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.

⚠️ 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.

⚠️ WARNING A WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠️ NOTICE A NOTICE indicates special precautions that must be taken to avoid damage to the vehicle or other property.

⚠️ TIP A TIP provides key information to make procedures easier or clearer.
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.
- Numbers “5” enclosed in parentheses indicate the quantities of parts.
- Symbols “6” indicate parts to be lubricated or replaced.
  Refer to “SYMBOLS”.
- A job instruction chart “7” accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.
- Jobs “8” requiring more information (such as special tools and technical data) are described sequentially.

CLUTCH

Removing the clutch

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<th>Qty</th>
<th>Remarks</th>
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<td>1</td>
<td></td>
</tr>
<tr>
<td>Clutch shoe thickness</td>
<td>1.5 mm (0.06 in) Limit 1.0 mm (0.04 in)</td>
<td></td>
</tr>
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Removing the clutch

1. Remove:
   - Clutch housing assembly

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 clutch holding tool "2" to hold the clutch carrier assembly.

Checking the clutch

1. Check:
   - Clutch housing
     - Damage/wear → Replace.
   - One-way clutch bearing
     - Chafing/wear/damage → Replace.

TIP

Replace the one-way clutch bearing and clutch housing as a set.

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.

TIP

After sanding the glazed areas, clean the clutch with a cloth.

2. Measure:
   - Clutch shoe thickness
     - 1.2 mm (0.04 in) Limit 1.0 mm (0.04 in)
SYMBOLS
The following symbols are used in this manual for easier understanding.

**TIP**

The following symbols are not relevant to every vehicle.

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<th>DEFINITION</th>
<th>SYMBOL</th>
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<td><img src="image3" alt="fillingfluid" /></td>
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<td><img src="image4" alt="molybdenum" /></td>
<td>Molybdenum disulfide oil</td>
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<td><img src="image8" alt="bear" /></td>
<td>Wheel bearing grease</td>
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<td><img src="image9" alt="tightening" /></td>
<td>Tightening torque</td>
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<td><img src="image11" alt="wearlimit" /></td>
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<td><img src="image12" alt="enginespeed" /></td>
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<td>Electrical data</td>
<td><img src="image15" alt="lockingagent" /></td>
<td>Apply locking agent (LOCTITE®).</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 to the frame under the driver seat. This information will be needed to order spare parts.
OUTLINE OF THE FI SYSTEM

The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions and the atmospheric temperature. In the conventional carburetor system, the air-fuel ratio of the mixture that is supplied to the combustion chamber is created by the volume of the intake air and the fuel that is metered by the jet used in the respective carburetor.

Despite the same volume of intake air, the fuel volume requirement varies by the engine operating conditions, such as acceleration, deceleration, or operating under a heavy load. Carburetors that meter the fuel through the use of jets have been provided with various auxiliary devices, so that an optimum air-fuel ratio can be achieved to accommodate the constant changes in the operating conditions of the engine.

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

The adoption of the FI system has resulted in a highly precise fuel supply, improved engine response, better fuel economy, and reduced exhaust emissions.
FEATURES

**FI SYSTEM**

The fuel pump delivers fuel to the fuel injector via the fuel filter. The pressure regulator maintains the fuel pressure that is applied to the fuel injector at a certain level. Accordingly, when the energizing signal from the ECU energizes the fuel injector, the fuel passage opens, causing the fuel to be injected into the intake manifold only during the time the passage remains open. Therefore, the longer the length of time the fuel injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the fuel injector is energized (injection duration), the lesser the volume of fuel that is supplied.

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

*Illustration is for reference only.*

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1. Fuel pump
2. Fuel injector
3. Ignition coil
4. ECU (engine control unit)
5. Speed sensor
6. Lean angle sensor
7. Coolant temperature sensor
8. Catalytic converter
9. Crankshaft position sensor
10. Intake air pressure sensor
11. Throttle body
12. ISC (idle speed control) unit
13. Throttle position sensor
14. Intake air temperature sensor
15. Air filter case

A. Fuel system
B. Air system
C. Control system
OUTLINE OF THE EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)
1. Speed information from speed sensor
2. Engine RPM information from ECU
3. Battery
4. EPS control unit
5. EPS unit
6. EPS motor
7. Torque sensor
   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.
INSTRUMENT FUNCTIONS

Multi-function meter unit

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 enables you to plan future fuel stops.

TIP

To switch the display between “mph” and “km/h”, turn the key to “0” (off), then push and hold the “SELECT” button while turning the key to “1” (on).

Clock, hour meter and voltage display modes

Pushing the “CLOCK” button switches the display between the clock mode “CLOCK”, the hour meter mode “HOUR”, and the voltage display mode “v” in the following order:

CLOCK → HOUR → v → 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.
Voltage display mode

This display shows the battery voltage. "b" appears for 1 second when the voltage display mode is first selected, and then "b" appears and the battery voltage is displayed. If the battery voltage is less than 10 volts, "LO" is displayed, and if the voltage is above 16 volts, "HI" is displayed.

NOTICE
If the voltage display indicates "LO" or "HI", there may be trouble with the battery charging circuit or the battery may be faulty. If this occurs, check or repair the vehicle. Refer to "CHARGING SYSTEM" on page 9-11.

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 a problem is detected in an electrical circuit, all the display segments and fuel level warning indicator 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 "culos"

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 comes on or flashes, and the multi-function display indicates a fault code. If the multi-function display indicates a fault code, note the code number, and then check the fuel injection system. Refer to “FUEL INJECTION SYSTEM” on page 9-33.

NOTICE
If the multi-function 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 1-16.

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.

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.

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.
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.
EAS30402

ELECTRICAL SYSTEM

Electrical parts handling

NOTICE

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

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.

TIP

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

NOTICE

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

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.

NOTICE

Turn the main switch to “OFF” before disconnecting or connecting an electrical component.
Handle electrical components with special care, and do not subject them to strong shocks.

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.

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".

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.

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.
Checking the connections
Check the leads, couplers, and connectors for stains, rust, moisture, etc.
1. Disconnect:
   • Lead
   • Coupler
   • Connector

   **NOTICE**

   • When disconnecting a coupler, release the coupler lock, hold both sections of the coupler securely, and then disconnect the coupler.
   • There are many types of coupler locks; therefore, be sure to check the type of coupler lock before disconnecting the coupler.

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

3. Connect:
   • Lead
   • Coupler
   • Connector

   **TIP**

   • When connecting a coupler or connector, push both sections of the coupler or connector together until they are connected securely.
   • Make sure all connections are tight.

   **NOTICE**

   When disconnecting a connector, do not pull the leads. Hold both sections of the connector securely, and then disconnect the connector.
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

   **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
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-“.

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<tr>
<td>Six piece tappet set</td>
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<td>Boots band installation tool 90890-01526 YM-01526</td>
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<td>Valve spring compressor 90890-04019 YM-04019</td>
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90890-03174  
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| Sheave fixed block  
90890-04135  
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<tr>
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<td>YU-24460-A</td>
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<tr>
<td>Pressure tester adapter 90890-01352</td>
<td></td>
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<td>YU-33984</td>
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</tr>
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### Model

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<th>Description</th>
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<tr>
<td>1XD2</td>
<td>(YX70ME [for CDN])</td>
</tr>
<tr>
<td>1XD5</td>
<td>(YX70MHE [for sun top models for CDN])</td>
</tr>
<tr>
<td>1XD7</td>
<td>(YX70MNE [for sun top models for CDN])</td>
</tr>
<tr>
<td>1XP2</td>
<td>(YX70MPE [for EPS models for CDN])</td>
</tr>
<tr>
<td>1XPA</td>
<td>(YX70MPHE [for EPS/sun top models for CDN])</td>
</tr>
<tr>
<td>1XPD</td>
<td>(YX70MPNE [for EPS/sun top models for CDN])</td>
</tr>
<tr>
<td>1XP3</td>
<td>(YX700PE [for EPS models for CDN])</td>
</tr>
<tr>
<td>1XPB</td>
<td>(YX700PHE [for EPS/sun top models for CDN])</td>
</tr>
<tr>
<td>1XD3</td>
<td>(YX700DE [for sun top models for CDN])</td>
</tr>
<tr>
<td>1XP4</td>
<td>(YX700PE [for EPS/sun top models for CDN])</td>
</tr>
</tbody>
</table>

### Dimensions

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<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall length</td>
<td>3100 mm (122.0 in)</td>
</tr>
<tr>
<td>Overall width</td>
<td>1570 mm (61.8 in)</td>
</tr>
<tr>
<td>Overall height</td>
<td>1880 mm (74.1 in) (YX70ME/YX70MPE/YX700DE/YX700PE [for Oceania])</td>
</tr>
<tr>
<td></td>
<td>1925 mm (75.8 in) (YX70MHE/YX70MNE/YX70MPHE/YX70MPN E/YX700PE [for Europe]/YX700PHE)</td>
</tr>
<tr>
<td>Seat height</td>
<td>793 mm (31.2 in)</td>
</tr>
<tr>
<td>Wheelbase</td>
<td>2135 mm (84.1 in)</td>
</tr>
<tr>
<td>Ground clearance</td>
<td>300 mm (11.8 in)</td>
</tr>
<tr>
<td>Minimum turning radius</td>
<td>4500 mm (177 in)</td>
</tr>
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### Weight

<table>
<thead>
<tr>
<th>Weight</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curb weight</td>
<td>609.0 kg (1342 lb) (YX70ME/YX700DE)</td>
</tr>
<tr>
<td></td>
<td>615.0 kg (1356 lb) (YX70MPE/YX700PE [for Oceania])</td>
</tr>
<tr>
<td></td>
<td>617.0 kg (1360 lb) (YX70MHE/YX70MNE)</td>
</tr>
<tr>
<td></td>
<td>623.0 kg (1373 lb) (YX70MPHE/YX70MPNE/YX700PE [for Europe]/YX700PHE)</td>
</tr>
<tr>
<td>Maximum loading limit</td>
<td>445 kg (981 lb) (Total weight of rider, passengers, cargo, accessories, and tongue)</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Engine</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Engine type</strong></td>
<td>Liquid cooled 4-stroke, SOHC</td>
</tr>
<tr>
<td><strong>Displacement</strong></td>
<td>686 cm³</td>
</tr>
<tr>
<td><strong>Cylinder arrangement</strong></td>
<td>Single cylinder</td>
</tr>
<tr>
<td><strong>Bore × stroke</strong></td>
<td>102.0 × 84.0 mm (4.02 × 3.31 in)</td>
</tr>
<tr>
<td><strong>Compression ratio</strong></td>
<td>10.00 : 1</td>
</tr>
<tr>
<td><strong>Standard compression pressure (at sea level)</strong></td>
<td>500 kPa (5.0 kgf/cm², 71.1 psi)</td>
</tr>
<tr>
<td><strong>Minimum–maximum</strong></td>
<td>440–560 kPa (4.4–5.6 kgf/cm², 62.6–79.6 psi)</td>
</tr>
<tr>
<td><strong>Starting system</strong></td>
<td>Electric starter</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Fuel</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommended fuel</strong></td>
<td>Regular unleaded gasoline only</td>
</tr>
<tr>
<td><strong>Fuel tank capacity</strong></td>
<td>36.7 L (9.70 US gal, 8.07 Imp.gal)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Engine oil</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lubrication system</strong></td>
<td>Wet sump</td>
</tr>
<tr>
<td><strong>Recommended brand</strong></td>
<td>YAMALUBE</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>SAE 5W-30, 10W-30, 10W-40, 15W-40, 20W-40 or 20W-50</td>
</tr>
<tr>
<td><strong>Recommended engine oil grade</strong></td>
<td>API service SG type or higher, JASO standard MA</td>
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</table>

<table>
<thead>
<tr>
<th>Engine oil quantity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total amount</strong></td>
<td>2.60 L (2.75 US qt, 2.29 Imp.qt)</td>
</tr>
<tr>
<td><strong>Without oil filter cartridge replacement</strong></td>
<td>2.20 L (2.33 US qt, 1.94 Imp.qt)</td>
</tr>
<tr>
<td><strong>With oil filter cartridge replacement</strong></td>
<td>2.30 L (2.43 US qt, 2.02 Imp.qt)</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Final gear oil</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>SAE 80 API GL-4 Hypoid gear oil</td>
</tr>
<tr>
<td><strong>Total amount</strong></td>
<td>0.45 L (0.47 US qt, 0.40 Imp.qt)</td>
</tr>
<tr>
<td><strong>Quantity</strong></td>
<td>0.40 L (0.42 US qt, 0.35 Imp.qt)</td>
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</table>

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<tr>
<th>Differential gear oil</th>
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</thead>
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<tr>
<td><strong>Type</strong></td>
<td>SAE 80 API GL-4 Hypoid gear oil</td>
</tr>
<tr>
<td><strong>Total amount</strong></td>
<td>0.20 L (0.21 US qt, 0.18 Imp.qt)</td>
</tr>
<tr>
<td><strong>Quantity</strong></td>
<td>0.18 L (0.19 US qt, 0.16 Imp.qt)</td>
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<table>
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<tr>
<th>Oil filter</th>
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<tr>
<td><strong>Oil filter type</strong></td>
<td>Cartridge</td>
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<table>
<thead>
<tr>
<th>Oil pump</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Oil pump type</strong></td>
<td>Trochoid</td>
</tr>
<tr>
<td><strong>Inner-rotor-to-outer-rotor-tip clearance</strong></td>
<td>Less than 0.12 mm (0.0047 in)</td>
</tr>
<tr>
<td><strong>Limit</strong></td>
<td>0.20 mm (0.0079 in)</td>
</tr>
<tr>
<td><strong>Outer-rotor-to-oil-pump-housing clearance</strong></td>
<td>0.090–0.170 mm (0.0035–0.0067 in)</td>
</tr>
<tr>
<td><strong>Limit</strong></td>
<td>0.24 mm (0.0094 in)</td>
</tr>
<tr>
<td><strong>Oil-pump-housing-to-inner-and-outer-rotor clearance</strong></td>
<td>0.03–0.10 mm (0.0012–0.0039 in)</td>
</tr>
<tr>
<td><strong>Limit</strong></td>
<td>0.17 mm (0.0067 in)</td>
</tr>
<tr>
<td><strong>Pressure check location</strong></td>
<td>Cylinder head</td>
</tr>
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### ENGINE SPECIFICATIONS

**Cooling system**
- **Radiator capacity (including all routes)**: 2.74 L (2.90 US qt, 2.41 Imp.qt)
- **Coolant reservoir capacity (up to the maximum level mark)**: 0.28 L (0.30 US qt, 0.25 Imp.qt)
- **From low to full level**: 0.17 L (0.18 US qt, 0.15 Imp.qt)
- **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**: 85 °C (185 °F)
- **Valve lift (full open)**: 8.0 mm (0.31 in)

**Radiator core**
- **Width**: 400.0 mm (15.75 in)
- **Height**: 253.4 mm (9.98 in)
- **Depth**: 28.0 mm (1.10 in)

**Water pump**
- **Water pump type**: Single suction centrifugal pump
- **Reduction ratio**: 32/31 (1.032)
- **Impeller shaft tilt limit**: 0.15 mm (0.006 in)

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

**Cylinder head**
- **Combustion chamber volume**: 57.60–61.20 cm³ (3.51–3.73 cu.in)
- **Warpage limit**: 0.03 mm (0.0012 in)

**Camshaft**
- **Drive system**: Chain drive (right)
- **Camshaft lobe dimensions**:
  - **Intake A**
    - Limit: 42.885 mm (1.6884 in)
  - **Intake B**
    - Limit: 36.850 mm (1.4572 in)
  - **Exhaust A**
    - Limit: 43.900 mm (1.7083 in)
  - **Exhaust B**
    - Limit: 36.850 mm (1.4572 in)
### ENGINE SPECIFICATIONS

**Camshaft runout limit**
0.015 mm (0.0006 in)

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**Timing chain**
- **Tensioning system**: Automatic

**Rocker arm/rocker arm shaft**
- **Rocker arm inside diameter**: 12.000–12.018 mm (0.4724–0.4731 in)
- **Rocker arm shaft outside diameter**: 11.981–11.991 mm (0.4717–0.4721 in)
- **Rocker-arm-to-rocker-arm-shaft clearance**: 0.009–0.037 mm (0.0004–0.0015 in)

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**Valve, valve seat, valve guide**
- **Valve clearance (cold)**
  - **Intake**: 0.09–0.13 mm (0.0035–0.0051 in)
  - **Exhaust**: 0.16–0.20 mm (0.0063–0.0079 in)
- **Valve dimensions**
  - **Valve head diameter A (intake)**: 37.90–38.10 mm (1.4921–1.5000 in)
  - **Valve head diameter A (exhaust)**: 31.90–32.10 mm (1.2559–1.2638 in)
  - **Valve face width B (intake)**: 2.26 mm (0.0890 in)
  - **Valve face width B (exhaust)**: 2.26 mm (0.0890 in)
  - **Valve seat width C (intake)**: 1.00–1.20 mm (0.0394–0.0472 in)
    - **Limit**: 1.60 mm (0.0630 in)
  - **Valve seat width C (exhaust)**: 1.00–1.20 mm (0.0394–0.0472 in)
    - **Limit**: 1.60 mm (0.0630 in)
  - **Valve margin thickness D (intake)**: 0.80–1.20 mm (0.0315–0.0472 in)
    - **Limit**: 0.4 mm (0.016 in)
  - **Valve margin thickness D (exhaust)**: 0.80–1.20 mm (0.0315–0.0472 in)
    - **Limit**: 0.4 mm (0.016 in)
  - **Valve stem diameter (intake)**: 5.975–5.990 mm (0.2352–0.2358 in)
    - **Limit**: 5.945 mm (0.2341 in)
### ENGINE SPECIFICATIONS

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<th>Specification</th>
<th>Measurement</th>
</tr>
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<tr>
<td>Valve stem diameter (exhaust)</td>
<td>5.960–5.975 mm (0.2346–0.2352 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>5.930 mm (0.2335 in)</td>
</tr>
<tr>
<td>Valve guide inside diameter (intake)</td>
<td>6.000–6.012 mm (0.2362–0.2367 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>6.050 mm (0.2382 in)</td>
</tr>
<tr>
<td>Valve guide inside diameter (exhaust)</td>
<td>6.000–6.012 mm (0.2362–0.2367 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>6.050 mm (0.2382 in)</td>
</tr>
<tr>
<td>Valve-stem-to-valve-guide clearance (intake)</td>
<td>0.010–0.037 mm (0.0004–0.0015 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.080 mm (0.0031 in)</td>
</tr>
<tr>
<td>Valve-stem-to-valve-guide clearance (exhaust)</td>
<td>0.025–0.052 mm (0.0010–0.0020 in)</td>
</tr>
<tr>
<td>Limit</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>
<tr>
<td>Cylinder head valve seat width (intake)</td>
<td>1.00–1.20 mm (0.0394–0.0472 in)</td>
</tr>
<tr>
<td>Cylinder head valve seat width (exhaust)</td>
<td>1.00–1.20 mm (0.0394–0.0472 in)</td>
</tr>
<tr>
<td><strong>Valve spring</strong></td>
<td></td>
</tr>
<tr>
<td>Free length (intake)</td>
<td>40.38 mm (1.59 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>38.36 mm (1.51 in)</td>
</tr>
<tr>
<td>Free length (exhaust)</td>
<td>40.38 mm (1.59 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>38.36 mm (1.51 in)</td>
</tr>
<tr>
<td>Installed length (intake)</td>
<td>35.00 mm (1.38 in)</td>
</tr>
<tr>
<td>Installed length (exhaust)</td>
<td>35.00 mm (1.38 in)</td>
</tr>
<tr>
<td>Spring rate K1 (intake)</td>
<td>34.18 N/mm (3.49 kgf/mm, 195.16 lbf/in)</td>
</tr>
<tr>
<td>Spring rate K2 (intake)</td>
<td>44.14 N/mm (4.50 kgf/mm, 252.04 lbf/in)</td>
</tr>
<tr>
<td>Spring rate K1 (exhaust)</td>
<td>34.18 N/mm (3.49 kgf/mm, 195.16 lbf/in)</td>
</tr>
<tr>
<td>Spring rate K2 (exhaust)</td>
<td>44.14 N/mm (4.50 kgf/mm, 252.04 lbf/in)</td>
</tr>
<tr>
<td>Installed compression spring force (intake)</td>
<td>171.00–197.00 N (17.44–20.09 kgf, 38.44–44.29 lbf)</td>
</tr>
<tr>
<td>Installed compression spring force (exhaust)</td>
<td>171.00–197.00 N (17.44–20.09 kgf, 38.44–44.29 lbf)</td>
</tr>
<tr>
<td>Spring tilt (intake)</td>
<td>2.5°/1.8 mm (2.5°/0.07 in)</td>
</tr>
<tr>
<td>Spring tilt (exhaust)</td>
<td>2.5°/1.8 mm (2.5°/0.07 in)</td>
</tr>
<tr>
<td><strong>Cylinder</strong></td>
<td></td>
</tr>
<tr>
<td>Cylinder bore</td>
<td>102.000–102.010 mm (4.0157–4.0161 in)</td>
</tr>
<tr>
<td>Wear limit</td>
<td>102.080 mm (4.0189 in)</td>
</tr>
<tr>
<td>Taper limit</td>
<td>0.05 mm (0.002 in)</td>
</tr>
<tr>
<td>Out of round limit</td>
<td>0.05 mm (0.002 in)</td>
</tr>
</tbody>
</table>
**ENGINE SPECIFICATIONS**

