wire harness.
   b. Connect the pocket tester (Ω × 1) to the air induction system solenoid terminals as shown.

   ![Pocket tester](image)
   Pocket tester
   90890-03112
   Analog pocket tester
   YU-03112-C
ELECTRICAL COMPONENTS

• Positive tester probe →
  Air induction system solenoid terminal “1”
• Negative tester probe →
  Air induction system solenoid terminal “2”

c. Measure the air induction system solenoid resistance.

EBS30314
CHECKING THE INTAKE AIR PRESSURE SENSOR
1. Check:
• Intake air pressure sensor output voltage
  Out of specification → Replace.

Intake air pressure sensor output voltage
3.75–4.25 V

c. Measure the intake air pressure sensor output voltage.

EBS30315
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
5.40–6.60 kΩ at 0 °C (32 °F)
290–390 Ω at 80 °C (176 °F)

a. Connect the pocket tester (Ω x 100) to the intake air temperature sensor terminal as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

b. Immerse the intake air temperature sensor “1” in a container filled with water “2”.

TIP
Make sure that the air temperature sensor terminals do not get wet.

c. Place a thermometer “3” in the water.
d. Slowly heat the water, then let it cool down to the specified temperature.
ELECTRICAL COMPONENTS

9-98

EBS30319

CHECKING THE EPS MOTOR (for EPS models)
1. Remove:
   • EPS unit
2. Check:
   • EPS motor
     Out of specification → Replace the EPS unit.

TIP
The pocket tester and the analog pocket tester readings are shown in the following table.

<table>
<thead>
<tr>
<th>Continuity</th>
<th>Positive tester probe → red “1”</th>
<th>Negative tester probe → black “2”</th>
</tr>
</thead>
<tbody>
<tr>
<td>No continuity</td>
<td>Positive tester probe → red “1”</td>
<td>Negative tester probe → EPS motor body “3”</td>
</tr>
<tr>
<td>No continuity</td>
<td>Positive tester probe → black “2”</td>
<td>Negative tester probe → EPS motor body “3”</td>
</tr>
</tbody>
</table>

Coil resistance
1.00–1.50 kΩ (YF70GPG, YF70GPLG, YF70GPSG, YFM70FWAD, YFM70GPHG, YFM70GPLG, YFM70GPSG, YFM70GPXG)

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

a. Connect the pocket tester (Ω × 1) to the EPS motor coupler terminal as shown.

b. Measure the EPS torque sensor resistance.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

b. Check the EPS motor for continuity.
c. Check the EPS motor for no continuity.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

b. Check the EPS motor for continuity.
c. Check the EPS motor for no continuity.
TROUBLESHOOTING

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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 FAILURES**

**Engine**
1. Cylinder 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 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 drain hose
   - Clogged rollover valve
   - Clogged rollover valve hose
   - Deteriorated or contaminated fuel
2. Fuel pump
   - Faulty fuel pump
   - Faulty fuel injection system relay
   - Clogged or damaged fuel hose
3. Throttle body
   - Deteriorated or contaminated fuel

**INCORRECT ENGINE IDLING SPEED**

**Engine**
1. Cylinder 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
   - Improper throttle cable free play
   - Flooded throttle body

- 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
   - 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
   - Faulty crankshaft position sensor
   - Broken AC magneto rotor woodruff key
6. Switches and wiring
   - Faulty main switch
   - Faulty engine stop switch
   - Broken or shorted wiring
   - Faulty gear position switch
   - Faulty start switch
   - Faulty brake light switch
   - Improperly grounded circuit
   - Loose connections
7. Starting system
   - Faulty starter motor
   - Faulty starter relay
   - Faulty starter clutch
Electrical system
1. Battery
   • Discharged battery
   • Faulty battery
2. Spark plug
   • 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
   • Broken or shorted primary or secondary coils
   • Faulty spark plug lead
   • Cracked or broken ignition coil
4. Ignition system
   • Faulty ECU
   • Faulty crankshaft position sensor
   • Broken AC magneto rotor woodruff key
5. Valve train
   • Improperly adjusted valve clearance
   • Improperly adjusted valve timing

POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE
Refer to “STARTING FAILURES” on page 10-1.