### Piston

<table>
<thead>
<tr>
<th>Specification</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piston-to-cylinder clearance</td>
<td>0.030–0.055 mm (0.0012–0.0022 in)</td>
</tr>
<tr>
<td>Piston skirt diameter D</td>
<td>101.955–101.970 mm (4.0140–4.0146 in)</td>
</tr>
<tr>
<td>Height H</td>
<td>10.0 mm (0.39 in)</td>
</tr>
</tbody>
</table>

![Diagram of piston dimensions](image)

<table>
<thead>
<tr>
<th>Offset</th>
<th>0.50 mm (0.0197 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offset direction</td>
<td>Intake side</td>
</tr>
<tr>
<td>Piston pin bore inside diameter</td>
<td>23.004–23.015 mm (0.9057–0.9061 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>23.045 mm (0.9073 in)</td>
</tr>
<tr>
<td>Piston pin outside diameter</td>
<td>22.991–23.000 mm (0.9052–0.9055 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>22.971 mm (0.9044 in)</td>
</tr>
<tr>
<td>Piston-pin-to-piston-pin-bore clearance</td>
<td>0.004–0.024 mm (0.0002–0.0009 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.074 mm (0.0029 in)</td>
</tr>
</tbody>
</table>

### Piston ring

#### Top ring

<table>
<thead>
<tr>
<th>Ring type</th>
<th>Barrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (B × T)</td>
<td>1.20 × 3.80 mm (0.05 × 0.15 in)</td>
</tr>
</tbody>
</table>

![Diagram of top ring dimensions](image)

| Begin gap (installed) | 0.20–0.35 mm (0.008–0.014 in) |
| Limit               | 0.60 mm (0.024 in)             |
| Ring side clearance | 0.030–0.070 mm (0.0012–0.0028 in) |
| Limit               | 0.12 mm (0.0047 in)            |

#### 2nd ring

<table>
<thead>
<tr>
<th>Ring type</th>
<th>Taper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (B × T)</td>
<td>1.20 × 4.00 mm (0.05 × 0.16 in)</td>
</tr>
</tbody>
</table>

![Diagram of 2nd ring dimensions](image)

| Begin gap (installed) | 0.75–0.90 mm (0.03–0.04 in) |
| Limit               | 1.25 mm (0.049 in)          |
| Ring side clearance | 0.030–0.070 mm (0.0012–0.0028 in) |
| Limit               | 0.13 mm (0.0051 in)         |

### Oil ring

<table>
<thead>
<tr>
<th>Dimensions (B × T)</th>
<th>2.50 × 2.80 mm (0.10 × 0.11 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>End gap (installed)</td>
<td>0.20–0.70 mm (0.01–0.03 in)</td>
</tr>
</tbody>
</table>
### Crankshaft
| Width A | 74.92–75.00 mm (2.950–2.953 in) |
| Runout limit C | 0.030 mm (0.0012 in) |
| Big end side clearance D | 0.350–0.650 mm (0.0138–0.0256 in) |

### Balancer
| Balancer drive method | Gear |

### Automatic centrifugal clutch
| Clutch type | Wet, centrifugal automatic |
| Clutch shoe thickness | 1.5 mm (0.06 in) |
| Limit | 1.0 mm (0.04 in) |
| Clutch housing inside diameter | 150.0 mm (5.91 in) |
| Clutch-in revolution | 1950–2050 r/min |
| Clutch-stall revolution | 3550–3650 r/min |

### V-belt
| V-belt width | 33.0–33.6 mm (1.30–1.32 in) |
| Limit | 32.5 mm (1.28 in) |

### Transmission
| Transmission type | V-belt automatic |
| Primary reduction system | V-belt |
| Secondary reduction system | Shaft drive |
| Secondary reduction ratio | $41/21 \times 17/12 \times 33/9$ (10.142) |
| Operation | Right hand operation |
| Gear ratio | 2.554–0.705 : 1 |
| Low range | 31/16 (1.938) |
| High range | 30/21 (1.429) |
| Reverse gear | $23/14 \times 28/23$ (2.000) |
| Drive axle runout limit | 0.06 mm (0.0024 in) |

### Shifting mechanism
| Shift mechanism type | Shift drum and guide bar |
| 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 or equivalent oil |
### Fuel pump

| Pump type | Electrical |

### Fuel injector

| Model/quantity | EAT291/1 |
| Fuel injector resistance | 11.5–12.5 Ω |

### Throttle body

| Type/quantity | 44EHS/1 |
| ID mark | 1XD1 00 |
| Throttle valve size | #100 |

### Throttle position sensor

| Resistance | 2.64–6.16 kΩ |

### Fuel injection sensor

| Crankshaft position sensor resistance | 408.0–612.0 Ω |
| Intake air pressure sensor output voltage | 3.594–3.684 V at 101 kPa (1.01 kgf/cm², 14 psi) |
| Intake air temperature sensor resistance | 5.40–6.60 kΩ at 0 °C (32 °F) |
| Coolant temperature sensor resistance | 2.32–2.59 kΩ at 20 °C (68 °F) |
| Coolant temperature sensor resistance | 310–326 Ω at 80 °C (176 °F) |

### Idling condition

| Engine idling speed | 1550–1650 r/min |
| Intake vacuum | 32.7 kPa (245 mmHg, 9.7 inHg) |
| Water temperature | 75–85 °C (167–185 °F) |
| Oil temperature | 55–65 °C (131–149 °F) |
| Accelerator pedal free play | 12.0–32.0 mm (0.47–1.26 in) |
| CO% (air induction system ON) | 1 % |
| CO% (air induction system OFF) | 5.5–6.5 % |

### Air induction system

| Solenoid resistance | 20–24 Ω |

### Drive train

| Middle gear backlash | 0.10–0.30 mm (0.004–0.012 in) |
| Final gear backlash | 0.13–0.23 mm (0.005–0.009 in) |
| Differential gear backlash | 0.05–0.25 mm (0.002–0.0010 in) |
## CHASSIS SPECIFICATIONS

### Chassis
- **Frame type**: Steel tube frame
- **Caster angle**: 3.7°
- **Camber angle**: 0.4°
- **Kingpin angle**: 12.7°
- **Kingpin offset**: 7.7 mm (0.30 in)
- **Trail**: 19.0 mm (0.75 in)
- **Tread rear (STD)**: 1304.0 mm (51.34 in)
- **Tread front (STD)**: 1320.0 mm (51.97 in)
- **Toe-in (with tires touching the ground)**: 5.0–15.0 mm (0.20–0.59 in)

### Front wheel
- **Wheel type**: Panel wheel
- **Rim size**: 12 × 6.0AT
- **Wheel material**: Steel
- **Wheel travel**: 205 mm (8.1 in)
- **Radial wheel runout limit**: 2.0 mm (0.08 in)
- **Lateral wheel runout limit**: 2.0 mm (0.08 in)

### Rear wheel
- **Wheel type**: Panel wheel
- **Rim size**: 12 × 7.5AT
- **Wheel material**: Steel
- **Wheel travel**: 205 mm (8.1 in)
- **Radial wheel runout limit**: 2.0 mm (0.08 in)
- **Lateral wheel runout limit**: 2.0 mm (0.08 in)

### Front tire
- **Type**: Tubeless
- **Size**: 25 × 8–12NHS
- **Manufacturer/model**: MAXXIS/MU09
- **Wear limit (front)**: 3.0 mm (0.12 in)

### Rear tire
- **Type**: Tubeless
- **Size**: 25 × 10–12NHS
- **Manufacturer/model**: MAXXIS/MU10
- **Wear limit (rear)**: 3.0 mm (0.12 in)

### Tire air pressure (measured on cold tires)
- **Recommended**
  - **Vehicle load**
    - **Front**: 75.0 kPa (0.750 kgf/cm², 11 psi)
    - **Rear**: 90.0 kPa (0.900 kgf/cm², 13 psi)
  - **Vehicle load**
    - **Front**: 75.0 kPa (0.750 kgf/cm², 11 psi)
    - **Rear**: 125.0 kPa (1.250 kgf/cm², 18 psi)
- **Minimum**
  - **Vehicle load**
    - **Front**: 70.0 kPa (0.700 kgf/cm², 10 psi)
# CHASSIS SPECIFICATIONS

<table>
<thead>
<tr>
<th>Rear</th>
<th>Vehicle load 300–445 kg (661–981 lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td>70.0 kPa (0.700 kgf/cm², 10 psi)</td>
</tr>
<tr>
<td>Rear</td>
<td>120.0 kPa (1.200 kgf/cm², 17 psi)</td>
</tr>
</tbody>
</table>

### Front brake
- **Type**: Disc brake
- **Operation**: Unified brake
- **Front disc brake**:
  - Disc outside diameter × thickness: 207.0 × 4.0 mm (8.15 × 0.16 in)
  - Brake disc thickness limit: 3.5 mm (0.14 in)
  - Brake disc deflection limit: 0.1 mm (0.004 in)
  - Brake pad lining thickness (inner): 4.5 mm (0.18 in)
  - Limit: 1.0 mm (0.04 in)
  - Brake pad lining thickness (outer): 4.5 mm (0.18 in)
  - Limit: 1.0 mm (0.04 in)
  - Master cylinder inside diameter: 17.46 mm (0.69 in)
  - Caliper cylinder inside diameter: 32.03 mm × 2 (1.26 in × 2)
  - Specified brake fluid: DOT 4

### Rear brake
- **Type**: Disc brake
- **Operation**: Unified brake
- **Rear disc brake**:
  - Disc outside diameter × thickness: 207.0 × 4.0 mm (8.15 × 0.16 in)
  - Brake disc thickness limit: 3.5 mm (0.14 in)
  - Brake disc deflection limit: 0.1 mm (0.004 in)
  - Brake pad lining thickness (inner): 4.3 mm (0.17 in)
  - Limit: 1.0 mm (0.04 in)
  - Brake pad lining thickness (outer): 4.3 mm (0.17 in)
  - Limit: 1.0 mm (0.04 in)
  - Caliper cylinder inside diameter: 27.00 mm × 2
  - Specified brake fluid: DOT 4

### Parking brake
- **Type**: Disc
- **Disc outside diameter × thickness**: 200.0 × 3.5 mm (7.87 × 0.14 in)
- **Brake disc thickness limit**: 3.0 mm (0.12 in)
- **Brake pad lining thickness**: 3.2 mm (0.13 in)
- **Limit**: 1.0 mm (0.04 in)
- **Brake pad lining thickness**: 3.2 mm (0.13 in)
- **Limit**: 1.0 mm (0.04 in)

### Front suspension
- **Type**: Double wishbone
- **Spring/shock absorber type**: Coil spring/gas-oil damper
- **Wheel travel**: 205 mm (8.1 in)
- **Shock absorber travel**: 123.0 mm (4.84 in)
- **Spring free length**: 334.0 mm (13.15 in)
- **Installed length**: 277.0 mm (10.91 in)
- **Spring rate K1**: 28.00 N/mm (2.86 kgf/mm, 159.88 lbf/in)
- **Spring stroke K1**: 0.0–123.0 mm (0.00–4.84 in)
### Rear suspension

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Double wishbone</td>
</tr>
<tr>
<td>Spring/shock absorber type</td>
<td>Coil spring/gas-oil damper</td>
</tr>
<tr>
<td>Wheel travel</td>
<td>205 mm (8.1 in)</td>
</tr>
<tr>
<td>Rear shock absorber assembly travel</td>
<td>112.0 mm (4.41 in)</td>
</tr>
<tr>
<td>Spring free length</td>
<td>381.2 mm (15.01 in)</td>
</tr>
<tr>
<td>Installed length</td>
<td>316.2 mm (12.45 in)</td>
</tr>
<tr>
<td>Spring rate $K_1$</td>
<td>36.00 N/mm (3.67 kgf/mm, 205.56 lbf/in)</td>
</tr>
<tr>
<td>Spring rate $K_2$</td>
<td>115.00 N/mm (11.73 kgf/mm, 656.65 lbf/in)</td>
</tr>
<tr>
<td>Spring stroke $K_1$</td>
<td>0.0–75.0 mm (0.00–2.95 in)</td>
</tr>
<tr>
<td>Spring stroke $K_2$</td>
<td>75.0–112.0 mm (2.95–4.41 in)</td>
</tr>
</tbody>
</table>
## ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voltage</strong></td>
<td></td>
</tr>
<tr>
<td>System voltage</td>
<td>12 V</td>
</tr>
<tr>
<td><strong>Ignition system</strong></td>
<td></td>
</tr>
<tr>
<td>Ignition system</td>
<td>TCI</td>
</tr>
<tr>
<td>Advancer type</td>
<td>Digital</td>
</tr>
<tr>
<td>Ignition timing (B.T.D.C.)</td>
<td>5.0°/1600 r/min</td>
</tr>
<tr>
<td><strong>Engine control unit</strong></td>
<td></td>
</tr>
<tr>
<td>Model/manufacturer</td>
<td>F8T85871/MITSUBISHI</td>
</tr>
<tr>
<td><strong>Ignition coil</strong></td>
<td></td>
</tr>
<tr>
<td>Minimum ignition spark gap</td>
<td>6.0 mm (0.24 in)</td>
</tr>
<tr>
<td>Primary coil resistance</td>
<td>2.16–2.64 Ω</td>
</tr>
<tr>
<td>Secondary coil resistance</td>
<td>8.64–12.96 kΩ</td>
</tr>
<tr>
<td><strong>Spark plug cap</strong></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Resin</td>
</tr>
<tr>
<td>Resistance</td>
<td>7.5–12.5 kΩ</td>
</tr>
<tr>
<td><strong>AC magneto</strong></td>
<td></td>
</tr>
<tr>
<td>Standard output</td>
<td>14.0 V, 36.4 A at 5000 r/min</td>
</tr>
<tr>
<td>Stator coil resistance</td>
<td>0.09–0.13 Ω</td>
</tr>
<tr>
<td><strong>Rectifier/regulator</strong></td>
<td></td>
</tr>
<tr>
<td>Regulator type</td>
<td>Semi conductor-short circuit</td>
</tr>
<tr>
<td>Regulated voltage (DC)</td>
<td>14.3–14.7 V</td>
</tr>
<tr>
<td>Rectifier capacity (DC)</td>
<td>50.0 A</td>
</tr>
<tr>
<td>Withstand voltage</td>
<td>40.0 V</td>
</tr>
<tr>
<td><strong>Battery</strong></td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>U1-H11L</td>
</tr>
<tr>
<td>Voltage, capacity</td>
<td>12 V, 28.0 Ah</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>GS</td>
</tr>
<tr>
<td>Ten hour rate charging current</td>
<td>2.8 A</td>
</tr>
<tr>
<td><strong>Headlight</strong></td>
<td></td>
</tr>
<tr>
<td>Bulb type</td>
<td>Halogen bulb</td>
</tr>
<tr>
<td><strong>Bulb voltage, wattage × quantity</strong></td>
<td></td>
</tr>
<tr>
<td>Headlight</td>
<td>12 V, 35.0/35.0 W × 2</td>
</tr>
<tr>
<td>Tail/brake light</td>
<td>12 V, 5.0/21.0 W × 2</td>
</tr>
<tr>
<td><strong>Indicator and warning lights</strong></td>
<td></td>
</tr>
<tr>
<td>Neutral indicator light</td>
<td>LED</td>
</tr>
<tr>
<td>Reverse indicator light</td>
<td>LED</td>
</tr>
<tr>
<td>Coolant temperature warning light</td>
<td>LED</td>
</tr>
<tr>
<td>Parking brake indicator light</td>
<td>LED</td>
</tr>
<tr>
<td>On-Command four-wheel-drive/differential gear lock indicator</td>
<td>LCD</td>
</tr>
</tbody>
</table>
**ELECTRICAL SPECIFICATIONS**

| Engine trouble warning light | LED |
| EPS warning light             | LED (for EPS models) |
| High-range indicator light    | LED |
| Low-range indicator light     | LED |
| Differential gear lock indicator light | LED |
| Helmet/seat belt indicator light | 14 V, 0.85 W × 2 |

**Electric starting system**
- **System type**: Constant mesh

**Starter motor**
- **Power output**: 0.80 kW
- **Armature coil resistance**: 0.025–0.035 Ω
- **Brush overall length**: 12.5 mm (0.49 in)
- **Limit**: 5.00 mm (0.20 in)
- **Brush spring force**: 7.65–10.01 N (780–1021 gf, 27.54–36.03 oz)
- **Commutator diameter**: 28.0 mm (1.10 in)
- **Limit**: 27.0 mm (1.06 in)
- **Mica undercut (depth)**: 0.70 mm (0.03 in)

**Starter relay**
- **Amperage**: 180.0 A
- **Coil resistance**: 4.18–4.62 Ω

**Horn (for Europe and Oceania)**
- **Horn type**: Plane
- **Quantity**: 1 pc
- **Maximum amperage**: 1.0 A

**Fuel sender unit**
- **Sender unit resistance (full)**: 19.0–21.0 Ω
- **Sender unit resistance (empty)**: 139.0–141.0 Ω

**EPS torque sensor**
- **Coil resistance**: 0.875–1.625 kΩ (for EPS models)

**Auxiliary DC output**
- **Jack capacity**: 12 V, 10.0 A (120 W)

**Fuses**
- **Main fuse**: 40.0 A
- **Headlight fuse**: 15.0 A
- **Signaling system fuse**: 10.0 A
- **Ignition fuse**: 10.0 A
- **Radiator fan motor fuse**: 25.0 A
- **Auxiliary DC jack fuse**: 10.0 A
- **Fuel injection system fuse**: 10.0 A
- **Backup fuse**: 10.0 A
- **Differential motor fuse**: 10.0 A
- **EPS fuse**: 40.0 A (for EPS models)
- **Spare fuse**: 25.0 A
- **Spare fuse**: 15.0 A
- **Spare fuse**: 10.0 A × 2
GENERAL TIGHTENING TORQUE SPECIFICATIONS

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

A. Distance between flats
B. Outside thread diameter

<table>
<thead>
<tr>
<th>A (nut)</th>
<th>B (bolt)</th>
<th>General tightening torques</th>
</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>
<td>55</td>
</tr>
<tr>
<td>19 mm</td>
<td>14 mm</td>
<td>85</td>
</tr>
<tr>
<td>22 mm</td>
<td>16 mm</td>
<td>130</td>
</tr>
</tbody>
</table>
## ENGINE TIGHTENING TORQUES

<table>
<thead>
<tr>
<th>Item</th>
<th>Thread size</th>
<th>Q’ty</th>
<th>Tightening torque</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust pipe nut</td>
<td>M8</td>
<td>2</td>
<td>20 Nm (2.0 m-kgf, 14 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Muffler bolt</td>
<td>M8</td>
<td>1</td>
<td>23 Nm (2.3 m-kgf, 17 ft-lbf)</td>
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<tr>
<td>Muffler mount shaft</td>
<td>M8</td>
<td>1</td>
<td>17 Nm (1.7 m-kgf, 12 ft-lbf)</td>
<td></td>
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<tr>
<td>Spark arrester bolt</td>
<td>M6</td>
<td>4</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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<tr>
<td>Intake air pressure sensor screw</td>
<td>M5</td>
<td>1</td>
<td>3.6 Nm (0.36 m-kgf, 2.6 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>Injector fuel rail screw</td>
<td>M6</td>
<td>2</td>
<td>5 Nm (0.5 m-kgf, 3.6 ft-lbf)</td>
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</tr>
<tr>
<td>Throttle cable locknut (throttle body end, air intake silencer side)</td>
<td>M7</td>
<td>1</td>
<td>4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Throttle cable locknut (throttle body end, throttle body side)</td>
<td>M6</td>
<td>1</td>
<td>0.8 Nm (0.08 m-kgf, 0.6 ft-lbf)</td>
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<tr>
<td>Throttle cable housing cover screw</td>
<td>M4</td>
<td>3</td>
<td>2.0 Nm (0.20 m-kgf, 1.4 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Cylinder head stud bolt (exhaust pipe)</td>
<td>M8</td>
<td>2</td>
<td>15 Nm (1.5 m-kgf, 11 ft-lbf)</td>
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<tr>
<td>Reed valve cover bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td>I = 39 mm (1.54 in)</td>
</tr>
<tr>
<td>Cylinder head bolt</td>
<td>M9</td>
<td>4</td>
<td>35 Nm (3.5 m-kgf, 25 ft-lbf)</td>
<td>I = 135 mm (5.31 in), I = 145 mm (5.71 in)</td>
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<tr>
<td>Cylinder head bolt</td>
<td>M9</td>
<td>2</td>
<td>38 Nm (3.8 m-kgf, 27 ft-lbf)</td>
<td>I = 39 mm (1.54 in)</td>
</tr>
<tr>
<td>Cylinder head bolt</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>Tappet cover bolt</td>
<td>M6</td>
<td>8</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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<tr>
<td>Camshaft sprocket cover bolt</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>Thermostat cover bolt</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>Thermostat cover air bleed bolt</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>
<tr>
<td>Oil check bolt</td>
<td>M8</td>
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<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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<tr>
<td>Camshaft sprocket bolt</td>
<td>M7</td>
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<td>20 Nm (2.0 m-kgf, 14 ft-lbf)</td>
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<tr>
<td>Decompression assembly bolt</td>
<td>M7</td>
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<td>20 Nm (2.0 m-kgf, 14 ft-lbf)</td>
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<tr>
<td>Valve adjusting screw locknut</td>
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<td>4</td>
<td>14 Nm (1.4 m-kgf, 10 ft-lbf)</td>
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<tr>
<td>Bearing retainer bolt (camshaft)</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>Cylinder bolt</td>
<td>M10</td>
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<td>See TIP.</td>
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<tr>
<td>Cylinder bolt</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>
<tr>
<td>Timing chain guide (intake side) bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td></td>
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<tr>
<td>Timing chain tensioner cap bolt</td>
<td>M16</td>
<td>1</td>
<td>20 Nm (2.0 m-kgf, 14 ft-lbf)</td>
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</tr>
<tr>
<td>Item</td>
<td>Thread size</td>
<td>Q’ty</td>
<td>Tightening torque</td>
<td>Remarks</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>-------------</td>
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<td>-----------------------------</td>
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<tr>
<td>Timing chain tensioner bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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</tr>
<tr>
<td>Oil pipe (crankcase to cylinder head) union bolt</td>
<td>M10</td>
<td>1</td>
<td>20 Nm (2.0 m-kgf, 14 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Oil pipe (crankcase to cylinder head) union bolt</td>
<td>M14</td>
<td>2</td>
<td>35 Nm (3.5 m-kgf, 25 ft-lbf)</td>
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<tr>
<td>Oil pipe (crankcase to cylinder head) bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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<tr>
<td>Oil pipe union bolt (AC magneto cover)</td>
<td>M8</td>
<td>2</td>
<td>18 Nm (1.8 m-kgf, 13 ft-lbf)</td>
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<tr>
<td>Thermostat outlet hose guide bolt</td>
<td>M10</td>
<td>1</td>
<td>48 Nm (4.8 m-kgf, 35 ft-lbf)</td>
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<tr>
<td>Crankcase bolt</td>
<td>M8</td>
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<td>26 Nm (2.6 m-kgf, 19 ft-lbf)</td>
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<tr>
<td>Crankcase bolt</td>
<td>M6</td>
<td>13</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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<tr>
<td>Dipstick guide bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Engine oil drain bolt</td>
<td>M14</td>
<td>1</td>
<td>30 Nm (3.0 m-kgf, 22 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Crankcase plug</td>
<td>M16</td>
<td>1</td>
<td>8 Nm (0.8 m-kgf, 5.8 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Crankcase plug</td>
<td>M14</td>
<td>1</td>
<td>18 Nm (1.8 m-kgf, 13 ft-lbf)</td>
<td></td>
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<tr>
<td>Oil filter cartridge</td>
<td>M20</td>
<td>1</td>
<td>17 Nm (1.7 m-kgf, 12 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Oil filter cartridge union bolt</td>
<td>M20</td>
<td>1</td>
<td>30 Nm (3.0 m-kgf, 22 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Timing chain stopper guide (lower) bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Bearing retainer bolt (crankcase)</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td></td>
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<tr>
<td>Oil pump bolt</td>
<td>M6</td>
<td>3</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Oil pump housing cover screw</td>
<td>M5</td>
<td>1</td>
<td>5 Nm (0.5 m-kgf, 3.6 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Water jacket joint bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Water pump outlet hose clamp screw</td>
<td>M5</td>
<td>2</td>
<td>1.5 Nm (0.15 m-kgf, 1.1 ft-lbf)</td>
<td></td>
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<tr>
<td>Water pump housing bolt</td>
<td>M6</td>
<td>3</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td></td>
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<tr>
<td>Coolant drain bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td></td>
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<tr>
<td>Water pump air bleed bolt</td>
<td>M6</td>
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<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Water pump outlet pipe bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td></td>
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<tr>
<td>Crankshaft end accessing screw</td>
<td>M36</td>
<td>1</td>
<td>2.0 Nm (0.20 m-kgf, 1.4 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Timing mark accessing screw</td>
<td>M14</td>
<td>1</td>
<td>1.5 Nm (0.15 m-kgf, 1.1 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Drive select lever shift cable bracket bolt (engine side)</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>AC magneto cover bolt</td>
<td>M6</td>
<td>11</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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</tr>
<tr>
<td>AC magneto rotor nut</td>
<td>M16</td>
<td>1</td>
<td>60 Nm (6.0 m-kgf, 43 ft-lbf)</td>
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<tr>
<td>AC magneto/crankshaft position sensor lead holder bolt</td>
<td>M5</td>
<td>2</td>
<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Starter clutch bolt</td>
<td>M8</td>
<td>3</td>
<td>30 Nm (3.0 m-kgf, 22 ft-lbf)</td>
<td></td>
</tr>
</tbody>
</table>
## TIGHTENING TORQUES

<table>
<thead>
<tr>
<th>Item</th>
<th>Thread size</th>
<th>Q’ty</th>
<th>Tightening torque</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil pump driven sprocket nut</td>
<td>M10</td>
<td>1</td>
<td>22 Nm (2.2 m-kgf, 16 ft-lbf)</td>
<td>Use a lock washer.</td>
</tr>
<tr>
<td>Balancer driven gear nut</td>
<td>M18</td>
<td>1</td>
<td>85 Nm (8.5 m-kgf, 61 ft-lbf)</td>
<td>Use a lock washer.</td>
</tr>
<tr>
<td>Drive belt cover bolt</td>
<td>M6</td>
<td>11</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Bearing housing bolt (primary</td>
<td>M6</td>
<td>4</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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</tr>
<tr>
<td>sheave assembly)</td>
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<td></td>
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<td></td>
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<tr>
<td>Bearing retainer bolt (bearing</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>housing)</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Primary sheave assembly nut</td>
<td>M16</td>
<td>1</td>
<td>190 Nm (19 m-kgf, 137 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Primary sheave cap screw</td>
<td>M4</td>
<td>8</td>
<td>3.0 Nm (0.30 m-kgf, 2.2 ft-lbf)</td>
<td></td>
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<tr>
<td>Secondary sheave assembly nut</td>
<td>M16</td>
<td>1</td>
<td>100 Nm (10 m-kgf, 72 ft-lbf)</td>
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<tr>
<td>Secondary sheave spring retaining nut</td>
<td>M36</td>
<td>1</td>
<td>90 Nm (9.0 m-kgf, 65 ft-lbf)</td>
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<tr>
<td>Drive belt case bolt</td>
<td>M6</td>
<td>8</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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<tr>
<td>Clutch housing assembly bolt</td>
<td>M6</td>
<td>9</td>
<td>10 Nm (1.0 m-kgf, 7.2 ft-lbf)</td>
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</tr>
<tr>
<td>Clutch carrier assembly nut</td>
<td>M22</td>
<td>1</td>
<td>190 Nm (19 m-kgf, 137 ft-lbf)</td>
<td>Left-hand threads Stake.</td>
</tr>
<tr>
<td>Drive select lever unit bolt</td>
<td>M6</td>
<td>5</td>
<td>13 Nm (1.3 m-kgf, 9.4 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Drive select lever shift cable</td>
<td>M8</td>
<td>2</td>
<td>16 Nm (1.6 m-kgf, 12 ft-lbf)</td>
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</tr>
<tr>
<td>bracket bolt (drive select lever</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>side)</td>
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<tr>
<td>Drive select lever shift cable</td>
<td>M14</td>
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<td>39 Nm (3.9 m-kgf, 28 ft-lbf)</td>
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<tr>
<td>lock-nut</td>
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<tr>
<td>Shift arm bolt</td>
<td>M6</td>
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<td>14 Nm (1.4 m-kgf, 10 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Shift lever cover bolt</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>Shift lever 2 bolt</td>
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<td>14 Nm (1.4 m-kgf, 10 ft-lbf)</td>
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<tr>
<td>Shift drum stopper bolt</td>
<td>M14</td>
<td>1</td>
<td>18 Nm (1.8 m-kgf, 13 ft-lbf)</td>
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</tr>
<tr>
<td>Middle drive pinion gear nut</td>
<td>M22</td>
<td>1</td>
<td>190 Nm (19 m-kgf, 137 ft-lbf)</td>
<td>Stake.</td>
</tr>
<tr>
<td>Middle drive shaft bearing</td>
<td>M8</td>
<td>4</td>
<td>32 Nm (3.2 m-kgf, 23 ft-lbf)</td>
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</tr>
<tr>
<td>housing bolt</td>
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<td></td>
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<td>Stake.</td>
</tr>
<tr>
<td>Middle drive shaft bearing</td>
<td>M8</td>
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<td>29 Nm (2.9 m-kgf, 21 ft-lbf)</td>
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</tr>
<tr>
<td>retainer bolt</td>
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<td></td>
<td>Left-hand threads</td>
</tr>
<tr>
<td>Front drive shaft yoke nut</td>
<td>M16</td>
<td>1</td>
<td>190 Nm (19 m-kgf, 137 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>(middle gear side)</td>
<td></td>
<td></td>
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<tr>
<td>Middle driven shaft bearing</td>
<td>M55</td>
<td>1</td>
<td>80 Nm (8.0 m-kgf, 58 ft-lbf)</td>
<td>Left-hand threads</td>
</tr>
</tbody>
</table>
### TIGHTENING TORQUES

<table>
<thead>
<tr>
<th>Item</th>
<th>Thread size</th>
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<th>Tightening torque</th>
<th>Remarks</th>
</tr>
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<tbody>
<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 threads</td>
</tr>
<tr>
<td>Rear drive shaft yoke nut (middle gear side)</td>
<td>M16</td>
<td>1</td>
<td>190 Nm (19 m·kgf, 137 ft·lbf)</td>
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</tr>
<tr>
<td>Starter motor bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
<td>Left-hand threads</td>
</tr>
<tr>
<td>Starter motor cover bolt</td>
<td>M5</td>
<td>2</td>
<td>4.9 Nm (0.49 m·kgf, 3.5 ft·lbf)</td>
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</tr>
<tr>
<td>Brush set bolt</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 nut</td>
<td>M6</td>
<td>1</td>
<td>4.9 Nm (0.49 m·kgf, 3.5 ft·lbf)</td>
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<tr>
<td>Negative battery lead bolt</td>
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</tr>
<tr>
<td>Spark plug</td>
<td>M10</td>
<td>1</td>
<td>13 Nm (1.3 m·kgf, 9.4 ft·lbf)</td>
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<tr>
<td>Stator coil assembly bolt</td>
<td>M6</td>
<td>3</td>
<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
<td>Left-hand threads</td>
</tr>
<tr>
<td>Crankshaft position sensor bolt</td>
<td>M5</td>
<td>2</td>
<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
<td></td>
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<tr>
<td>Coolant temperature sensor</td>
<td>M12</td>
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<td>18 Nm (1.8 m·kgf, 13 ft·lbf)</td>
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<tr>
<td>Gear position switch bolt</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
<td></td>
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<tr>
<td>Reverse switch</td>
<td>M10</td>
<td>1</td>
<td>17 Nm (1.7 m·kgf, 12 ft·lbf)</td>
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<tr>
<td>Speed sensor bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
<td></td>
</tr>
</tbody>
</table>

**TIP**

**Cylinder bolt**
Temporarily tighten the cylinder bolts to 15 Nm (1.5 m·kgf, 11 ft·lbf), and then tighten them to 50 Nm (5.0 m·kgf, 36 ft·lbf).