Engine
1. Air filter
   • Clogged air filter element

Fuel system
1. Fuel pump
   • Faulty fuel pump
FAULTY DRIVE TRAIN
The following conditions may indicate damaged shaft drive components:

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Possible Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A pronounced hesitation or “jerky” movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.)</td>
<td>A. Bearing damage.</td>
</tr>
<tr>
<td>2. A “rolling rumble” noticeable at low speed; a high-pitched whine; a “clunk” from a shaft drive component or area.</td>
<td>B. Improper gear backlash.</td>
</tr>
<tr>
<td>3. A locked-up condition of the shaft drive mechanism, no power transmitted from the engine to the front and/or rear wheels.</td>
<td>C. Gear tooth damage.</td>
</tr>
<tr>
<td></td>
<td>D. Broken drive shaft.</td>
</tr>
<tr>
<td></td>
<td>E. Broken gear teeth.</td>
</tr>
<tr>
<td></td>
<td>F. Seizure due to lack of lubrication.</td>
</tr>
<tr>
<td></td>
<td>G. Small foreign objects lodged between the moving parts.</td>
</tr>
</tbody>
</table>

TIP
Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.
TROUBLESHOOTING

**EBS30326**

**FAULTY GEAR SHIFTING**

Shifting is difficult
Refer to “FAULTY CLUTCH” on page 10-4.

**EBS30327**

**SHIFT LEVER DOES NOT MOVE**

Shift drum and shift forks
- Foreign object in a shift drum groove
- Seized shift fork
- Bent shift fork guide bar

Transmission
- Seized transmission gear
- Foreign object between transmission gears
- Improperly assembled transmission

**EBS30328**

**JUMPS OUT OF GEAR**

Shift forks
- Worn shift fork

Shift drum
- Incorrect axial play
- Worn shift drum groove

Transmission
- Worn gear dog

**EBS30329**

**FAULTY CLUTCH**

Engine operates but vehicle will not move
1. V-belt
   - 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 spring
   - Damaged, loose or worn clutch spring
2. Clutch shoe
   - Damaged or worn clutch shoe
3. Primary sliding sheave
   - Seized primary sliding sheave

Poor starting performance
1. V-belt
   - V-belt slips
   - Oil or grease on the V-belt
2. Primary sliding sheave
   - Faulty operation
   - Worn pin groove
   - Worn pin
3. Clutch shoe
   - 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

**EBS30330**

**OVERHEATING**

Engine
1. Clogged coolant passages
2. Cylinder head and piston
   - Heavy carbon buildup
3. 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
4. Thermostat
   - Thermostat stays closed
5. Hose(s) and pipe(s)
   - Damaged hose
   - Improperly connected hose
   - Damaged pipe
   - Improperly connected pipe
TROUBLESHOOTING

Fuel system
1. 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
   • Incorrect spark plug gap
   • Incorrect spark plug heat range
2. Ignition system
   • Faulty ECU

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 piston 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 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 SHOCK ABSORBER ASSEMBLY

Leaking oil
• Bent, damaged or rusty damper rod
• Cracked or damaged shock absorber
• Damaged oil seal lip

Malfunction
• Fatigued or damaged shock absorber spring
• Bent or damaged damper rod

UNSTABLE HANDLING
1. Handlebar
   • Bent or improperly installed handlebar
2. Steering
   • Incorrect toe-in
   • Bent steering stem
   • Improperly installed steering stem
   • Damaged bearing or bearing race
   • Bent tie-rods
   • Deformed steering knuckles
3. Shock absorber
   • Faulty shock absorber spring
   • Leaking oil
4. Tire(s)
   • Uneven tire pressures (left and right)
   • Incorrect tire pressure
   • Uneven tire wear
5. Wheel(s)
   • Incorrect wheel balance
   • Deformed wheel
   • Damage or loose wheel bearing
   • Bent or loose wheel axle
   • Excessive wheel runout
6. Frame
   • Bent frame
   • Damaged frame

FAULTY LIGHTING OR SIGNALING SYSTEM

Headlight or handle mounted light does not come on
• Wrong handle mounted light bulb
• Too many electrical accessories
• Hard charging
• Incorrect connection
• Improperly grounded circuit
• Poor contacts (main or light switch)
• Burnt-out handle mounted light bulb
• Faulty headlight or handle mounted light assembly

Handle mounted light bulb burnt out
• Wrong handle mounted light bulb
• Faulty battery
• Faulty rectifier/regulator
• Improperly grounded circuit
• Faulty main switch
• Faulty light switch
• Handle mounted light bulb life expired

Tail/brake light does not come on
• Faulty brake light switch
• Too many electrical accessories
• Incorrect connection
• Faulty tail/brake light assembly
### SELF-DIAGNOSTIC FUNCTION TABLE