**TIP**

**Cylinder head bolt**
Tighten the cylinder head bolts to specification in the proper tightening sequence.

**Cylinder head tightening sequence:**

![Cylinder head tightening sequence diagram]
### CHASSIS TIGHTENING TORQUES

<table>
<thead>
<tr>
<th>Item</th>
<th>Thread size</th>
<th>Q’ty</th>
<th>Tightening torque</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine mounting bolt</td>
<td>M10</td>
<td>4</td>
<td>42 Nm (4.2 m·kgf, 30 ft·lbf)</td>
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<tr>
<td>Engine mounting bolt</td>
<td>M6</td>
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<td>10 Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
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<td>42 Nm (4.2 m·kgf, 30 ft·lbf)</td>
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<tr>
<td>Front fender and front grill bolt</td>
<td>M6</td>
<td>6</td>
<td>4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)</td>
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<tr>
<td>Radiator bracket bolt</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
<td></td>
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<tr>
<td>Radiator fan bolt</td>
<td>M6</td>
<td>4</td>
<td>8 Nm (0.8 m·kgf, 5.8 ft·lbf)</td>
<td></td>
</tr>
<tr>
<td>Radiator pipe holder bolt</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
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</tr>
<tr>
<td>Front fender and electrical components tray bolt</td>
<td>M6</td>
<td>4</td>
<td>4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)</td>
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<tr>
<td>Front grill and front guard bolt</td>
<td>M6</td>
<td>2</td>
<td>4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)</td>
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<tr>
<td>Front guard bolt</td>
<td>M10</td>
<td>4</td>
<td>48 Nm (4.8 m·kgf, 35 ft·lbf)</td>
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<tr>
<td>Front guard cover screw</td>
<td>M6</td>
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<td>2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)</td>
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<tr>
<td>Front grill and frame bolt</td>
<td>M6</td>
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<td>4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)</td>
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<tr>
<td>Headlight screw</td>
<td>M5</td>
<td>6</td>
<td>1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)</td>
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</tr>
<tr>
<td>Front fender and frame bolt</td>
<td>M6</td>
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<td>4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)</td>
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<tr>
<td>Electrical components tray and frame 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>Muffler heat protector plate bolt</td>
<td>M8</td>
<td>2</td>
<td>17 Nm (1.7 m·kgf, 12 ft·lbf)</td>
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<tr>
<td>Side panel bolt</td>
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<td>4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)</td>
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<td>ECU nut</td>
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<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
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<td>Lean angle sensor bolt</td>
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<tr>
<td>Starter relay lead bolt</td>
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<td>3.6 Nm (0.36 m·kgf, 2.6 ft·lbf)</td>
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<tr>
<td>Positive battery lead nut</td>
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<td>1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)</td>
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<tr>
<td>Negative battery lead nut</td>
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<td>1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)</td>
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<tr>
<td>EPS control unit bolt (for EPS models)</td>
<td>M6</td>
<td>1</td>
<td>2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)</td>
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<tr>
<td>V-belt cooling intake duct joint 1 clamp screw (V-belt cooling intake duct side)</td>
<td>M4</td>
<td>1</td>
<td>1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)</td>
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<tr>
<td>V-belt cooling intake duct joint 1 clamp screw (drive belt cover side)</td>
<td>M6</td>
<td>1</td>
<td>2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)</td>
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<tr>
<td>V-belt cooling intake duct joint 2 clamp screw</td>
<td>M4</td>
<td>2</td>
<td>1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)</td>
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</tr>
<tr>
<td>V-belt cooling exhaust duct joint clamp screw (V-belt cooling exhaust duct side)</td>
<td>M4</td>
<td>1</td>
<td>1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)</td>
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<tr>
<td>V-belt cooling exhaust duct joint clamp screw (drive belt cover side)</td>
<td>M6</td>
<td>1</td>
<td>2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)</td>
<td></td>
</tr>
<tr>
<td>Fuel tank retainer bolt</td>
<td>M8</td>
<td>2</td>
<td>16 Nm (1.6 m·kgf, 12 ft·lbf)</td>
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</tr>
<tr>
<td>Item</td>
<td>Thread size</td>
<td>Q’ty</td>
<td>Tightening torque</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------</td>
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<td>---------------------------------------</td>
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<tr>
<td>Fuel tank 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>Fuel tank bracket bolt</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Fuel tank breather hose joint bolt</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Fuel pump nut</td>
<td>M6</td>
<td>6</td>
<td>See TIP</td>
<td></td>
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<tr>
<td>Throttle body joint clamp screw</td>
<td>M5</td>
<td>2</td>
<td>2.8 Nm (0.28 m-kgf, 2.0 ft-lbf)</td>
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<tr>
<td>Air intake silencer joint clamp screw (throttle body side)</td>
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<td>1</td>
<td>3.5 Nm (0.35 m-kgf, 2.5 ft-lbf)</td>
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<tr>
<td>Air intake silencer joint clamp screw (air intake silencer side)</td>
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<td>1</td>
<td>2.0 Nm (0.20 m-kgf, 1.4 ft-lbf)</td>
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<tr>
<td>Air filter case joint clamp screw</td>
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<td>2.0 Nm (0.20 m-kgf, 1.4 ft-lbf)</td>
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<tr>
<td>Air intake duct joint clamp screw</td>
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<td>2.0 Nm (0.20 m-kgf, 1.4 ft-lbf)</td>
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<tr>
<td>Air filter case 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>Coolant reservoir bolt</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Door hinge nut</td>
<td>M6</td>
<td>8</td>
<td>1.3 Nm (0.13 m-kgf, 0.94 ft-lbf)</td>
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<td>Door hinge bolt</td>
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<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Door handle latch nut</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 skid plate bolt</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Rear skid plate 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>Lower panel and floor board 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>Lower panel and frame 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>Frame cross member bolt</td>
<td>M8</td>
<td>4</td>
<td>17 Nm (1.7 m-kgf, 12 ft-lbf)</td>
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<tr>
<td>Exhaust pipe heat protector plate bolt</td>
<td>M8</td>
<td>2</td>
<td>17 Nm (1.7 m-kgf, 12 ft-lbf)</td>
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<tr>
<td>Exhaust pipe heat protector plate bolt</td>
<td>M6</td>
<td>2</td>
<td>8 Nm (0.8 m-kgf, 5.8 ft-lbf)</td>
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<tr>
<td>Front wheel axle nut</td>
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<td>350 Nm (35 m-kgf, 253 ft-lbf)</td>
<td>Stake.</td>
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<tr>
<td>Front wheel nut</td>
<td>M12</td>
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<td>75 Nm (7.5 m-kgf, 54 ft-lbf)</td>
<td>Stake.</td>
</tr>
<tr>
<td>Rear wheel axle nut</td>
<td>M24</td>
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<td>350 Nm (35 m-kgf, 253 ft-lbf)</td>
<td>Stake.</td>
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<tr>
<td>Rear wheel nut</td>
<td>M12</td>
<td>8</td>
<td>75 Nm (7.5 m-kgf, 54 ft-lbf)</td>
<td>Stake.</td>
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<tr>
<td>Front brake disc guard bolt</td>
<td>M6</td>
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<td>9 Nm (0.9 m-kgf, 6.5 ft-lbf)</td>
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<tr>
<td>Front brake caliper bolt</td>
<td>M10</td>
<td>4</td>
<td>48 Nm (4.8 m-kgf, 35 ft-lbf)</td>
<td></td>
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<tr>
<td>Front brake disc bolt</td>
<td>M8</td>
<td>8</td>
<td>30 Nm (3.0 m-kgf, 22 ft-lbf)</td>
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<tr>
<td>Front brake caliper retaining pin nut</td>
<td>M8</td>
<td>2</td>
<td>22 Nm (2.2 m-kgf, 16 ft-lbf)</td>
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<tr>
<td>Front brake pad bolt</td>
<td>M10</td>
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<td>17 Nm (1.7 m-kgf, 12 ft-lbf)</td>
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<tr>
<td>Front brake caliper guide pin</td>
<td>M8</td>
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<td>17 Nm (1.7 m-kgf, 12 ft-lbf)</td>
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<tr>
<td>Front 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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<td>Rear brake disc guard bolt</td>
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<td>9 Nm (0.9 m-kgf, 6.5 ft-lbf)</td>
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<tr>
<td>Rear brake disc cleaning plate bolt</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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<td>-------------------------------------</td>
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<tr>
<td>Rear 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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<td>Rear brake caliper bolt</td>
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<tr>
<td>Rear brake caliper retaining pin</td>
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<tr>
<td>Rear brake pad bolt</td>
<td>M10</td>
<td>4</td>
<td>17 Nm (1.7 m·kgf, 12 ft·lbf)</td>
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</tr>
<tr>
<td>Rear brake caliper guide pin</td>
<td>M8</td>
<td>2</td>
<td>17 Nm (1.7 m·kgf, 12 ft·lbf)</td>
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<tr>
<td>Rear 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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<td>Brake pipe flare nut</td>
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<tr>
<td>Front brake hose joint bolt</td>
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<tr>
<td>Rear brake hose joint bolt</td>
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<tr>
<td>Front brake hose 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>Rear brake hose holder bolt</td>
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<td>Front brake hose union bolt</td>
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<tr>
<td>Rear brake hose union bolt</td>
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<td>27 Nm (2.7 m·kgf, 20 ft·lbf)</td>
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<td>Brake master cylinder reservoir cap</td>
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<td>Brake master cylinder reservoir</td>
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<td>clamp screw</td>
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<td>Parking brake cable holder bolt</td>
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<td>Parking brake caliper guide pin</td>
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<tr>
<td>Parking brake caliper retaining pin</td>
<td>M8</td>
<td>1</td>
<td>22 Nm (2.2 m·kgf, 16 ft·lbf)</td>
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</tr>
<tr>
<td>Parking brake pad bolt</td>
<td>M8</td>
<td>2</td>
<td>17 Nm (1.7 m·kgf, 12 ft·lbf)</td>
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<tr>
<td>Parking brake caliper arm nut</td>
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<td>17 Nm (1.7 m·kgf, 12 ft·lbf)</td>
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</tr>
<tr>
<td>Brake master cylinder bolt</td>
<td>M8</td>
<td>2</td>
<td>16 Nm (1.6 m·kgf, 12 ft·lbf)</td>
<td></td>
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<tr>
<td>Pedal assembly bolt</td>
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<td>16 Nm (1.6 m·kgf, 12 ft·lbf)</td>
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<tr>
<td>Brake pedal rod locknut</td>
<td>M8</td>
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<td>17 Nm (1.7 m·kgf, 12 ft·lbf)</td>
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<tr>
<td>Throttle cable locknut (accelerator</td>
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<td>2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)</td>
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</tr>
<tr>
<td>pedal end)</td>
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<tr>
<td>Parking brake lever bolt</td>
<td>M6</td>
<td>2</td>
<td>13 Nm (1.3 m·kgf, 9.4 ft·lbf)</td>
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<tr>
<td>Parking brake caliper bolt</td>
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<td>40 Nm (4.0 m·kgf, 29 ft·lbf)</td>
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<tr>
<td>Parking brake disc nut</td>
<td>M6</td>
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<td>10 Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
<td></td>
</tr>
<tr>
<td>Parking brake cable locknut</td>
<td>M6</td>
<td>2</td>
<td>16 Nm (1.6 m·kgf, 12 ft·lbf)</td>
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</tr>
<tr>
<td>Front arm nut</td>
<td>M10</td>
<td>8</td>
<td>45 Nm (4.5 m·kgf, 33 ft·lbf)</td>
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<tr>
<td>Front 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>Steering knuckle nut</td>
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<td>4</td>
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<tr>
<td>Front arm protector bolt</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
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</tr>
<tr>
<td>Steering wheel nut</td>
<td>M12</td>
<td>1</td>
<td>35 Nm (3.5 m·kgf, 25 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>
</tr>
</thead>
<tbody>
<tr>
<td>Steering column bolt (except for EPS models)</td>
<td>M8</td>
<td>4</td>
<td>21 Nm (2.1 m·kgf, 15 ft·lbf)</td>
<td></td>
</tr>
<tr>
<td>EPS unit bolt (for EPS models)</td>
<td>M8</td>
<td>4</td>
<td>21 Nm (2.1 m·kgf, 15 ft·lbf)</td>
<td></td>
</tr>
<tr>
<td>EPS unit bracket bolt (for EPS models)</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
<td></td>
</tr>
<tr>
<td>Steering joint bolt</td>
<td>M8</td>
<td>2</td>
<td>27 Nm (2.7 m·kgf, 20 ft·lbf)</td>
<td></td>
</tr>
<tr>
<td>Steering assembly bolt</td>
<td>M10</td>
<td>4</td>
<td>27 Nm (2.7 m·kgf, 20 ft·lbf)</td>
<td>See TIP.</td>
</tr>
<tr>
<td>Tie-rod end locknut</td>
<td>M12</td>
<td>2</td>
<td>40 Nm (4.0 m·kgf, 29 ft·lbf)</td>
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</tr>
<tr>
<td>Steering knuckle and tie-rod end nut</td>
<td>M12</td>
<td>2</td>
<td>39 Nm (3.9 m·kgf, 28 ft·lbf)</td>
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<tr>
<td>Rear arm nut</td>
<td>M10</td>
<td>4</td>
<td>45 Nm (4.5 m·kgf, 33 ft·lbf)</td>
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<tr>
<td>Rear shock absorber assembly nut</td>
<td>M12</td>
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<td>82 Nm (8.2 m·kgf, 59 ft·lbf)</td>
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<tr>
<td>Stabilizer joint nut</td>
<td>M10</td>
<td>4</td>
<td>60 Nm (6.0 m·kgf, 43 ft·lbf)</td>
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<tr>
<td>Stabilizer holder bolt</td>
<td>M10</td>
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<td>85 Nm (8.5 m·kgf, 61 ft·lbf)</td>
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<td>Rear knuckle nut</td>
<td>M12</td>
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<td>85 Nm (8.5 m·kgf, 61 ft·lbf)</td>
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<tr>
<td>Rear arm protector bolt</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
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<tr>
<td>Rear knuckle grease nipple</td>
<td>M6</td>
<td>4</td>
<td>3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)</td>
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<tr>
<td>Differential gear oil filler bolt</td>
<td>M14</td>
<td>1</td>
<td>23 Nm (2.3 m·kgf, 17 ft·lbf)</td>
<td></td>
</tr>
<tr>
<td>Differential gear oil drain bolt</td>
<td>M10</td>
<td>1</td>
<td>10 Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
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<tr>
<td>Differential motor bolt</td>
<td>M6</td>
<td>3</td>
<td>11 Nm (1.1 m·kgf, 8.0 ft·lbf)</td>
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<tr>
<td>Front drive shaft yoke nut</td>
<td>M14</td>
<td>1</td>
<td>62 Nm (6.2 m·kgf, 45 ft·lbf)</td>
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<tr>
<td>Differential case bolt</td>
<td>M8</td>
<td>5</td>
<td>24 Nm (2.4 m·kgf, 17 ft·lbf)</td>
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<tr>
<td>Front drive shaft universal joint yoke nut</td>
<td>M16</td>
<td>1</td>
<td>150 Nm (15 m·kgf, 108 ft·lbf)</td>
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<tr>
<td>Differential assembly nut</td>
<td>M12</td>
<td>1</td>
<td>105 Nm (10.5 m·kgf, 76 ft·lbf)</td>
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</tr>
<tr>
<td>Differential assembly bolt</td>
<td>M10</td>
<td>2</td>
<td>60 Nm (6.0 m·kgf, 43 ft·lbf)</td>
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</tr>
<tr>
<td>Differential assembly bracket nut</td>
<td>M10</td>
<td>1</td>
<td>60 Nm (6.0 m·kgf, 43 ft·lbf)</td>
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<tr>
<td>Support bearing bracket bolt</td>
<td>M8</td>
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<td>18 Nm (1.8 m·kgf, 13 ft·lbf)</td>
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<tr>
<td>Final gear oil filler bolt</td>
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<td>23 Nm (2.3 m·kgf, 17 ft·lbf)</td>
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</tr>
<tr>
<td>Final gear oil drain bolt</td>
<td>M10</td>
<td>1</td>
<td>23 Nm (2.3 m·kgf, 17 ft·lbf)</td>
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<tr>
<td>Final drive assembly bracket bolt</td>
<td>M8</td>
<td>6</td>
<td>33 Nm (3.3 m·kgf, 24 ft·lbf)</td>
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<tr>
<td>Final drive assembly nut</td>
<td>M12</td>
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<td>105 Nm (10.5 m·kgf, 76 ft·lbf)</td>
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<tr>
<td>Rear drive shaft yoke nut (final drive assembly side)</td>
<td>M14</td>
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<td>97 Nm (9.7 m·kgf, 70 ft·lbf)</td>
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<tr>
<td>Final drive pinion gear bearing housing bolt</td>
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<td>26 Nm (2.6 m·kgf, 19 ft·lbf)</td>
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<tr>
<td>Ring gear stopper nut</td>
<td>M8</td>
<td>1</td>
<td>16 Nm (1.6 m·kgf, 12 ft·lbf)</td>
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<tr>
<td>Final drive case cover bolt</td>
<td>M10</td>
<td>8</td>
<td>52 Nm (5.2 m·kgf, 38 ft·lbf)</td>
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<tr>
<td>Driver seat frame bolt</td>
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<tr>
<td>Item</td>
<td>Thread size</td>
<td>Q'ty</td>
<td>Tightening torque</td>
<td>Remarks</td>
</tr>
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<td>-------------------------------------------</td>
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<tr>
<td>Center passenger seat frame bolt</td>
<td>M8</td>
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<td>23 Nm (2.3 m-kgf, 17 ft-lbf)</td>
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<tr>
<td>Outer passenger seat frame bolt</td>
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<td>23 Nm (2.3 m-kgf, 17 ft-lbf)</td>
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<tr>
<td>Seat back bolt</td>
<td>M6</td>
<td>9</td>
<td>6 Nm (0.6 m-kgf, 4.3 ft-lbf)</td>
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<tr>
<td>Headrest bolt</td>
<td>M6</td>
<td>9</td>
<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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</tr>
<tr>
<td>Seat belt bolt</td>
<td>M12</td>
<td>6</td>
<td>59 Nm (5.9 m-kgf, 43 ft-lbf)</td>
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<tr>
<td>Seat belt buckle bolt</td>
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<td>59 Nm (5.9 m-kgf, 43 ft-lbf)</td>
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<tr>
<td>Seat belt guide bolt</td>
<td>M11</td>
<td>3</td>
<td>59 Nm (5.9 m-kgf, 43 ft-lbf)</td>
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<tr>
<td>Passenger handhold bracket bolt</td>
<td>M8</td>
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<td>16 Nm (1.6 m-kgf, 12 ft-lbf)</td>
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</tr>
<tr>
<td>Passenger handhold stopper nut</td>
<td>M6</td>
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<td>3.0 Nm (0.30 m-kgf, 2.2 ft-lbf)</td>
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</tr>
<tr>
<td>Left floor board and frame bolt</td>
<td>M6</td>
<td>6</td>
<td>4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Center floor board and frame bolt</td>
<td>M6</td>
<td>2</td>
<td>4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Right floor board and frame bolt</td>
<td>M6</td>
<td>6</td>
<td>4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)</td>
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</tr>
<tr>
<td>Center floor board and left floor board</td>
<td>M6</td>
<td>4</td>
<td>4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)</td>
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<tr>
<td>Center floor board and right floor board</td>
<td>M6</td>
<td>5</td>
<td>4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)</td>
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<tr>
<td>Instrument panel bolt</td>
<td>M6</td>
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<td>4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)</td>
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<tr>
<td>Meter assembly nut</td>
<td>M5</td>
<td>3</td>
<td>3.8 Nm (0.38 m-kgf, 2.8 ft-lbf)</td>
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<tr>
<td>Meter assembly bracket 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>Glove compartment latch plate screw</td>
<td>M4</td>
<td>1</td>
<td>1.3 Nm (0.13 m-kgf, 0.94 ft-lbf)</td>
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<tr>
<td>Gas spring assembly ball stud nut</td>
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<td>16 Nm (1.6 m-kgf, 12 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Tail/brake light nut</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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</tr>
<tr>
<td>Cargo bed release lever bolt</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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</tr>
<tr>
<td>Cargo bed release lever 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>Cargo hook nut</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>Tailgate shaft bolt</td>
<td>M6</td>
<td>3</td>
<td>7 Nm (0.7 m-kgf, 5.1 ft-lbf)</td>
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<tr>
<td>Tailgate cable</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>Tailgate cable bracket bolt</td>
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<td>9 Nm (0.9 m-kgf, 6.5 ft-lbf)</td>
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<tr>
<td>Cargo bed heat protector plate bolt</td>
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<td>5</td>
<td>8 Nm (0.8 m-kgf, 5.8 ft-lbf)</td>
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</tr>
<tr>
<td>Left side frame nut (front)</td>
<td>M10</td>
<td>2</td>
<td>65 Nm (6.5 m-kgf, 47 ft-lbf)</td>
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</tr>
<tr>
<td>Left side frame nut (rear)</td>
<td>M10</td>
<td>1</td>
<td>48 Nm (4.8 m-kgf, 35 ft-lbf)</td>
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<tr>
<td>Right side frame nut (front)</td>
<td>M10</td>
<td>2</td>
<td>65 Nm (6.5 m-kgf, 47 ft-lbf)</td>
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<tr>
<td>Right side frame nut (rear)</td>
<td>M10</td>
<td>1</td>
<td>48 Nm (4.8 m-kgf, 35 ft-lbf)</td>
<td></td>
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<tr>
<td>Front top frame bolt</td>
<td>M10</td>
<td>4</td>
<td>48 Nm (4.8 m-kgf, 35 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Rear top frame bolt</td>
<td>M10</td>
<td>4</td>
<td>48 Nm (4.8 m-kgf, 35 ft-lbf)</td>
<td></td>
</tr>
<tr>
<td>Rear center frame bolt</td>
<td>M10</td>
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<td>48 Nm (4.8 m-kgf, 35 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>
</tr>
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<tbody>
<tr>
<td>Rear left frame bolt</td>
<td>M10</td>
<td>4</td>
<td>48 Nm (4.8 m·kgf, 35 ft·lbf)</td>
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<tr>
<td>Rear right frame bolt</td>
<td>M10</td>
<td>4</td>
<td>48 Nm (4.8 m·kgf, 35 ft·lbf)</td>
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<tr>
<td>Sun top front bracket screw (for sun top models)</td>
<td>M6</td>
<td>8</td>
<td>3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)</td>
<td></td>
</tr>
<tr>
<td>Sun top rear bracket screw (for sun top models)</td>
<td>M6</td>
<td>8</td>
<td>3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)</td>
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</tr>
<tr>
<td>Sun top lower bracket bolt (for sun top models)</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
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</tr>
<tr>
<td>Sun top lower bracket nut (for sun top models)</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
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<tr>
<td>Intake air temperature sensor screw</td>
<td>M5</td>
<td>1</td>
<td>1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)</td>
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<tr>
<td>Rectifier/regulator 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>Ground lead bolt</td>
<td>M6</td>
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<td>Ignition coil 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>Horn lead nut (for Europe and Oceania)</td>
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<td>2</td>
<td>2.3 Nm (0.23 m·kgf, 1.7 ft·lbf)</td>
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<tr>
<td>Horn nut (for Europe and Oceania)</td>
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<td>1</td>
<td>7 Nm (0.7 m·kgf, 5.1 ft·lbf)</td>
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</tbody>
</table>

**TIP**

**Enclosure bolt and nut**
Tighten the enclosure bolts and nuts to specification in the proper tightening sequence.

**Enclosure tightening sequence:**

![Enclosure tightening sequence diagram]

**TIP**

**Steering assembly bolt**
Tighten the steering assembly bolts to 48 Nm (4.8 m·kgf, 35 ft·lbf) in the proper tightening sequence.
Steering assembly tightening sequence:

TIP

**Fuel pump nut**
Tighten the fuel pump nuts to 7 Nm (0.7 m·kgf, 5.1 ft·lbf) in the proper tightening sequence.

Fuel pump tightening sequence:

TIP

**Fuel tank bolt**
Tighten the fuel tank bolts and fuel tank retainer bolts to specification in the proper tightening sequence.

Fuel tank tightening sequence:

TIP

**Final drive assembly bolt and nut**
Tighten the final drive assembly bolts and nuts to specification in the proper tightening sequence.
Final drive assembly tightening sequence:
<table>
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<th>Lubricant/Sealant</th>
</tr>
</thead>
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</tr>
<tr>
<td>Bearings</td>
<td></td>
</tr>
<tr>
<td>O-rings</td>
<td></td>
</tr>
<tr>
<td>Cylinder head bolts</td>
<td></td>
</tr>
<tr>
<td>Crankshaft pin</td>
<td></td>
</tr>
<tr>
<td>Connecting rod big end thrust surface</td>
<td></td>
</tr>
<tr>
<td>Crankshaft sprocket</td>
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</tr>
<tr>
<td>Inner race (crankshaft)</td>
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</tr>
<tr>
<td>Buffer boss (crankshaft)</td>
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<tr>
<td>Crankshaft seal</td>
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<tr>
<td>Piston pin</td>
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<tr>
<td>Piston rings and ring grooves</td>
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<tr>
<td>Valve stems and stem ends (intake and exhaust)</td>
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</tr>
<tr>
<td>Valve stem seals (intake and exhaust)</td>
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</tr>
<tr>
<td>Rocker arm shafts</td>
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<tr>
<td>Camshaft lobes</td>
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<tr>
<td>Decompressor lever pin</td>
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</tr>
<tr>
<td>Decompressor lever</td>
<td></td>
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<tr>
<td>Rocker arms (intake and exhaust)</td>
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<tr>
<td>Oil pump shaft</td>
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<tr>
<td>O-ring (oil filter cartridge)</td>
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<tr>
<td>Water pump impeller shaft</td>
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<tr>
<td>Dipstick mating surface</td>
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<tr>
<td>Starter idler gear inner surface</td>
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<tr>
<td>Starter idler gear shaft</td>
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<td>Starter wheel gear</td>
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<td>Torque limiter</td>
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<td>Clutch housing shaft end</td>
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<td>Clutch carrier assembly</td>
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<tr>
<td>One-way clutch bearing</td>
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<td>Clutch dog</td>
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<tr>
<td>Reverse idle gear shaft</td>
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<tr>
<td>Reverse idle gear</td>
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2-27
<table>
<thead>
<tr>
<th>Lubrication point</th>
<th>Lubricant/Sealant</th>
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<tbody>
<tr>
<td>Middle driven shaft splines</td>
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<tr>
<td>Shift drum</td>
<td>[ ]</td>
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<tr>
<td>Shift forks and shift fork guide bar</td>
<td>[ ]</td>
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<tr>
<td>Shift drum stopper ball</td>
<td>[ ]</td>
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<tr>
<td>Shift lever 1 and shift lever 2</td>
<td>[ ]</td>
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<tr>
<td>AC magneto lead grommet</td>
<td>Yamaha bond No.1215 (Three bond No.1215®)</td>
</tr>
<tr>
<td>Crankcase mating surface</td>
<td>Yamaha bond No.1215 (Three bond No.1215®)</td>
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</tbody>
</table>
1. Oil pan
2. Oil strainer
3. Oil pump assembly
4. Relief valve assembly
5. Oil cooler
6. Oil filter cartridge
7. Drive axle
8. Reverse idle gear shaft
9. Oil pipe (crankcase to cylinder head)
10. Crankshaft
11. Cylinder head
1. Oil pipe (crankcase to cylinder head)
2. Oil filter cartridge
3. Oil cooler
4. Oil strainer
5. Oil pump
6. Oil pipe (AC magneto cover)
7. Reverse idle gear shaft
8. Drive axle
9. Relief valve assembly
1. Camshaft
2. Crankshaft
3. Oil strainer
4. Oil pump
5. Oil pump driven sprocket
1. Radiator
2. Radiator outlet hose
3. Radiator outlet pipe
4. Radiator inlet pipe
5. Radiator inlet hose
6. Radiator cap
1. Radiator outlet pipe
2. Water pump inlet hose
3. Thermostat outlet hose
4. Oil cooler outlet hose
5. Radiator inlet pipe
6. Thermostat
1. Thermostat outlet hose
2. Water pump inlet hose
3. Water pump
4. Water pump outlet pipe
5. Oil cooler inlet hose
6. Oil cooler
7. Oil cooler outlet hose
8. Water pump outlet hose
9. Water jacket joint
CABLE ROUTING

Radiator view (right side)
1. Horn lead (for Europe and Oceania)
2. Wire harness
3. Radiator fan motor breather hose
4. Differential assembly breather hose
5. Coolant reservoir breather hose
6. Radiator outlet hose
7. Differential motor lead
8. Coolant reservoir hose
9. Radiator fan motor lead
10. Drive select lever shift cable
11. Parking brake cable
12. Ground lead
13. Auxiliary DC jack lead

A. Route the wire harness, starter motor lead, negative battery lead, and horn lead (for Europe and Oceania) into the electrical components tray.
B. Make sure that there is no slack in the coolant reservoir breather hose in the area shown in the illustration.
C. Fasten the coolant reservoir breather hose to the radiator outlet hose with the plastic band. Align the plastic band with the portion of the radiator outlet hose where the hose begins to bend.
D. Fasten the differential assembly breather hose with the holder on the radiator.
E. Fasten the coolant reservoir hose to the radiator outlet hose with the plastic band. Align the plastic band with the portion of the radiator outlet hose where the hose begins to bend.
F. Fasten the radiator fan motor lead to the radiator outlet hose with the plastic band.
G. Insert the projection on the wire harness holder into the hole in the frame from the inside of the frame.
H. Fasten the wire harness, starter motor lead, negative battery lead, drive select lever shift cable, and parking brake cable with the plastic band.
I. Fasten the wire harness, starter motor lead, and negative battery lead with the plastic band. Position the plastic band at the section of the wire harness where the leads branch off from the harness.
Radiator view (left side)
1. Coolant reservoir hose
2. Wire harness
3. Throttle cable
4. Brake light switch lead
5. EPS motor lead (for EPS models)
6. EPS torque sensor lead (for EPS models)
7. Drive select lever shift cable
8. Parking brake cable
9. Radiator inlet hose
10. Differential assembly breather hose
11. Coolant reservoir breather hose
12. Radiator fan motor breather hose
13. Horn lead (for Europe and Oceania)

A. Fasten the coolant reservoir hose with the holder on the radiator.
B. Route the right headlight lead and horn lead (for Europe and Oceania) into the electrical components tray, and then fasten the lead with the holder on the electrical components tray.
C. Route the differential assembly breather hose, coolant reservoir breather hose, and radiator fan motor breather hose through the hole in the electrical components tray. Make sure that the end of each breather hose protrudes out of the electrical components tray.
D. Fasten the right headlight lead and horn lead (for Europe and Oceania) with the holder on the electrical components tray.
E. Fasten the throttle cable to the radiator inlet hose with the plastic band. Be sure to route the throttle cable to the outside of the radiator inlet hose and install the plastic band around the hose protector of the radiator inlet hose, not the hose itself.
F. Fasten the throttle cable to the radiator inlet hose with the plastic band. Be sure to route the throttle cable to the inside of the radiator inlet hose and install the plastic band around the hose protector of the radiator inlet hose, not the hose itself.
1. Right headlight lead  
2. Horn lead (for Europe and Oceania)  
3. Wire harness  
4. Negative battery lead  
5. Starter motor lead  
6. Parking brake lead  
7. Drive select lever shift cable  
8. Throttle cable  
9. Meter assembly lead  
10. Indicator light assembly lead  
11. Parking brake switch lead  
12. Main switch lead  
13. EPS motor lead (for EPS models)  
14. EPS torque sensor lead (for EPS models)  
15. Light switch lead  
16. On-Command four-wheel-drive switch lead  
17. Left headlight lead  

A. Fasten the right headlight lead and horn lead (for Europe and Oceania) to the frame with the plastic band.  
B. To the electrical components tray  
C. Fasten the wire harness with the plastic band. Position the plastic band at the section of the wire harness before the leads branch off from the harness.  
D. Fasten the wire harness and horn lead (for Europe and Oceania) at the white mark on the harness with the plastic band.  
E. Fasten the wire harness, starter motor lead, negative battery lead, drive select lever shift cable, and parking brake cable with the plastic band.  
F. To the horn switch (for Europe and Oceania)  
G. Fasten the throttle cable with the plastic band.  
H. Fasten the parking brake switch lead with the plastic band.  
I. Route the EPS torque sensor lead through the frame, and then connect the coupler to the EPS torque sensor. (For EPS models)  
J. Fasten the wire harness with the plastic band. Position the plastic band at the section of the wire harness before the leads branch off from the harness.  
K. Fasten the wire harness and EPS motor lead (for EPS models) with the plastic band. Position the plastic band at the section of the wire harness before the leads branch off from the harness.  
L. Route the EPS torque sensor lead and EPS motor lead through the hole in the electrical components tray, and then connect the couplers to the EPS control unit. (For EPS models)  
M. Fasten the left headlight lead to the frame with the plastic band.  
N. Insert the projection on the holder into the second hole from the right in the frame, and then fasten the wire harness with the holder.
Engine view (right side)
1. Wire harness
2. Final drive assembly breather hose
3. Drive select lever shift cable
4. Intake air temperature sensor lead
5. Speed sensor lead
6. Parking brake cable
7. AC magneto lead
8. Negative battery lead
9. Starter motor lead

A. Route the final drive assembly breather hose through the hole in the frame.
B. Fasten the final drive assembly breather hose with the holder.
C. Fasten the wire harness with the plastic band. Position the plastic band to the front of the split in the wire harness.
D. Fasten the negative battery lead and starter motor lead with the holder.
E. Fasten the wire harness to the frame with the plastic band. Be sure to position the plastic band above the bracket.
F. Route the wire harness in front of the frame, and then fasten the wire harness to the frame with the plastic band. Be sure to position the plastic band under the bracket.
G. Route the wire harness to the inside of the frame.
H. Fasten the negative battery lead and starter motor lead with the plastic band.
I. \( 10^\circ\text{–}30^\circ \)
J. \( 50\text{–}60\text{ mm (1.97–2.36 in)} \)
K. Align the holder with the white mark on the final drive assembly breather hose.
Engine view (left side)
1. Seat belt switch lead
2. Gear position switch lead
3. Reverse switch lead
4. Throttle cable
5. Cylinder head breather hose
6. Throttle body breather hose
7. ISC unit lead
8. Coolant temperature sensor lead
9. Air induction system solenoid lead
10. Spark plug lead
11. Wire harness

A. Fasten the seat belt switch lead with the holder.
B. Route the seat belt switch lead to the left side of the frame.
C. To the seat belt switch
D. Fasten the wire harness with the plastic band. Position the plastic band near the ignition coil bracket and at the section of the wire harness before the leads branch off from the harness.
E. Make sure that the throttle body breather hose is not pinched.
1. Wire harness
2. Parking brake cable
3. Drive select lever shift cable
4. Fuel pump lead
5. Fuel hose
6. TPS lead
7. Intake air pressure sensor lead
8. Air induction system hose (air cut-off valve to reed valve cover)
9. Right tail/brake light lead
10. Left tail/brake light lead
11. Spark plug lead
12. Air induction system solenoid lead
13. Air induction system hose (air intake silencer to air cut-off valve)
14. Thermostat outlet hose
15. ISC unit lead
16. Throttle cable
17. Seat belt switch lead

A. To the fuel pump
B. Fasten the wire harness with the holder.
C. Fasten the hose protector of the fuel hose with the holder.
D. Insert the projection on the holder into the hole in the frame cross member from under the member, and then fasten the wire harness with the holder.
E. Connect the right tail/brake light connectors. Make sure that there is no slack in the lead between the holders in the area shown in the illustration. Place the slack in the lead to the outside of the outermost holder.
F. Connect the left tail/brake light connectors. Make sure that there is no slack in the lead between the holders in the area shown in the illustration. Place the slack in the lead to the outside of the outermost holder.
G. Route the wire harness between the air induction system hose (air intake silencer to air cut-off valve) and the thermostat outlet hose.
H. Fasten the air induction system solenoid lead with the holder under the frame cross member. Position the holder at the section of the lead after the lead branches off from the wire harness.
I. Fasten the spark plug lead to the air induction system hose (air intake silencer to air cut-off valve) with the holder. Align the holder with the portion of the air induction system hose (air intake silencer to air cut-off valve) where the hose begins to bend.
J. Route the spark plug lead above the air induction system hose (air intake silencer to air cut-off valve) and wire harness.
K. Fasten the wire harness with the holder. Position the holder at the section of the wire harness before the leads branch off from the harness.
L. Fasten the throttle cable at the white paint mark to the hose protector of the thermostat outlet hose with the plastic band. Align the plastic band with the portion of the thermostat outlet hose where the hose begins to bend.
M. Route the wire harness under the frame. Make sure that the wire harness is not pinched between the frame and the air intake silencer.
1. Wire harness
2. Final drive assembly breather hose
3. Parking brake cable
4. Rear brake hose
A. Fasten the wire harness with the holder.
B. Fasten the final drive assembly breather hose with the holder.
C. Insert the projection on the holder into the hole in the cargo bed, and then fasten the wire harness with the holder.
D. Fasten the rear brake hose with the holder.
E. Fasten the rear brake hose and final drive assembly breather hose with the holder. Position the holder to the right of the centerline between the holders securing the brake hose.
F. Centerline
Fuel tank view
1. Fuel hose
2. Fuel pump lead
3. Fuel tank breather hose (fuel tank to fuel tank breather hose joint)
4. Fuel tank breather hose (fuel tank breather hose joint to air)
   A. Fasten the grommet on the fuel hose with the holder.
   B. Fasten the fuel pump lead with the holder.
   C. Insert the fuel tank breather hose (fuel tank breather hose joint to air) into the hole in the frame.
   D. 0–3.0 mm (0–0.12 in)
1. Front brake pipe
2. Front brake hose
3. Rear brake pipe
   A. Connect the front brake hose end that has a projection to the left front brake caliper.
   B. Fasten the front brake hose with the holder.
Front brake caliper view (top)
1. Front brake hose
2. Front brake pipe
3. Rear brake pipe
   A. Face the paint mark upward.
   B. Route the front brake hose under the front upper arm.
   C. Fasten the front brake hose with the holder.
1. Rear brake pipe
2. Rear brake hose
   A. Fasten the rear brake pipe with the holder.
   B. Fasten the rear brake hose with the holder.
   C. Face the paint mark forward.
Rear brake caliper view (top)
1. Rear brake pipe
2. Rear brake hose
   A. Fasten the rear brake pipe with the holder.
   B. Fasten the rear brake hose with the holder.
   C. Right side
   D. Connect the rear brake hose end that has a projection to the right rear brake caliper.
Parking brake view
CABLE ROUTING

1. Parking brake cable
   A. Fit the parking brake cable into the slit in the parking brake lever.
   B. Fit the parking brake cable into the holder on the parking brake caliper.
Electrical components tray view
1. Wire harness
2. Right headlight lead
3. Load control relay
4. Differential motor relay 2
5. Fuel injection system relay
6. Differential motor relay 1
7. Radiator fan motor relay
8. Headlight relay
9. Main fuse lead
10. Fuel injection system fuse
11. Battery
12. EPS control unit (for EPS models)
13. EPS motor lead (for EPS models)
14. Left headlight lead
15. EPS torque sensor lead (for EPS models)
16. Lean angle sensor lead
17. Negative battery lead
18. Starter relay lead
19. Positive battery lead
20. EPS fuse (for EPS models)
21. ECU (engine control unit) lead
22. Main fuse lead
23. Starter motor lead
24. Fuse box

A. Fasten the right headlight lead with the holder on the electrical components tray.
B. Fasten the wire harness and main fuse lead with a plastic band, making sure to align the band with the white tape on the harness.
C. Fasten the left headlight lead, EPS motor lead (for EPS models), and EPS torque sensor lead (for EPS models) with the holder on the electrical components tray.
D. Place the slack in the leads in the electrical components tray.
E. Connect the EPS motor coupler and EPS torque sensor coupler, and then insert the projection on each coupler into the hole in the electrical components tray. (For EPS models)
**PERIODIC MAINTENANCE**

**INTRODUCTION**

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

**PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM**

- For vehicles not equipped with an odometer or 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>Whichsoever comes first</td>
<td>1 3 6 6 12</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>month</td>
<td>km (mi)</td>
<td>hours</td>
</tr>
<tr>
<td>1</td>
<td>Fuel line</td>
<td>Check fuel hose for cracks or damage. Replace if necessary.</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>2</td>
<td>Valves</td>
<td>Check valve clearance. Adjust if necessary.</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>3</td>
<td>Spark plug</td>
<td>Check condition. Adjust gap and clean. Replace if necessary.</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>4</td>
<td>Crankcase breather system</td>
<td>Check breather hose for cracks or damage. Replace if necessary.</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>5</td>
<td>Exhaust system</td>
<td>Check for leakage. Tighten if necessary. 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. Replace any damaged parts if necessary.</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
</tbody>
</table>

**GENERAL MAINTENANCE AND LUBRICATION CHART**

<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>Whichsoever comes first</td>
<td>1 3 6 12</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>month</td>
<td>km (mi)</td>
<td>hours</td>
</tr>
<tr>
<td>1</td>
<td>Cooling system</td>
<td>Check coolant leakage. Repair if necessary. Replace coolant every 24 months.</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>2</td>
<td>Air filter element</td>
<td>Clean. Replace if necessary. Every 20–40 hours (more often in wet or dusty areas.)</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>3</td>
<td>Engine oil</td>
<td>Replace (warm engine before draining).</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>4</td>
<td>Engine oil filter cartridge</td>
<td>Replace.</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
</tbody>
</table>
### 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>5</td>
<td>Final gear oil</td>
<td>• Check oil level/oil leakage.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>6</td>
<td>Differential gear oil</td>
<td>• Check operation/brake pad wear/liquid leakage.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Correct if necessary. Replace pads if worn to the limit.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Front brake</td>
<td>• Check operation/brake pad wear/liquid leakage.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Correct if necessary. Replace pads if worn to the limit.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Rear brake</td>
<td>• Check operation/brake pad wear/liquid leakage.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Correct if necessary. Replace pads if worn to the limit.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Parking brake</td>
<td>• Check operation and free play/brake pad wear.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Correct if necessary. Replace pads if worn to the limit.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Brake fluid</td>
<td>• Replace.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>11</td>
<td>Accelerator pedal</td>
<td>• Check operation and free play.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>V-belt</td>
<td>• Check operation.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check for wear, cracks, or damage.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Wheels</td>
<td>• Check balance/damage/runout.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Repair if necessary.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Wheel bearings</td>
<td>• Check bearing assemblies for looseness/damage.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace if damaged.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Front and rear suspension</td>
<td>• Check operation and for leakage.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Correct if necessary.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Steering system</td>
<td>• Check operation and for looseness/Replace if damaged.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check toe-in/Adjust if necessary.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Stabilizer bushes</td>
<td>• Check for cracks or other damage, and replace if necessary.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Rear upper and lower knuckle pivots</td>
<td>• Lubricate with lithium-soap-based grease.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Drive shaft universal joint</td>
<td>• Lubricate with lithium-soap-based grease.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Engine mount</td>
<td>• Check for cracks or damage.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check bolt tightness.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Front and rear axle boots</td>
<td>• Check for cracks or other damage, and replace if necessary.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lubricate with lithium-soap-based grease.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Fittings and fasteners</td>
<td>• Check all chassis fittings and fasteners.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Correct if necessary.</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 cylinder and calipers, and change the brake fluid.
  - Replace the brake hoses every four years and if cracked or damaged.
CHECKING THE FUEL LINE
1. Lift the cargo bed.
2. Remove:
   • Outer passenger seat frame
   • Right passenger compartment panel
   Refer to “GENERAL CHASSIS” on page 4-1.
3. Check:
   • Fuel hose “1”
     Cracks/damage → Replace.
     Loose connection → Connect properly.
4. Install:
   • Right passenger compartment panel
   • Outer passenger seat frame
   Refer to “GENERAL CHASSIS” on page 4-1.
5. Lower the cargo bed.

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. Lift the cargo bed.
2. Remove:
   • Frame cross member
   • Right rear panel
   Refer to “GENERAL CHASSIS” on page 4-1.
   • Exhaust pipe heat protector plate
   Refer to “ENGINE REMOVAL” on page 5-1.
3. Disconnect:
   • Cylinder head breather hose “1”
4. Remove:
   • Intake tappet cover “2”
   • Exhaust tappet cover “3”
   • Camshaft sprocket cover “4”
5. Disconnect:
   • Spark plug cap
6. 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.

7. Remove:
   • Crankshaft end accessing screw “1”
   • Timing mark accessing screw “2”
8. Measure:
   • Valve clearance
   Out of specification → Adjust.

<table>
<thead>
<tr>
<th>Valve clearance (cold)</th>
<th>Intake</th>
<th>0.09–0.13 mm (0.0035–0.0051 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exhaust</td>
<td>0.16–0.20 mm (0.0063–0.0079 in)</td>
</tr>
</tbody>
</table>

a. Turn the crankshaft counterclockwise.
b. When the piston is at TDC on the compression stroke, align the “I” mark “a” on the AC magneto rotor with the stationary pointer “b” on the AC magneto cover.
PERIODIC MAINTENANCE

TIP
To position the piston at TDC on the compression stroke, align the “I” mark “c” on the camshaft sprocket with the stationary pointer “d” on the cylinder head, as shown in the illustration.

c. Measure the valve clearance with the thickness gauge “1”.
   Out of specification → Adjust.

Thickness gauge
90890-03079
Narrow gauge set
YM-34483

9. Adjust:
   • Valve clearance

   a. Loosen the locknut “1”.
   b. Insert the thickness gauge “2” between the end of the adjusting screw and the valve tip.

   c. Turn the adjusting screw “3” in direction “a” or “b” with the tappet adjusting tool “4” until the specified valve clearance is obtained.

   • Hold the adjusting screw to prevent it from moving and tighten the locknut to specification.

   Direction “a”
   Valve clearance is increased.
   Direction “b”
   Valve clearance is decreased.

   • O-ring
   • Timing mark accessing screw
   • O-ring
   • Crankshaft end accessing screw

10. Install:

   Timing mark accessing screw
   1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)
   Crankshaft end accessing screw
   2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)

11. Install:
   • Spark plug
TIP
Before installing the spark plug, clean the spark plug and gasket surface.

| Spark plug cap | 13 Nm (1.3 m·kgf, 9.4 ft·lbf) |

12. Connect:
   - Spark plug cap

13. Install:
   - O-ring
   - Camshaft sprocket cover
   - O-ring “1”
   - Intake tappet cover
   - O-ring
   - Exhaust tappet cover

| Camshaft sprocket cover bolt | 10 Nm (1.0 m·kgf, 7.2 ft·lbf) |
| Tappet cover bolt | 10 Nm (1.0 m·kgf, 7.2 ft·lbf) |

14. Connect:
   - Cylinder head breather hose

15. Install:
   - Exhaust pipe heat protector plate
   - Refer to “ENGINE REMOVAL” on page 5-1.
   - Right rear panel
   - Frame cross member
   - Refer to “GENERAL CHASSIS” on page 4-1.

16. Lower the cargo bed.

CHECKING THE SPARK PLUG
1. Lift the cargo bed.
2. Disconnect:
   - Spark plug cap
3. Remove:
   - Spark plug

TIP
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

| Spark plug | 13 Nm (1.3 m·kgf, 9.4 ft·lbf) |

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

9. Connect:
   - Spark plug cap
10. Lower the cargo bed.

**CHECKING THE BREATHER HOSES**

1. Lift the cargo bed.
2. Remove:
   - Frame cross member
   Refer to "GENERAL CHASSIS" on page 4-1.
3. Check:
   - Cylinder head breather hose “1”
   - Throttle body breather hose “2”
     Cracks/damage → Replace.
     Loose connection → Connect properly.
4. Install:
   - Frame cross member
   Refer to "GENERAL CHASSIS" on page 4-1.
5. Lower the cargo bed.

**NOTICE**

Make sure the cylinder head breather hose and throttle body breather hose are routed correctly.

4. Lower the cargo bed.

**ADJUSTING THE EXHAUST GAS VOLUME**

(for Europe and Oceania)

**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.

1. Connect the Yamaha diagnostic tool to the coupler. For information about connecting the Yamaha diagnostic tool, refer to “YAMAHA DIAGNOSTIC TOOL” on page 9-37.

**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”.

---

Exhaust pipe nut
20 Nm (2.0 m·kgf, 14 ft·lbf)
Muffler bolt
23 Nm (2.3 m·kgf, 17 ft·lbf)
Muffler mount shaft
17 Nm (1.7 m·kgf, 12 ft·lbf)
PERIODIC MAINTENANCE

2. Lift the cargo bed.
3. Check:
   - Radiator “1”
   - Coolant reservoir hose “2”
   - Coolant reservoir “3”
   - Radiator outlet hose “4”
   - Radiator inlet hose “5”
   - Radiator outlet pipe “6”
   - Radiator inlet pipe “7”
   - Thermostat outlet hose “8”
   - Thermostat cover “9”
   - Water pump inlet hose “10”
   - Water pump housing “11”
   - Water pump outlet pipe “12”
   - Water pump outlet hose “13”
   - Water jacket joint “14”
   - Oil cooler inlet hose “15”
   - Oil cooler “16”
   - Oil cooler outlet hose “17”

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

Refer to “OIL COOLER” on page 6-1, “RADIATOR” on page 6-4, “THERMOSTAT” on page 6-8 and “WATER PUMP” on page 6-11.

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 7-19.

CHECKING THE COOLING SYSTEM
1. Remove:
   - Sun top (for sun top models)
   - Side frames
   - Hood
   - Front fender
   - Instrument panel
   - Center passenger seat frame
   - Center passenger compartment panel
   - Center floor board
   - Air filter case
   - Refer to “GENERAL CHASSIS” on page 4-1.