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.</td>
</tr>
<tr>
<td>13</td>
<td>Intake air pressure sensor: open or short circuit detected.</td>
</tr>
<tr>
<td>14</td>
<td>Intake air pressure sensor: hose system malfunction (clogged or detached hose).</td>
</tr>
<tr>
<td>15</td>
<td>Throttle position sensor: open or short circuit detected.</td>
</tr>
<tr>
<td>16</td>
<td>Throttle position sensor: stuck throttle position sensor is detected.</td>
</tr>
<tr>
<td>21</td>
<td>Coolant temperature sensor: open or short circuit detected.</td>
</tr>
<tr>
<td>22</td>
<td>Intake air temperature sensor: open or short circuit detected.</td>
</tr>
<tr>
<td>30</td>
<td>Latch up detected.</td>
</tr>
<tr>
<td>33</td>
<td>Ignition coil: open or short circuit detected in the primary lead of the ignition coil.</td>
</tr>
<tr>
<td>37</td>
<td>Component other than ISC (Idle Speed Control) unit is defective (ISC operating sound is heard).</td>
</tr>
<tr>
<td></td>
<td>Defective ISC (Idle Speed Control) unit (ISC operating sound is not heard).</td>
</tr>
<tr>
<td>39</td>
<td>Fuel injector: open or short circuit detected.</td>
</tr>
<tr>
<td>41</td>
<td>Lean angle sensor: open or short circuit detected.</td>
</tr>
<tr>
<td>42</td>
<td>Speed sensor: no normal signals are received from the speed sensor.</td>
</tr>
<tr>
<td>43</td>
<td>Fuel system voltage: incorrect voltage supplied to the fuel injector and fuel pump.</td>
</tr>
<tr>
<td>44</td>
<td>EEPROM fault code number: an error is detected while reading or writing on EEPROM.</td>
</tr>
<tr>
<td>46</td>
<td>Charging voltage is abnormal.</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.)</td>
</tr>
</tbody>
</table>

### COMMUNICATION ERROR WITH THE METER

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Er-1</td>
<td>ECU (Engine Control Unit) internal malfunction (output signal error): signals cannot be transmitted between the ECU and the multi-function meter.</td>
</tr>
<tr>
<td>Er-2</td>
<td>ECU (Engine Control Unit) internal malfunction (output signal error): no signals are received from the ECU within the specified duration.</td>
</tr>
<tr>
<td>Er-3</td>
<td>ECU (Engine Control Unit) internal malfunction (output signal error): data from the ECU cannot be received correctly.</td>
</tr>
<tr>
<td>Er-4</td>
<td>ECU (Engine Control Unit) internal malfunction (input signal error): non-registered data has been received from the meter assembly.</td>
</tr>
</tbody>
</table>

### DIAGNOSTIC CODE: SENSOR OPERATION TABLE

**TIP**

The diagnostic code numbers cannot be displayed on the multi-function meter. To display the diagnostic code numbers, use the Yamaha diagnostic tool.
<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Display</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Throttle angle</td>
<td>Fully closed position</td>
<td>14–20</td>
</tr>
<tr>
<td>03</td>
<td>Pressure difference (atmospheric pressure and intake air pressure)</td>
<td>Displays the intake air pressure.</td>
<td>Set the engine stop switch to &quot;O&quot;, and then operate the throttle while pushing the start switch &quot;@&quot;. (If the display value changes, the performance is OK.)</td>
</tr>
<tr>
<td>05</td>
<td>Intake air temperature</td>
<td>Displays the intake air temperature.</td>
<td>Compare the actually measured intake air temperature with the indicated value.</td>
</tr>
<tr>
<td>06</td>
<td>Coolant temperature</td>
<td>Displays the coolant temperature.</td>
<td>Compare the actually measured coolant temperature with the indicated value.</td>
</tr>
<tr>
<td>07</td>
<td>Vehicle speed pulse</td>
<td>0–999</td>
<td>Check that the number increases when the rear wheels are 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 output voltage</td>
<td>Upright: 3.6–4.4, Overturned: 0.7–1.3</td>
<td>Remove the lean angle sensor and incline it more than 65 degrees.</td>
</tr>
<tr>
<td>09</td>
<td>Fuel system voltage (battery voltage)</td>
<td>Approximately 12.0</td>
<td>Turn the main switch to &quot;I&quot; (on), and then compare the actually measured battery voltage with the display value. (If the actually measured battery voltage is low, recharge the battery.)</td>
</tr>
<tr>
<td>21</td>
<td>Neutral switch</td>
<td>Neutral: ON, In gear: OFF</td>
<td>Shift the transmission.</td>
</tr>
<tr>
<td>60</td>
<td>EEPROM fault code display</td>
<td>The fault code No. 44 detected EEPROM errors are indicated. 00 indication: Normal status</td>
<td>—</td>
</tr>
<tr>
<td>61</td>
<td>Malfunction history code display</td>
<td>00</td>
<td>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.)</td>
</tr>
</tbody>
</table>