2. Lift the cargo bed.
3. Check:
   - Radiator “1”
   - Coolant reservoir hose “2”
   - Coolant reservoir “3”
   - Radiator outlet hose “4”
   - Radiator inlet hose “5”
   - Radiator outlet pipe “6”
   - Radiator inlet pipe “7”
   - Thermostat outlet hose “8”
   - Thermostat cover “9”
   - Water pump inlet hose “10”
   - Water pump housing “11”
   - Water pump outlet pipe “12”
   - Water pump outlet hose “13”
   - Water jacket joint “14”
   - Oil cooler inlet hose “15”
   - Oil cooler “16”
   - Oil cooler outlet hose “17”

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

Refer to “OIL COOLER” on page 6-1, “RADIATOR” on page 6-4, “THERMOSTAT” on page 6-8 and “WATER PUMP” on page 6-11.
4. Lower the cargo bed.
5. Install:
   - Air filter case
     Refer to “AIR FILTER CASE” on page 7-5.
   - Center floor board
   - Center passenger compartment panel
   - Center passenger seat frame
   - Instrument panel
   - Front fender
   - Hood
   - Side frames
   - Sun top (for sun top models)
     Refer to “GENERAL CHASSIS” on page 4-1.

**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 reservoir cap “1”, add coolant or distilled water to the maximum level mark “a”, install the reservoir cap.

**COOLANT RESERVOIR CAPACITY**

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**CHANGING THE COOLANT**

1. Remove the hood.
2. Lift the cargo bed.
3. Remove:
   - Right rear panel
     Refer to “GENERAL CHASSIS” on page 4-1.
4. Remove:
   - Coolant reservoir cap “1”
5. Disconnect:
   - Coolant reservoir hose “2”
6. Drain:
   - Coolant
     (from the coolant reservoir)
7. Connect:
   • Coolant reservoir hose
8. 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.

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

**TIP**

Place a container under the engine, and then remove the coolant drain bolt.

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

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

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

- **Recommended antifreeze**
  - High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines
  - Mixing ratio 1:1 (antifreeze:water)
  - Radiator capacity (including all routes) 2.74 L (2.90 US qt, 2.41 Imp.qt)
  - Coolant reservoir capacity (up to the maximum level mark) 0.28 L (0.30 US qt, 0.25 Imp.qt)

**Handling notes for coolant**

Coolant is potentially harmful and should be handled with special care.

**WARNING**

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

**NOTICE**

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

13. Install:
    • Radiator cap
14. Fill:
   - Coolant reservoir
     (with the recommended coolant to the maximum level mark “a”)
15. Install:
   - Coolant reservoir cap “1”
16. Bleed:
   - Cooling system

a. Loosen the water pump air bleed bolt “1”, 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 “2”, 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.

<table>
<thead>
<tr>
<th>Water pump air bleed bolt</th>
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<tbody>
<tr>
<td>10Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
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</tbody>
</table>

TIP
There are check hoses “1” at the bottom of the air filter case and on the air intake duct. If dust and/or water collects in these hoses, clean the air filter element, filter frame, and air filter case.

<table>
<thead>
<tr>
<th>Thermostat cover air bleed bolt</th>
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<tbody>
<tr>
<td>10Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
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</tbody>
</table>
PERIODIC MAINTENANCE

3. Remove:
   • Air filter case cover “1”

4. Remove:
   • Air filter element “1”

5. Disassemble:
   • Air filter element holder “1”
   • Air filter element “2”
   • Air filter element frame “3”

3. Remove:
   • Air filter case cover “1”

4. Remove:
   • Air filter element “1”

5. Disassemble:
   • Air filter element holder “1”
   • Air filter element “2”
   • Air filter element frame “3”

NOTICE
ECA1XD1028
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

WARNING
EWA13020
Never use low flash point solvents, such as gasoline, to clean the air filter element. Such solvents may cause a fire or an explosion.

a. Carefully wash the air filter element in solvent.

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

NOTICE
ECA13430
Do not twist the air filter element when squeezing it.

c. Properly dispose of the used solvent.
PERIODIC MAINTENANCE

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

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

NOTICE

Do not twist the air filter element when rinsing it.

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

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.

Air filter oil grade
Foam air filter oil or equivalent oil

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:
    • Center passenger seat cushion
      Refer to “GENERAL CHASSIS” on page 4-1.

CHECKING THE ENGINE OIL LEVEL

1. Place the vehicle on a level surface.
2. Check the engine oil level on a cold engine.

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. Lift the cargo bed.
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 5W-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. Lower the cargo bed.

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

6. Drain:
   - Engine oil
   (completely from the crankcase)
7. If the oil filter cartridge is also to be replaced, perform the following procedure.

   ▼▼▼ ▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼▼▼ ▼ ▼▼▼
   a. Remove the oil filter cartridge “1” with the oil filter wrench “2”.

   ![Oil filter wrench](90890-01426_YU-38411)

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

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

   ![New oil filter cartridge](3)

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

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

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

10. Install:
    • Dipstick

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

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

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

14. Check:
    • Engine oil pressure

b. Start the engine and keep it idling until engine oil starts to seep from the oil check bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.

c. Check the engine oil passages, the oil filter cartridge and the oil pump for damage or leakage. Refer to “CRANKSHAFT AND OIL PUMP” on page 5-71.

d. Start the engine after solving the problems and check the engine oil pressure again.
e. Tighten the oil check bolt to specification.

15. Install:
    • Right rear panel
      Refer to “GENERAL CHASSIS” on page 4-1.

16. Lower the cargo bed.

CHECKING THE FINAL GEAR OIL LEVEL

1. Place the vehicle on a level surface.

2. Remove:
    • Final gear oil filter 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.

- Oil filter cartridge
  17 Nm (1.7 m·kgf, 12 ft·lbf)

- Engine oil drain bolt
  30 Nm (3.0 m·kgf, 22 ft·lbf)

- Engine oil quantity
  Total amount
  - Without oil filter cartridge replacement
    - 2.60 L (2.75 US qt, 2.29 Imp.qt)
    - With oil filter cartridge replacement
    - 2.30 L (2.43 US qt, 2.02 Imp.qt)

- Oil check bolt
  10 Nm (1.0 m·kgf, 7.2 ft·lbf)

- Type
  SAE 80 API GL-4 Hypoid gear oil

**NOTICE**
Do not allow foreign material to enter the final drive case.
4. Check:
   • Final gear oil filler bolt gasket
     Damage → Replace.

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

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

   EAS01470

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 level check bolt “1”
     (along with the gasket)
   • Final gear oil drain bolt “2”
     (along with the gasket)

   Completely drain the final drive case of its oil.

4. Install:
   • Final gear oil drain bolt
     (along with the gasket)

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

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

   Type
   SAE 80 API GL-4 Hypoid gear oil

   ECA1XD1017

   NOTICE
   Do not allow foreign material to enter the final drive case.

6. Check:
   • Oil level
     Refer to “CHECKING THE FINAL GEAR OIL LEVEL” on page 3-14.

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

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

   EAS1XD1014

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.

   Type
   SAE 80 API GL-4 Hypoid gear oil

   ECA1XD1007

   NOTICE
   Do not allow foreign material to enter the differential case.

4. Check:
   • Differential gear oil filler bolt gasket
     Damage → Replace.

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

   Differential gear oil filler bolt
   23 Nm (2.3 m·kgf, 17 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 “1”
     (along with the gasket)
   - Differential gear oil drain bolt “2”
     (along with the gasket)
   Completely drain the differential case of its oil.

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

5. Fill:
   - Differential case
     (with the specified amount of the recommended differential gear oil)

6. Check:
   - Oil level
     Refer to “CHECKING THE DIFFERENTIAL GEAR OIL LEVEL” on page 3-15.

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

---

NOTICE

Do not allow foreign material to enter the differential case.

---

CHECKING THE FRONT BRAKE PADS

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

1. Remove:
   - Front wheels
     Refer to “FRONT AND REAR WHEELS” on page 4-25.

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 AND REAR BRAKES” on page 4-29.

4. Install:
   - Front wheels
     Refer to “FRONT AND REAR WHEELS” on page 4-25.

---

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 master cylinder 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](image)

   **WARNING**

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

   **NOTICE**

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

   **TIP**

   In order to ensure a correct reading of the brake fluid level, make sure the top of the brake master cylinder 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.

---

**TIP**

1. Remove:
   • Front wheels
   • Rear wheels
     Refer to “FRONT AND REAR WHEELS” on page 4-25.

2. Bleed:
   • Hydraulic brake system

   ▼▼▼ ▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼▼▼

   a. Fill the brake master cylinder reservoir to the proper level with the specified brake fluid.
   b. Install the diaphragm (brake master cylinder reservoir).
   c. Connect a clear plastic hose “1” tightly to the bleed screw “2”.

---

![A Front brake](image)

B. Rear brake
d. Place the other end of the hose into a container.
e. Slowly apply the brake several times.
f. Fully depress the brake pedal and hold it in position.
g. Loosen the bleed screw.

**TIP**
Loosening the bleed screw will release the pressure and cause the brake pedal to fully extend.
h. Tighten the bleed screw, and then release the brake pedal.
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.

**Bleed screw**
5 Nm (0.5 m·kgf, 3.6 ft·lbf)

k. Fill the brake master cylinder reservoir to the proper level with the specified brake fluid. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-16.

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

3. Install:
   - Rear wheels
   - Front wheels
   Refer to “FRONT AND REAR WHEELS” on page 4-25.

**CHECKING THE BRAKE HOSES AND BRAKE PIPES**
1. Remove:
   - Sun top (for sun top models)
   - Side frames
   - Hood
   - Front fender
   - Instrument panel
   - Center passenger seat frame
   - Center floor board
   - Left rear panel
   Refer to “GENERAL CHASSIS” on page 4-1.
   - Air filter case
   Refer to “AIR FILTER CASE” on page 7-5.

2. Check:
   - Rear brake pipes “3”
     Cracks/damage → Replace.
3. Check:
   - Front brake pipe “2”
     Cracks/damage → Replace.
4. Check:
   - Rear brake pipe “3”
     Cracks/damage → Replace.
5. Check:
   - Rear brake hoses “4”
     Cracks/damage/wear → Replace.
PERIODIC MAINTENANCE
a

4

4

2

1

2. Adjust:
• Brake pedal free play

6. Check:
• Brake hose holders
Loose → Tighten the holder bolts.
Damage → Replace.
7. Place the vehicle in an upright position and
apply the brake several times.
8. Check:
• Brake hoses
• Brake pipe
Brake fluid leakage → Replace any damaged
hose and pipe.
Refer to “FRONT AND REAR BRAKES” on
page 4-29.
9. Install:
• Air filter case
Refer to “AIR FILTER CASE” on page 7-5.
• Left rear panel
• Center floor board
• Center passenger seat frame
• Instrument panel
• Front fender
• Hood
• Side frames
• Sun top (for sun top models)
Refer to “GENERAL CHASSIS” on page 4-1.

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Loosen the locknut “1”.
b. Turn the brake pedal rod “2” in direction “a” or
“b” until the correct free play is obtained.
Direction “a”
Brake pedal free play is increased.
Direction “b”
Brake pedal free play is decreased.

b

1

a
2
c. Tighten the locknut to specification.

T.

R.

Brake pedal rod locknut
17 Nm (1.7 m·kgf, 12 ft·lbf)

EWA1XD1005

EAS29190

ADJUSTING THE BRAKE PEDAL
1. Check:
• Brake pedal free play “a”
Out of specification → Adjust.

WARNING

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

TIP

The end of the brake pedal rod “1” should lightly
contact the brake master cylinder “2”.

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲

Brake pedal free play
0 mm (0 in)

EAS1XD1058

LUBRICATING THE BRAKE PEDAL AND
ACCELERATOR PEDAL
Lubricate the pivoting point and metal-to-metal
moving parts of the pedal.
Recommended lubricant
Lithium-soap-based grease

3-19


CHECKING THE REAR BRAKE PADS
The following procedure applies to all of the rear brake pads.
1. Remove:
   • Rear wheels
     Refer to “FRONT AND REAR WHEELS” on page 4-25.
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 “FRONT AND REAR BRAKES” on page 4-29.
4. Install:
   • Rear wheels
     Refer to “FRONT AND REAR WHEELS” on page 4-25.

CHECKING THE PARKING BRAKE PADS
1. Operate the brake.
2. Check:
   • Parking brake pads
     A wear indicator groove “a” has almost appeared → Replace the brake pads and brake pad spring as a set.
     Refer to “PARKING BRAKE” on page 4-42.

ADJUSTING THE PARKING BRAKE LEVER
1. Shift the drive select lever into low gear “L”.
2. Check:
   • Parking brake lever free play “a”
     The maximum free play is equal to one click of the parking brake lever.
     Incorrect → Adjust.
3. Adjust:
   • Parking brake lever free play

Direction “a” Parking brake cable free play is increased.
Direction “b” Parking brake cable free play is decreased.
e. Tighten the locknut to specification.

f. Slide the rubber cover to its original position.

### 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.

**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 throttle cable and drive select lever shift cable)

### ADJUSTING THE ACCELERATOR PEDAL FREE PLAY
1. Check:
   - Accelerator pedal free play “a”
     Out of specification → Adjust.

**Recommended lubricant**
Engine oil or a suitable cable lubricant

**Accelerator pedal free play**
12.0–32.0 mm (0.47–1.26 in)
If length "c" is 8.5 mm (0.33 in) or more, loosen locknut "5" and turn the adjusting nut "6" in direction "d" or "e" until the specified accelerator pedal free play is obtained.

**TIP**
If length "c" is 8.5 mm (0.33 in) or more, loosen locknut "5" and turn the adjusting nut "6" in direction "d" or "e" until the specified accelerator pedal free play is obtained.

**Direction “d”**
Accelerator pedal free play is increased.

**Direction “e”**
Accelerator pedal free play is decreased.

e. Tighten the locknuts to specification.

**TIP**
When the accelerator pedal is fully depressed (throttle valve fully open), the gap "f" between the throttle valve pulley "7" and the pulley stopper "8" should be 1 mm (0.04 in) or less.

h. Install the throttle cable housing cover.

---

**Throttle cable housing cover screw**

2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)

---

5. Install:
- Frame cross member
Refer to "GENERAL CHASSIS" on page 4-1.

6. Lower the cargo bed.

---

**CHECKING THE V-BELT**

1. Lift the cargo bed.

2. Remove:
- Frame cross member
- Left rear panel
- V-belt cooling ducts
Refer to "GENERAL CHASSIS" on page 4-1.

3. Remove:
- Drive belt cover
Refer to "PRIMARY AND SECONDARY SHEAVES" on page 5-50.

4. Check:
- V-belt “1”
  Cracks/damage/wear → Replace.
  Grease/oil → Clean the primary and secondary sheaves.
Refer to "REPLACING THE V-BELT" on page 3-23.

5. Measure:
- V-belt width “a”
  Out of specification → Replace.
Refer to "REPLACING THE V-BELT" on page 3-23.

---

**V-belt width**

33.0–33.6 mm (1.30–1.32 in)

Limit
32.5 mm (1.28 in)

---

6. Install:
- Drive belt cover
Refer to "PRIMARY AND SECONDARY SHEAVES" on page 5-50.
7. Install:
   - V-belt cooling ducts
   - Left rear panel
   - Frame cross member
   Refer to “GENERAL CHASSIS” on page 4-1.
8. Lower the cargo bed.

REPLACING THE V-BELT
1. Lift the cargo bed.
2. Remove:
   - Frame cross member
   - Left rear panel
   - V-belt cooling ducts
   Refer to “GENERAL CHASSIS” on page 4-1.
3. Remove:
   - Bearing housing
   Refer to “PRIMARY AND SECONDARY SHEAVES” on page 5-50.
4. Replace:
   - V-belt

TIP

[Diagram]

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

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

c. Install a new V-belt.

d. Remove the bolts.

CHECKING THE WHEELS
The following procedure applies to all of the wheels.
1. Check:
   - 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:
   - Radial wheel runout
   - Lateral wheel runout
   Refer to “CHECKING THE WHEELS” on page 4-26.
3. Check:
   - Wheel bearings
   Refer to “CHECKING THE STEERING KNUCKLES AND FRONT WHEEL BEARINGS” on page 4-57 and “CHECKING THE REAR KNUCKLES AND REAR WHEEL BEARINGS” on page 4-66.
CHECKING THE TIRES
The following procedure applies to all of the tires.

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

Tire characteristics

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: 25 × 8–12NHS
- Manufacturer/model: MAXXIS/MU09

Rear tire
- Type: Tubeless
- Size: 25 × 10–12NHS
- Manufacturer/model: MAXXIS/MU10

Tire air pressure (measured on cold tires)

<table>
<thead>
<tr>
<th>Vehicle load</th>
<th>Front</th>
<th>Rear</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–300 kg (0–661 lb)</td>
<td>75.0 kPa (0.750 kgf/cm², 11 psi)</td>
<td>90.0 kPa (0.900 kgf/cm², 13 psi)</td>
</tr>
<tr>
<td>300–445 kg (661–981 lb)</td>
<td>75.0 kPa (0.750 kgf/cm², 11 psi)</td>
<td>125.0 kPa (1.250 kgf/cm², 18 psi)</td>
</tr>
</tbody>
</table>

Minimum

<table>
<thead>
<tr>
<th>Vehicle load</th>
<th>Front</th>
<th>Rear</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–300 kg (0–661 lb)</td>
<td>70.0 kPa (0.700 kgf/cm², 10 psi)</td>
<td>85.0 kPa (0.850 kgf/cm², 12 psi)</td>
</tr>
<tr>
<td>300–445 kg (661–981 lb)</td>
<td>70.0 kPa (0.700 kgf/cm², 10 psi)</td>
<td>120.0 kPa (1.200 kgf/cm², 17 psi)</td>
</tr>
</tbody>
</table>

Maximum loading limit

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

Maximum loading limit

445 kg (981 lb)
(Total weight of rider, passengers, cargo, accessories, and tongue)

Cargo bed
272 kgf (600 lbf)

Trailer hitch
- Pulling load (total weight of trailer and cargo)
  680 kgf (1500 lbf)
- Tongue weight (vertical weight on trailer hitch point)
  50 kgf (110 lbf)

1. Measure:
- Tire pressure
  Out of specification → Adjust.
PERIODIC MAINTENANCE

TIP
- Two tire pressure gauges are included as standard equipment. Use the lower range tire pressure gauge "1" for the front wheels and the higher range tire pressure gauge for the rear wheels.
- 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.

<table>
<thead>
<tr>
<th>Tire air pressure (measured on cold tires)</th>
<th>Tire pressures must be equal in both front tires and equal in both rear tires.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommended</strong></td>
<td></td>
</tr>
<tr>
<td>Vehicle load</td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>Front</td>
<td></td>
</tr>
<tr>
<td>75.0 kPa (0.750 kgf/cm², 11 psi)</td>
<td></td>
</tr>
<tr>
<td>Rear</td>
<td></td>
</tr>
<tr>
<td>90.0 kPa (0.900 kgf/cm², 13 psi)</td>
<td></td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td></td>
</tr>
<tr>
<td>Vehicle load</td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>Front</td>
<td></td>
</tr>
<tr>
<td>70.0 kPa (0.700 kgf/cm², 10 psi)</td>
<td></td>
</tr>
<tr>
<td>Rear</td>
<td></td>
</tr>
<tr>
<td>85.0 kPa (0.850 kgf/cm², 12 psi)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tire pressure (measured on cold tires)</th>
<th>Tire pressures must be equal in both front tires and equal in both rear tires.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommended</strong></td>
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<td>Front</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>Rear</td>
<td></td>
</tr>
<tr>
<td>125.0 kPa (1.250 kgf/cm², 18 psi)</td>
<td></td>
</tr>
</tbody>
</table>

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.

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

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

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 4-61.
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 4-59.

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 4-69.
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 4-67.

EAS29280
CHECKING THE STEERING SYSTEM
1. Place the vehicle on a level surface.
2. Check:
   • Steering column (except for EPS models)
   • EPS unit (for EPS models)
   • Steering wheel nut
     Move the steering wheel up and down, and back and forth.
     Excessive play → Check that the steering column bolts, EPS unit bolts, or steering wheel nut are tightened to specification.
     Refer to “STEERING SYSTEM” on page 4-52.
3. Check:
   • Tie-rod ends
     Free play → Replace the tie-rod end.

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

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

Toeing In (with tires touching the ground)
5.0–15.0 mm (0.20–0.59 in)

TIP
Mark both front tire tread centers.
Face the steering wheel straight ahead.
Measure the width “A” between the marks.
Rotate the front tires 180° until the marks are exactly opposite one another.
Measure the width “B” between the marks.
Calculate the toe-in using the formula given below.
PERIODIC MAINTENANCE

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

![Diagram of a wheel and tie-rod]

3. Adjust:
   • Toe-in

   **WARNING**
   • Be sure that both tie-rods are turned the same amount. If not, the vehicle will drift right or left even though the steering wheel is straight. This may lead to mishandling and an accident.
   • After setting the toe-in to specification, run the vehicle slowly for some distance with both hands lightly holding the steering wheel and check that the steering wheel responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.

   **CAUTION**
   • Mark both tie-rods ends.

   This reference point will be needed during adjustment.
   • Loosen the tie-rod end locknuts “1” of both tie-rods.
   • 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.

   ![Diagram of the adjustment process]

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

   **Recommended lubricant**

   Lithium-soap-based grease

   - Tie-rod end locknut
     - 40 Nm (4.0 m·kgf, 29 ft·lbf)

   4. Check:
      • Steering wheel

   **TIP**
   After adjusting the toe-in, the steering wheel should be centered.

   Refer to “INSTALLING THE STEERING WHEEL” on page 4-15.

   ![Diagram of the steering wheel]

   **LUBRICATING THE STEERING SHAFT**

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

   **CHECKING THE STABILIZER BUSHINGS**

   1. Check:
      • Stabilizer bushings
        Damage/wear → Replace.

        Refer to “REAR KNUCKLES AND STABILIZER” on page 4-64.
PERIODIC MAINTENANCE

LUBRICATING THE REAR KNUCKLE PIVOTS
1. Remove:
   • Rear arm protectors
2. Lubricate:
   • Rear knuckle pivots

Recommended lubricant
Lithium-soap-based grease

LUBRICATING THE DRIVE SHAFT UNIVERSAL JOINTS
1. Remove:
   • Center passenger seat frame
     Refer to “GENERAL CHASSIS” on page 4-1.
   • Air filter case
     Refer to “AIR FILTER CASE” on page 7-5.
2. Lubricate:
   • Drive shaft universal joint

Recommended lubricant
Lithium-soap-based grease

CHECKING THE ENGINE MOUNT
1. Check:
   • Engine brackets
     Cracks/damage → Replace.
   • Engine mounting bolts
   • Engine bracket nuts
     Loosen → Tighten.
     Refer to “ENGINE REMOVAL” on page 5-1.

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 8-3 and “REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT” on page 8-17.
CHECKING THE FASTENERS

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

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- Checking the tie-rod ends ........................................ 4-54
- Installing the steering system .................................. 4-54

STEERING KNUCKLES

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- Checking the steering knuckles and front wheel bearings ........................................ 4-57
- Checking the steering knuckle ball joints .............. 4-57

FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

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- Handling the front shock absorber assemblies .......... 4-61
- Disposing of a front shock absorber assembly ....... 4-61
- Checking the front shock absorber assemblies ....... 4-61
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REAR KNUCKLES AND STABILIZER

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REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES

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- Handling the rear shock absorber assemblies .......... 4-69
- Disposing of a rear shock absorber assembly ....... 4-69
- Checking the rear shock absorber assemblies ....... 4-69
- Installing the rear arms and rear shock absorber assemblies ........................................ 4-70
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>Rear skid plate</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

7 Nm (0.7 m·kgf, 5.1 ft·lbf)

7 Nm (0.7 m·kgf, 5.1 ft·lbf)
Removing the doors and side panels

The following procedure applies to both of the doors.

<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>Door hinge</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Door</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Door handle latch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rubber damper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fuel tank cap</td>
<td>1</td>
<td>Right side only.</td>
</tr>
<tr>
<td>6</td>
<td>Side panel</td>
<td>1</td>
<td>Lift the cargo bed.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
INSTALLING THE DOOR
The following procedure applies to both of the doors.
1. Install:
   • Door hinge “1”

   ![Door hinge nut](image)
   Door hinge nut
   1.3 Nm (0.13 m·kgf, 0.94 ft·lbf)

2. Install:
   • Door “1”

   ![Door hinge bolt](image)
   Door hinge bolt
   7 Nm (0.7 m·kgf, 5.1 ft·lbf)

3. Install:
   • Door handle latch “1”

   ![Door handle latch nut](image)
   Door handle latch nut
   7 Nm (0.7 m·kgf, 5.1 ft·lbf)

   **TIP**
   Fit the tab “a” on the door hinge with the slot “b” in the frame.

   **TIP**
   Adjust the position of the door latch so that it fully engages the bar “2” on the frame when the door is closed. Make sure that the spring force of the door hinge can close the door without latching it when the door is opened less than 60°.
Removing the seats

### Table: Job/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>Seat cushion</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Center passenger seat frame</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Driver seat frame</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Outer passenger seat frame</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Seat back</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Shoulder holster</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Headrest</td>
<td>3</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>

**Torque Specifications:**
- 6 Nm (0.6 m-kgf, 4.3 ft-lbf)
- 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
- 23 Nm (2.3 m-kgf, 17 ft-lbf)
REMOVING THE SEATS
The following procedure applies to all of the seats.
1. Remove:
   • Seat cushion “1”

   a. Lift the front of the seat cushion.
b. Pull the cushion off.

ADJUSTING THE DRIVER SEAT POSITION
The driver seat can be adjusted to one of three positions to suit the driver’s preference.
1. Remove:
   • Driver seat cushion
   Refer to “REMOVING THE SEATS” on page 4-5.
2. Adjust:
   • Driver seat position

   a. Remove the driver seat frame bolts “1”.
b. Move the driver seat frame “2” to the desired position and align the bolt holes in the seat frame with the bolt holes “a” in the vehicle frame.
c. Install the driver seat frame bolts, and then tighten the bolts to specification.

| Driver seat frame bolt | 23 Nm (2.3 m·kgf, 17 ft·lbf) |

INSTALLING THE SEATS
The following procedure applies to all of the seats.
1. Install:
   • Seat cushion “1”

   a. Insert the projections “a” on the rear of the seat cushion under the seat frame.
b. Insert the projection “b” on the front of the cushion into the grommet while pushing the cushion downward.

   TIP
   Make sure the seats are properly secured before riding.
## Removing the seat belts

**Order** | **Job/Parts to remove** | **Q’ty** | **Remarks**  
--- | --- | --- | ---  
 | Side panels |  | Refer to “Removing the doors and side panels”. |  
1 | Set belt switch coupler | 1 | Disconnect. |  
2 | Driver seat belt | 1 |  |  
3 | Driver seat belt buckle | 1 |  |  
4 | Center passenger seat belt | 1 |  |  
5 | Center passenger seat belt buckle | 1 |  |  
6 | Outer passenger seat belt | 1 |  |  
7 | Outer passenger seat belt buckle | 1 |  |  

---

**T.R. 59 Nm (5.9 m-kgf, 43 ft-lbf) 59 Nm (5.9 m-kgf, 43 ft-lbf) 59 Nm (5.9 m-kgf, 43 ft-lbf)**

For installation, reverse the removal procedure.
INSTALLING THE SEAT BELTS

1. Install:
   • Seat belts

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TIP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Install the seat belt anchor plates “1” so that they contact</td>
</tr>
<tr>
<td></td>
<td>the stoppers “a”.</td>
</tr>
<tr>
<td></td>
<td>• Fit the projection “b” on each seat belt “2” into the holes</td>
</tr>
<tr>
<td></td>
<td>“c” in the frame.</td>
</tr>
</tbody>
</table>

Seat belt bolt
59 Nm (5.9 m-kgf, 43 ft-lbf)

Seat belt buckle bolt
59 Nm (5.9 m-kgf, 43 ft-lbf)
Removing the sun top (for sun top 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>Sun top lower bracket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Damper</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Sun top rear bracket</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Sun top front bracket</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Sun top</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Damper</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Damper</td>
<td>4</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>
### Removing the enclosure

<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 top frame</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Front top frame</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear right frame</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rear left frame</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Right side frame</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Left side frame</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rear center frame</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

For removal, reverse the removal procedure.

Remove Headrests Refer to “Removing the seats”.

Remove Seat belts Refer to “Removing the seat belts”.

Remove Sun top
For sun top models Refer to “Removing the sun top (for sun top models)”. 

- Headrests: 48 Nm (4.8 m-kgf, 35 ft-lbf)
- Seat belts: 48 Nm (4.8 m-kgf, 35 ft-lbf)
- Sun top: 65 Nm (6.5 m-kgf, 47 ft-lbf)
INSTALLING THE ENCLOSURE

1. Install:
   - Rear center frame “1”
   - Right side frame “2”
   - Left side frame “3”
   - Rear right frame “4”
   - Rear left frame “5”
   - Front top frame “6”
   - Rear top frame “7”

TIP
Do not fully tighten the bolts and nuts.

a. Install the rear center frame “1”.

b. Install the right side frame “2” and left side frame “3”.

c. Install the rear right frame “4” and rear left frame “5”.

d. Install the front top frame “6” and rear top frame “7”.

2. Tighten:
   - Rear right frame bolts
   - Rear left frame bolts
   - Front top frame bolts
   - Rear top frame bolts
   - Right side frame nuts (front)
   - Left side frame nuts (front)
   - Rear center frame bolts
   - Right side frame nut (rear)
   - Left side frame nut (rear)

TIP
Tighten the bolts and nuts in the proper sequence as shown (1, 2, and so on).

<table>
<thead>
<tr>
<th>Rear right frame bolt</th>
<th>48 Nm (4.8 m·kgf, 35 ft·lbf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear left frame bolt</td>
<td>48 Nm (4.8 m·kgf, 35 ft·lbf)</td>
</tr>
<tr>
<td>Front top frame bolt</td>
<td>48 Nm (4.8 m·kgf, 35 ft·lbf)</td>
</tr>
<tr>
<td>Rear top frame bolt</td>
<td>48 Nm (4.8 m·kgf, 35 ft·lbf)</td>
</tr>
<tr>
<td>Right side frame nut (front)</td>
<td>65 Nm (6.5 m·kgf, 47 ft·lbf)</td>
</tr>
<tr>
<td>Left side frame nut (front)</td>
<td>65 Nm (6.5 m·kgf, 47 ft·lbf)</td>
</tr>
<tr>
<td>Rear center frame bolt</td>
<td>48 Nm (4.8 m·kgf, 35 ft·lbf)</td>
</tr>
<tr>
<td>Right side frame nut (rear)</td>
<td>48 Nm (4.8 m·kgf, 35 ft·lbf)</td>
</tr>
<tr>
<td>Left side frame nut (rear)</td>
<td>48 Nm (4.8 m·kgf, 35 ft·lbf)</td>
</tr>
</tbody>
</table>
### Removing the hood and battery

#### Order Job/Parts to remove | Q’ty | Remarks
--- | --- | ---
1 | Hood | 1 | Refer to “Removing the skid plates”.
2 | Air intake duct cover | 1 |
3 | Negative battery lead | 1 | Disconnect.  
**NOTICE** First disconnect the negative battery lead, then disconnect the positive lead.
4 | Positive battery lead | 1 | Disconnect.  
5 | Battery band | 2 |
6 | Battery | 1 |
7 | Front guard | 1 |
8 | Front guard cover | 2 | Disconnect.  
9 | Headlight coupler | 2 |
10 | Front grill | 1 | For installation, reverse the removal procedure.

- **4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)**
- **1.5 Nm (0.15 m-kgf, 1.1 ft-lbf)**
- **2.5 Nm (0.25 m-kgf, 1.8 ft-lbf)**
- **48 Nm (4.8 m-kgf, 35 ft-lbf)**
- **4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)**
- **4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)**
- **1.5 Nm (0.15 m-kgf, 1.1 ft-lbf)**
- **4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)**
- **2.5 Nm (0.25 m-kgf, 1.8 ft-lbf)**
- **48 Nm (4.8 m-kgf, 35 ft-lbf)**
- **4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)**
Removing the front fender and instrument panel

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun top</td>
<td>For sun top models Refer to “Removing the sun top (for sun top models)”.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side frames</td>
<td>Refer to “Removing the enclosure”.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hood</td>
<td>Refer to “Removing the hood and battery”.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Front fender</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Passenger handhold</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Steering wheel cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Steering wheel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Meter assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Meter assembly bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Parking brake lever rubber cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>On-Command four-wheel-drive switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Light switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Main switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Indicator light assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Auxiliary DC jack</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the front fender and instrument panel

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Horn switch</td>
<td>1</td>
<td>For Europe and Oceania</td>
</tr>
<tr>
<td>14</td>
<td>Instrument panel</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

- 4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)
- 3.8 Nm (0.38 m-kgf, 2.8 ft-lbf)
- 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
- 35 Nm (3.5 m-kgf, 25 ft-lbf)
- 3.0 Nm (0.30 m-kgf, 2.2 ft-lbf)
- 16 Nm (1.6 m-kgf, 12 ft-lbf)
- 2.3 Nm (0.23 m-kgf, 1.7 ft-lbf)
- 4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)

For installation, reverse the removal procedure.
REMOVING THE STEERING WHEEL

1. Turn the steering wheel so that it is straight and the front wheels are pointing straight ahead.
2. Remove:
   - Steering wheel cover “1”

**TIP**

While pushing the ends of the projections “a” together, remove the steering wheel cover from the steering wheel.

3. Remove:
   - Steering wheel “1”

**TIP**

Use a general puller “2” to separate the steering wheel and steering column.

INSTALLING THE STEERING WHEEL

1. Install:
   - Steering wheel “1”

<table>
<thead>
<tr>
<th>Steering wheel nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 Nm (3.5 m-kgf, 25 ft-lbf)</td>
</tr>
</tbody>
</table>

**TIP**

Install the steering wheel onto the steering column so that it is centered as shown in the illustration.

2. Operate the vehicle at low speeds and make sure that the steering wheel is straight when the vehicle is advancing straight ahead.
### Removing the floor boards and 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>Rubber cover</td>
<td>1</td>
<td>Refer to “Removing the seats”.</td>
</tr>
<tr>
<td>2</td>
<td>Center floor board</td>
<td>1</td>
<td>Refer to “Removing the doors and side panels”.</td>
</tr>
<tr>
<td>3</td>
<td>Left floor board</td>
<td>1</td>
<td>Refer to “Removing the seat belts”.</td>
</tr>
<tr>
<td>4</td>
<td>Right floor board</td>
<td>1</td>
<td>For sun top models</td>
</tr>
<tr>
<td>5</td>
<td>Left lower panel</td>
<td>1</td>
<td>Refer to “Removing the sun top (for sun top models)”.</td>
</tr>
<tr>
<td>6</td>
<td>Right lower panel</td>
<td>1</td>
<td>Refer to “Removing the enclosure”.</td>
</tr>
<tr>
<td>7</td>
<td>Hood</td>
<td>1</td>
<td>Refer to “Removing the hood and battery”.</td>
</tr>
<tr>
<td>8</td>
<td>Instrument panel</td>
<td>1</td>
<td>Refer to “Removing the front fender and instrument panel”.</td>
</tr>
</tbody>
</table>

- **4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)**
- **7 Nm (0.7 m-kgf, 5.1 ft-lbf)**
Removing the floor boards and 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>7</td>
<td>Center passenger compartment panel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Left passenger compartment panel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Right passenger compartment panel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Left rear panel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Right rear panel</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)

7 Nm (0.7 m-kgf, 5.1 ft-lbf)
Removing the electrical components tray

<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>Headlight coupler</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Lean angle sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Starter relay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Main fuse</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>EPS fuse</td>
<td>1</td>
<td>For EPS models</td>
</tr>
<tr>
<td>6</td>
<td>ECU (engine control unit)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>EPS (electronic power steering) control unit</td>
<td>1</td>
<td>For EPS models</td>
</tr>
<tr>
<td>8</td>
<td>Fuse box</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Differential motor relay 2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Removing the sun top (for sun top models)**

Refer to "Removing the sun top (for sun top models)".

**Side frames**

Refer to "Removing the enclosure".

**Hood**

Refer to "Removing the hood and battery".

**Instrument panel**

Refer to "Removing the front fender and instrument panel".

Torque values:
- 3.6 Nm (0.36 m-kgf, 2.6 ft-lbf)
- 4.0 Nm (0.40 m-kgf, 2.9 ft-lbf)
- 2.5 Nm (0.25 m-kgf, 1.8 ft-lbf)
- 3.8 Nm (0.38 m-kgf, 2.8 ft-lbf)
- 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
- 2.5 Nm (0.25 m-kgf, 1.8 ft-lbf)
Removing the electrical components tray

<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>Differential motor relay 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Headlight relay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Load control relay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Fuel injection system relay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Radiator fan motor relay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Electrical components tray</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

3.6 Nm (0.36 m·kgf, 2.6 ft·lbf)

7 Nm (0.7 m·kgf, 5.1 ft·lbf)

3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)
Removing the V-belt cooling ducts

![Diagram of V-belt cooling ducts]

<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>Frame cross member</td>
<td></td>
<td>Refer to “Removing the cargo bed”.</td>
</tr>
<tr>
<td>2</td>
<td>V-belt cooling exhaust duct</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>V-belt cooling exhaust duct joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Outer passenger seat belt bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>V-belt cooling intake duct</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>V-belt cooling intake duct joint 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>V-belt cooling intake duct joint 2</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

**T.R.**

- 1.5 Nm (0.15 m-kgf, 1.1 ft-lbf)
- 2.0 Nm (0.20 m-kgf, 1.4 ft-lbf)
- 59 Nm (5.9 m-kgf, 43 ft-lbf)
INSTALLING THE V-BELT COOLING DUCTS

1. Install:
   • V-belt cooling intake duct joint 2 “1”
   • V-belt cooling intake duct joint 1 “2”
   • V-belt cooling exhaust duct joint “3”

TIP
   • Align the projection “a” on V-belt cooling intake duct joint 2 with the lip on the crankcase.
   • Fit the projection “b” on the V-belt cooling intake duct joints and V-belt cooling exhaust duct joint between the projections on the V-belt cooling intake duct and V-belt cooling exhaust duct.
   • Align the slit “c” in V-belt cooling intake duct joint 1 and V-belt cooling exhaust duct joint with the projection on the drive belt cover.
### Removing the cargo bed

**Order** | **Job/Parts to remove** | **Q’ty** | **Remarks**
--- | --- | --- | ---
1 | Frame cross member | 1 | Lift the cargo bed.
2 | Tail/brake light connector | 6 | Disconnect.
3 | Gas spring assembly | 1 | **TIP** Install the gas spring assembly so that the cylinder end is pointing upward.
4 | Pin | 2 | 
5 | Cargo bed assembly | 1 | For installation, reverse the removal procedure.

**Torque Specifications**

- 16 Nm (1.6 m-kgf, 12 ft-lbf)
- 17 Nm (1.7 m-kgf, 12 ft-lbf)
### Disassembling the cargo bed

**Order** | **Job/Parts to remove** | **Q’ty** | **Remarks**
---|---|---|---
1 | Cargo bed left panel | 1 | 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
2 | Cargo bed right panel | 1 | 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
3 | Cargo hook | 4 | 8 Nm (0.8 m-kgf, 5.8 ft-lbf)
4 | Tail/brake light | 2 | 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
5 | Tailgate cable | 2 | 9 Nm (0.9 m-kgf, 6.5 ft-lbf)
6 | Tailgate | 1 | 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
7 | Tailgate shaft | 1 | 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
8 | Cargo bed release lever | 1 | 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
9 | Cargo bed heat protector plate | 1 | 7 Nm (0.7 m-kgf, 5.1 ft-lbf)

For assembly, reverse the disassembly procedure.
DISASSEMBLING THE CARGO BED
1. Remove:
   • Tailgate “1”

TIP
Align the slot “a” in the left end of the tailgate shaft with the flat portions of the projection “b” on the cargo bed, and then lift the left end of the tailgate.

ASSEMBLING THE CARGO BED
1. Install:
   • Tailgate shaft “1”

   Tailgate shaft bolt
   7 Nm (0.7 m·kgf, 5.1 ft·lbf)

   TIP
   Install the tailgate shaft so that the end with the slot “a” is pointing to the left.

2. Install:
   • Tailgate “1”

   a. Fit the right end of the tailgate shaft onto the projection “a” on the cargo bed.
   b. Align the slot “b” in the left end of the tailgate shaft with the flat portions of the projection “c” on the cargo bed, and then fit the tailgate shaft onto the projection.