10-8
## Diagnostic Code: Actuator Operation Table

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Display</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>62</td>
<td>Malfunction history code erasure</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• No history</td>
<td>0</td>
<td>Displays the total number of malfunctions, including the current malfunction, that have occurred since the history was last erased. (For example, if there have been three malfunctions, “03” is displayed.)</td>
</tr>
<tr>
<td></td>
<td>• History exists</td>
<td></td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Save the malfunction history to the computer, and then delete the fault codes.</td>
</tr>
<tr>
<td>70</td>
<td>Control number</td>
<td>0–254 [-]</td>
<td>—</td>
</tr>
</tbody>
</table>

### Diagnostic code: Actuator Operation Table

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Actuation</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Ignition coil</td>
<td>Actuates the ignition coil five times at one-second intervals. The “CHECK” indicator and “_press” on the Yamaha diagnostic tool screen come on each time the ignition coil is actuated.</td>
<td>Check that a spark is generated five times. • Connect an ignition checker.</td>
</tr>
<tr>
<td>36</td>
<td>Fuel injector</td>
<td>Actuates the fuel injector five times at one-second intervals. The “CHECK” indicator and “_press” on the Yamaha diagnostic tool screen come on each time the fuel injector is actuated.</td>
<td>Disconnect the fuel pump coupler, and then check that fuel injector is actuated five times by listening for the operating sound.</td>
</tr>
<tr>
<td>48</td>
<td>Air induction system solenoid</td>
<td>Actuates the air induction system solenoid five times at one-second intervals. The “CHECK” indicator and “_press” on the Yamaha diagnostic tool screen come on each time the air induction system solenoid is actuated.</td>
<td>Check that the air induction system solenoid is actuated five times by listening for the operating sound.</td>
</tr>
<tr>
<td>50</td>
<td>Fuel injection system relay</td>
<td>Actuates the fuel injection system relay five times at one-second intervals. The “CHECK” indicator and “_press” on the Yamaha diagnostic tool screen come on each time the relay is actuated. (When the relay is on, the “CHECK” indicator and “_press” on the Yamaha diagnostic tool screen go off. When the relay is off, the “CHECK” indicator and “_press” on the Yamaha diagnostic tool screen come on.)</td>
<td>Check that the fuel injection system relay is actuated five times by listening for the operating sound.</td>
</tr>
</tbody>
</table>
### Self-Diagnostic Function and Diagnostic Code Table

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Actuation</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>Radiator fan motor relay</td>
<td>Actuates the radiator fan motor relay five times at five-second intervals. (2 seconds on, 3 seconds off)</td>
<td>Check that the radiator fan motor relay is actuated five times by listening for the operating sound.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The “CHECK” indicator and “ ” on the Yamaha diagnostic tool screen come on each time the relay is actuated. (When the relay is on, the “CHECK” indicator and “ ” on the Yamaha diagnostic tool screen go off. When the relay is off, the “CHECK” indicator and “ ” on the Yamaha diagnostic tool screen come on.)</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>ISC valve</td>
<td>Fully closes the ISC valve, and then opens the valve. This operation takes approximately 3 seconds. The “CHECK” indicator and “ ” on the Yamaha diagnostic tool screen come on during the operation.</td>
<td>The operating sound can be heard when ISC valve operates.</td>
</tr>
</tbody>
</table>
WIRING DIAGRAM
YF70GG/YFM70GDXG/YFM70G
DHG 2016
1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Main switch
5. Main fuse
6. Battery
7. Fuel injection system fuse
8. Starter relay
9. Engine ground
10. Starter motor
11. Joint coupler
12. Fuel injection system relay
13. Yamaha diagnostic tool coupler
14. Reverse switch
15. ISC (Idle Speed Control) unit
16. ECU (Engine Control Unit)
17. Ignition coil
18. Spark plug
19. Fuel injector
20. Intake air temperature sensor
21. Coolant temperature sensor
22. Speed sensor
23. TPS (throttle position sensor)
24. Intake air pressure sensor
25. Lean angle sensor
26. Air induction system solenoid
27. Gear position switch
28. Meter assembly
29. Multi-function meter
30. Engine trouble warning light
31. Coolant temperature warning light
32. Park indicator light
33. Reverse indicator light
34. Neutral indicator light
35. High-range indicator light
36. Low-range indicator light
37. On-Command four-wheel-drive motor switch and differential lock switch
38. Differential motor
39. Fuel sender
40. Fuel pump
41. Four-wheel-drive motor relay 1
42. Four-wheel-drive motor relay 2
43. Handlebar switch (left)
44. Override switch
45. Start switch
46. Engine stop switch
47. Light switch
48. Handle mounted light
49. Headlight
50. Headlight relay 2
51. Headlight relay 1
52. Tail/brake light
53. Diode
54. Rear brake light switch
55. Front brake light switch
56. Radiator fan motor
57. Radiator fan motor circuit breaker
58. Radiator fan motor relay
59. Headlight fuse
60. Signaling system fuse
61. Ignition fuse
62. Four-wheel-drive motor fuse
63. Auxiliary DC jack fuse
64. Radiator fan motor fuse
65. Auxiliary DC jack
66. Frame ground 1
67. Frame ground 2
68. Horn switch (except for CDN)
69. Horn (except for CDN)
A. Wire harness
B. Negative battery sub-wire harness

YF70GP/YF70GPSG/YF70GPLG/YFM70GPXG/YFM70GPHG/YFM70GPSG/YFM70GPLG/YFM70FWAD 2016
1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Main switch
5. EPS fuse
6. Main fuse
7. Battery
8. Fuel injection system fuse
9. Starter relay
10. Engine ground
11. Starter motor
12. Joint coupler
13. EPS torque sensor
14. EPS motor
15. EPS (electric power steering) control unit
16. EPS self-diagnosis signal connector
17. Fuel injection system relay
18. Yamaha diagnostic tool coupler
19. Reverse switch
20. ISC (Idle Speed Control) unit
21. ECU (Engine Control Unit)
22. Ignition coil
23. Spark plug
24. Fuel injector
25. Intake air temperature sensor
26. Coolant temperature sensor
27. Speed sensor
28. TPS (throttle position sensor)
29. Intake air pressure sensor
30. Lean angle sensor
31. Air induction system solenoid
32. Gear position switch
33. Meter assembly
34. Multi-function meter
35. Engine trouble warning light
36. Coolant temperature warning light
37. Park indicator light
38. Reverse indicator light
39. Neutral indicator light
40. High-range indicator light
41. Low-range indicator light
42. EPS warning light
43. On-Command four-wheel-drive motor switch and differential lock switch
44. Differential motor
45. Fuel sender
46. Fuel pump
47. Four-wheel-drive motor relay 1
48. Four-wheel-drive motor relay 2
49. Handlebar switch (left)
50. Override switch
51. Start switch
52. Engine stop switch
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61. Front brake light switch
62. Radiator fan motor
63. Radiator fan motor circuit breaker
64. Radiator fan motor relay
65. Headlight fuse
66. Signaling system fuse
67. Ignition fuse
68. Four-wheel-drive motor fuse
69. Auxiliary DC jack fuse
70. Radiator fan motor fuse
71. Auxiliary DC jack
72. Frame ground 1
73. Frame ground 2
74. Horn switch (except for CDN)
75. Horn (except for CDN)

A. Wire harness
B. Negative battery sub-wire harness
C. EPS (electric power steering) control unit

**COLOR CODE**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Black</td>
</tr>
<tr>
<td>Br</td>
<td>Brown</td>
</tr>
<tr>
<td>G</td>
<td>Green</td>
</tr>
<tr>
<td>Gy</td>
<td>Gray</td>
</tr>
<tr>
<td>L</td>
<td>Blue</td>
</tr>
<tr>
<td>Lg</td>
<td>Light green</td>
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<tr>
<td>O</td>
<td>Orange</td>
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<tr>
<td>P</td>
<td>Pink</td>
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<tr>
<td>R</td>
<td>Red</td>
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<tr>
<td>Sb</td>
<td>Sky blue</td>
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<tr>
<td>W</td>
<td>White</td>
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<tr>
<td>Y</td>
<td>Yellow</td>
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<td>Black/Blue</td>
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<td>Black/White</td>
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</table>