3. Install:
   • Tailgate cables “1”

   Tailgate cable bolt
   7 Nm (0.7 m·kgf, 5.1 ft·lbf)

   TIP
   Connect the straight end “a” of each tailgate cable to the tailgate “2”, and the offset end “b” to the cargo bed “3”. 
Removing the wheels and brake discs

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wheel</td>
<td>1</td>
<td>The following procedure applies to all of the wheels.</td>
</tr>
<tr>
<td>2</td>
<td>Wheel cap</td>
<td>1</td>
<td>TIP: Do not apply the brake pedal when the brake caliper is off of the brake disc as the brake pads will be forced shut.</td>
</tr>
<tr>
<td>3</td>
<td>Wheel axle nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake caliper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Wheel hub</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake disc</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

**TIP**: Do not apply the brake pedal when the brake caliper is off of the brake disc as the brake pads will be forced shut.
FRONT AND REAR WHEELS

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

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

REMOVING THE WHEEL HUBS
The following procedure applies to all of the wheel hubs.
1. Straighten the wheel axle nut rib “a”.
2. Remove:
   • Wheel axle nut
3. Remove:
   • Brake caliper

TIP
Do not apply the brake pedal when removing the brake caliper.
4. Remove:
   • Wheel hub “1”

TIP
Use a general puller “2” to separate the wheel hub and constant velocity shaft.

CHECKING THE WHEELS
The following procedure applies to all of the wheels.
1. Check:
   • Tire

• Wheel

Refer to “CHECKING THE TIRES” on page 3-24 and “CHECKING THE WHEELS” on page 3-23.

WARNING
After replacing the tire, ride conservatively to allow the tire to be properly seated in the rim. Failure to do so may cause an accident resulting in vehicle damage and possible injury.

Radial wheel runout limit
2.0 mm (0.08 in)

Lateral wheel runout limit
2.0 mm (0.08 in)
CHECKING THE WHEEL HUBS
The following procedure applies to all of the wheel hubs.
1. Check:
   • Wheel hub “1”
     Cracks/damage → Replace.
   • Splines (wheel hub) “2”
     Wear/damage → Replace the wheel hub.

INSTALLING THE BRAKE DISCS
The following procedure applies to all of the 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. 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.

Wheel axle nut
350 Nm (35 m·kgf, 253 ft·lbf)

Brake disc bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)
LOCTITE®
3. Check:
   • Brake disc
     Refer to “CHECKING THE BRAKE DISCS” on page 4-36.

---

**INSTALLING THE WHEELS**

The following procedure applies to all of the wheels.

1. Tighten:
   • Wheel nuts “1”

<table>
<thead>
<tr>
<th>Wheel nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 Nm (7.5 m-kgf, 54 ft-lbf)</td>
</tr>
</tbody>
</table>

---

**WARNING**

Tapered wheel nuts “1” 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.

Front wheel Refer to “FRONT AND REAR WHEELS” on page 4-25.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake pad bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake pad</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake pad spring</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

FWD

17 Nm (1.7 m·kgf, 12 ft·lbf)

T.R.

48 Nm (4.8 m·kgf, 35 ft·lbf)

17 Nm (1.7 m·kgf, 12 ft·lbf)
Removing the rear brake pads

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

1. **Brake caliper bolt** 2
2. **Brake pad bolt** 2
3. **Brake pad** 2
4. **Brake pad spring** 1

For installation, reverse the removal procedure.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Rear wheel</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Brake caliper bolt</td>
<td>2</td>
<td>Refer to “FRONT AND REAR WHEELS” on page 4-25.</td>
</tr>
<tr>
<td>2</td>
<td>Brake pad bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake pad</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake pad spring</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.

Front wheel

Refer to “FRONT AND REAR WHEELS” on page 4-25.

Brake fluid

Drain.

Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-17.

<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>Brake hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Brake pad bolt</td>
<td>2</td>
<td>Loosen.</td>
</tr>
<tr>
<td>5</td>
<td>Brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake caliper</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
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>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>Brake hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Brake pad bolt</td>
<td>2</td>
<td>Loosen.</td>
</tr>
<tr>
<td>5</td>
<td>Brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake caliper</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

Rear wheel
Refer to “FRONT AND REAR WHEELS” on page 4-25.

Brake fluid
Drain.
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-17.
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 bolt</td>
<td>2</td>
<td>The following procedure applies to both of the front brake calipers.</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>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Brake caliper piston dust seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Brake caliper piston seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bleed screw</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</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 bolt</td>
<td>2</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>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Brake caliper piston dust seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Brake caliper piston seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bleed screw</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.

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

T.R. 22 Nm (2.2 m-kgf, 16 ft-lbf)
T.R. 17 Nm (1.7 m-kgf, 12 ft-lbf)
T.R. 5 Nm (0.5 m-kgf, 3.6 ft-lbf)
T.R. 17 Nm (1.7 m-kgf, 12 ft-lbf)
Removing the brake master cylinder

3.5 Nm (0.35 m-kgf, 2.5 ft-lbf)
19 Nm (1.9 m-kgf, 14 ft-lbf)
16 Nm (1.6 m-kgf, 12 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>Brake fluid</td>
<td></td>
<td>Drain. Refer to “BLEEDING THE HYDRAULIC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BRAKE SYSTEM” on page 3-17.</td>
</tr>
<tr>
<td>1</td>
<td>Brake master cylinder reservoir cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake master cylinder reservoir diaphragm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake master cylinder reservoir diaphragm holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake master cylinder reservoir float</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear brake pipe</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Front brake pipe</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Brake master cylinder</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

FWDFWD
INTRODUCTION

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 BRAKE DISCS

The following procedure applies to all of the brake discs.

1. Remove:
   - Wheels
     Refer to “FRONT AND REAR WHEELS” on page 4-25.

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.

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.

Brake disc thickness limit
3.5 mm (0.14 in)

Brake disc deflection limit
0.1 mm (0.004 in)

a. Hold the dial gauge at a right angle against the brake disc surface.

b. Measure the deflection 3.0 mm (0.12 in) below the edge of the brake disc.
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:
   • Wheels
     Refer to “FRONT AND REAR WHEELS” on page 4-25.

REPLACING THE BRAKE PADS
The following procedure applies to all of the brake calipers.

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

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

   Front brake
   Brake pad lining thickness (inner)
     4.5 mm (0.18 in)
     Limit
     1.0 mm (0.04 in)
   Brake pad lining thickness (outer)
     4.5 mm (0.18 in)
     Limit
     1.0 mm (0.04 in)

   Rear brake
   Brake pad lining thickness (inner)
     4.3 mm (0.17 in)
     Limit
     1.0 mm (0.04 in)
   Brake pad lining thickness (outer)
     4.3 mm (0.17 in)
     Limit
     1.0 mm (0.04 in)

2. Install:
   • Brake pad spring
   • Brake pads

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

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

3. Install:
   • Brake pad bolts
   • Brake caliper

   Brake pad bolt
   17 Nm (1.7 m·kgf, 12 ft·lbf)
   Brake caliper bolt
   48 Nm (4.8 m·kgf, 35 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 3-16.

5. Check:
   • Brake pedal operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-17.

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

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

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

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

   WARNING
   • Cover the brake caliper piston with a rag.
     Be careful not to get injured when the piston is expelled from the brake caliper.
   • Never try to pry out the brake caliper piston.

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

CHECKING THE BRAKE CALIPERS
The following procedure applies to all 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, piston dust seals</td>
</tr>
<tr>
<td>Brake hoses</td>
</tr>
<tr>
<td>Brake fluid</td>
</tr>
</tbody>
</table>

1. Check:
   • Brake caliper pistons “1”
     Rust/scratches/wear → Replace the brake caliper pistons.
   • Brake caliper cylinders “2”
     Scratches/wear → Replace the brake caliper.
   • Brake caliper body “3”
     Cracks/damage → Replace the brake caliper.
   • 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 seals and brake caliper piston dust seals.

ASSEMBLING THE BRAKE CALIPERS
The following procedure applies to all of the brake calipers.
WARNING
• Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
• Never use solvents on internal brake components as they will cause the brake caliper piston seals and brake caliper piston dust seals to swell and distort.
• Whenever a brake caliper is disassembled, replace the brake caliper piston seals and brake caliper piston dust seals.

INSTALLING THE BRAKE CALIPERS

The following procedure applies to all of the brake calipers.

1. Install:
   • Brake caliper “1” (temporarily)
   • Copper washers
   • Brake hose “2”
   • Brake hose union bolt “3”

   Specified brake fluid
   DOT 4

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

WARNING
Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-41.

NOTICE
• When installing the left front brake hose onto the left front brake caliper, fit the projection “a” on the brake hose into the slot in the brake caliper.
• When installing the right front brake hose onto the right front brake caliper, make sure that the pipe section “b” on the end of the brake hose contacts the rib on the brake caliper.
• When installing the left rear brake hose onto the left rear brake caliper, fit the pipe section “c” on the end of the brake hose into the slot in the brake caliper.

2. Remove:
   • Brake caliper
3. Install:
   - Brake pads
   - Brake pad spring
   - Brake pad bolts
   - Brake caliper
   Refer to “REPLACING THE BRAKE PADS” on page 4-37.

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

   ![Specified brake fluid DOT 4](image)

   **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.

5. Bleed:
   - Brake system
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-17.

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 3-16.

7. Check:
   - Brake pedal operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-17.

---

**CHECKING THE 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 reservoir
     Cracks/damage → Replace the brake master cylinder.
   - Brake master cylinder reservoir diaphragm
     Holding screw → Replace.

3. Check:
   - Brake pipes
     Cracks/damage → Replace.

**CHECKING THE BRAKE PIPES**

The following procedure applies to both of the brake pipes.

1. Check:
   - Brake pipe end (flare nut)
     Damage → Replace the brake master cylinder, brake pipes, and related parts as a set.

**INSTALLING THE BRAKE MASTER CYLINDER**

1. Install:
   - Brake master cylinder
   - Brake pipes
Proper brake pipe routing is essential to ensure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-41.

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

   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 3-17.

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 3-16.

5. Check:
   • Brake pedal operation
     Soft or spongy feeling → Bleed the brake system.
Removing the parking brake pads

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rear skid plate</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td>1</td>
<td>Parking brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Parking brake caliper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Parking brake cable (parking brake caliper end)</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Parking brake pad bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Parking brake pad</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Brake pad spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Parking brake caliper arm nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Parking brake caliper arm</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

17 Nm (1.7 m-kgf, 12 ft-lbf)

40 Nm (4.0 m-kgf, 29 ft-lbf)
Removing the parking brake caliper

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rear skid plate</td>
<td></td>
<td>Refer to &quot;GENERAL CHASSIS&quot; on page 4-1.</td>
</tr>
<tr>
<td>1</td>
<td>Parking brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Parking brake caliper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Parking brake cable (parking brake</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td></td>
<td>caliper end)</td>
<td></td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

40 Nm (4.0 m-kgf, 29 ft-lbf)
Disassembling the parking brake caliper

For assembly, reverse the disassembly procedure.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Parking brake pad bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Parking brake pad</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake pad spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Parking brake caliper arm nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Parking brake caliper arm</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>Push rod</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Parking brake caliper arm shaft</td>
<td>1</td>
<td>Left-hand threads</td>
</tr>
<tr>
<td>10</td>
<td>Brake caliper bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Parking brake caliper guide pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Parking brake caliper retaining pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Parking brake cable holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Brake caliper piston seal</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Torque Specifications**

- 17 Nm (1.7 m-kgf, 12 ft-lbf)
- 22 Nm (2.2 m-kgf, 16 ft-lbf)
- 12 Nm (1.2 m-kgf, 8.7 ft-lbf)
- 17 Nm (1.7 m-kgf, 12 ft-lbf)
Removing the parking brake lever

### Order and Parts Information

<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>Sun top/Side frames/Hood/Front fender/Instrument panel</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td>1</td>
<td>Parking brake switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Parking brake lever</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Parking brake cable (parking brake lever end)</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

**Torque Specifications**
- 13 Nm (1.3 m-kgf, 9.4 ft-lbf)
- 16 Nm (1.6 m-kgf, 12 ft-lbf)
Removing the parking brake disc

![Diagram of parking brake disc and final drive assembly]

10 Nm (1.0 m-kgf, 7.2 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>Final drive assembly</td>
<td></td>
<td>Refer to “REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT” on page 8-17.</td>
</tr>
<tr>
<td>1</td>
<td>Parking brake disc</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
REMOVING THE PARKING BRAKE CALIPER
1. Move the parking brake lever to the released position, and then loosen the parking brake cable adjuster so that the parking brake cable is slack.

CHECKING THE PARKING BRAKE CALIPER
1. Check:
   • Brake caliper piston
     Scratches/rust/wear → Replace.
   • Brake caliper body
     Cracks/damage → Replace the parking brake caliper.

CHECKING THE PARKING BRAKE DISC
1. Check:
   • Brake disc
     Galling/damage → Replace.
2. Measure:
   • Brake disc deflection
   • Brake disc thickness “a”
     Out of specification → Replace.

REPLACING THE PARKING BRAKE PADS
1. Measure:
   • Brake pad wear limit “a”
     Out of specification → Replace the brake pads and brake pad spring as a set.

Brake pad lining thickness-inner 3.2 mm (0.13 in)
Limit 1.0 mm (0.04 in)
Brake pad lining thickness-outer 3.2 mm (0.13 in)
Limit 1.0 mm (0.04 in)

Brake disc deflection limit 0.10 mm (0.004 in)
Brake disc thickness limit 3.0 mm (0.12 in)

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

The parking brake arm shaft has left hand threads. To turn in the shaft, turn it counterclockwise.

b. Install the parking brake caliper arm “2” onto the parking brake caliper arm shaft, and then rotate the arm until it contacts the stopper “a”.

Parking brake pad bolt
17 Nm (1.7 m·kgf, 12 ft·lbf)

TIP
Measure the deflection 3.0 mm (0.12 in) below the edge of the brake disc.
c. Install the parking brake caliper arm nut "3", and then temporarily tighten it.

d. Insert a suitable tool "4" with a thickness of 4.7 mm (0.19 in) between the brake pads "5", and then finger tighten the push rod "6".

e. Tighten the parking brake caliper arm nut.

f. Install the spring.

2. Adjust:
   - Parking brake cable free play
     Refer to “ADJUSTING THE PARKING BRAKE LEVER” on page 3-20.

EAS1XD1051
INSTALLING THE PARKING BRAKE LEVER
1. Install:
   - Parking brake lever

   Parking brake lever bolt
   13 Nm (1.3 m·kgf, 9.4 ft·lbf)

2. Adjust:
   - Parking brake lever free play
     Refer to “ADJUSTING THE PARKING BRAKE LEVER” on page 3-20.

EAS1XD1079
INSTALLING THE PARKING BRAKE CALIPER
1. Install:
   - Parking brake caliper

   Parking brake caliper bolt
   40 Nm (4.0 m·kgf, 29 ft·lbf)
Removing the pedal assembly

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

Brake fluid
Drain. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-17.

Brake master cylinder
Refer to “FRONT AND REAR BRAKES” on page 4-29.

Steering joint
Refer to “STEERING SYSTEM” on page 4-52.

<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 light switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Throttle cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Pedal assembly</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

2.5 Nm (0.25 m-kgf, 1.8 ft-lbf)

16 Nm (1.6 m-kgf, 12 ft-lbf)

FWDFWD
Disassembling the pedal 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>Pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake pedal rod</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Spring</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>Washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake pedal</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>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Accelerator pedal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Pedal assembly bracket</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.

17 Nm (1.7 m-kgf, 12 ft-lbf)
INSTALLING THE PEDAL ASSEMBLY

1. Adjust:
   • Throttle cable length “a”

<table>
<thead>
<tr>
<th>Throttle cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5–6.5 mm (0.22–0.26 in)</td>
</tr>
</tbody>
</table>

   a. Turn the adjusting nut “1” until the specified length is obtained.
   b. Tighten the locknut “2” to specification.

2. Adjust:
   • Accelerator pedal free play
     Refer to “ADJUSTING THE ACCELERATOR PEDAL FREE PLAY” on page 3-21.

3. Adjust:
   • Brake pedal free play
     Refer to “ADJUSTING THE BRAKE PEDAL” on page 3-19.

4. Adjust:
   • Brake light operation timing

   **TIP**
   Adjustment is correct when the brake light comes on by depressing the brake pedal less than 5.0–10.0 mm (0.20–0.39 in).

   a. Hold the main body “1” of the brake light switch so that it does not rotate and turn the adjusting nut “2” in direction “a” or “b” until the brake light comes on at the proper time.

<table>
<thead>
<tr>
<th>Direction “a”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake light comes on sooner.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Direction “b”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake light comes on later.</td>
</tr>
</tbody>
</table>
Removing the steering 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>Steering joint bolt</td>
<td>2</td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td>2</td>
<td>Steering column</td>
<td>1</td>
<td>Except for EPS models</td>
</tr>
<tr>
<td>3</td>
<td>EPS motor coupler</td>
<td>1</td>
<td>Disconnect. For EPS models</td>
</tr>
<tr>
<td>4</td>
<td>EPS torque sensor coupler</td>
<td>1</td>
<td>Disconnect. For EPS models</td>
</tr>
<tr>
<td>5</td>
<td>EPS unit</td>
<td>1</td>
<td>For EPS models</td>
</tr>
<tr>
<td></td>
<td><strong>NOTICE</strong></td>
<td></td>
<td>The EPS unit should not be disassembled.</td>
</tr>
<tr>
<td>6</td>
<td>Steering joint</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the steering 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>7</td>
<td>Tie-rod end locknut</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Steering assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Tie-rod end</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Dust boot</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

The torque values provided are:
- 39 Nm (3.9 m·kgf, 28 ft·lbf)
- 40 Nm (4.0 m·kgf, 29 ft·lbf)
- 48 Nm (4.8 m·kgf, 35 ft·lbf)
- 27 Nm (2.7 m·kgf, 20 ft·lbf)
- 21 Nm (2.1 m·kgf, 15 ft·lbf)
- 27 Nm (2.7 m·kgf, 20 ft·lbf)
- 40 Nm (4.0 m·kgf, 29 ft·lbf)

New components are indicated with "New."
CHECKING THE STEERING JOINT
1. Check:
   • Steering joint
     Rough movement → Replace.

CHECKING THE TIE-ROD ENDS
The following procedure applies to both of the tie-rod ends.
1. Check:
   • Tie-rod end free play and movement
     Rough movement → Replace the tie-rod end.

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

INSTALLING THE STEERING SYSTEM
1. Install:
   • Dust boots

   a. Fit the tabs “a” into the holes “b” in the boot band “1”.

b. Crimp the portion “c” of the boot band with the boots band installation tool “2”.

TIP
Tighten the steering assembly bolts in the proper tightening sequence as shown.

<table>
<thead>
<tr>
<th>Part</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering assembly</td>
<td>48 Nm (4.8 m·kgf, 35 ft·lbf)</td>
</tr>
<tr>
<td>Steering column</td>
<td>21 Nm (2.1 m·kgf, 15 ft·lbf)</td>
</tr>
<tr>
<td>EPS unit</td>
<td>21 Nm (2.1 m·kgf, 15 ft·lbf)</td>
</tr>
<tr>
<td>Steering joint</td>
<td>27 Nm (2.7 m·kgf, 20 ft·lbf)</td>
</tr>
</tbody>
</table>

Steering assembly bolt 48 Nm (4.8 m·kgf, 35 ft·lbf)
Steering column bolt 21 Nm (2.1 m·kgf, 15 ft·lbf)
EPS unit bolt 21 Nm (2.1 m·kgf, 15 ft·lbf)
Steering joint bolt 27 Nm (2.7 m·kgf, 20 ft·lbf)
**TIP**
- Align the alignment mark “a” on the steering assembly shaft and the alignment mark “b” on the steering joint with the alignment mark “c” on the steering assembly housing.
- Fit the steering joint onto the steering column shaft or EPS unit shaft so that the bolt hole “d” in the joint is aligned with the area “e” on the shaft that does not have splines.

4. Adjust:
- Toe-in
  Refer to “ADJUSTING THE TOE-IN” on page 3-26.
Removing the steering knuckles

The following procedure applies to both of the steering knuckles.

Refer to “FRONT AND REAR WHEELS” on page 4-25.

<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>Tie-rod end</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Front brake hose holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Steering knuckle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Ball joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oil seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bearing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Spacer</td>
<td>1</td>
<td>For installation, reverse the removal pro-</td>
</tr>
</tbody>
</table>

New

7 Nm (0.7 m·kgf, 5.1 ft·lbf)

39 Nm (3.9 m·kgf, 28 ft·lbf)

30 Nm (3.0 m·kgf, 22 ft·lbf)

30 Nm (3.0 m·kgf, 22 ft·lbf)

30 Nm (3.0 m·kgf, 22 ft·lbf)

9 Nm (0.9 m·kgf, 6.5 ft·lbf)
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 STEERING KNUCKLES AND FRONT WHEEL BEARINGS
The following procedure applies to both of the steering knuckles and front wheel bearings.
1. Check:
   • Steering knuckle
     Damage/pitting → Replace.
2. Check:
   • Front wheel bearings “1”
     Rough movement/excessive free play → Replace.
   • Oil seals “2”
     Damage → Replace.

a. Clean the surface of the steering knuckle.
b. Remove the oil seals.
c. Drive out the bearings.

WARNING
Eye protection is recommended when using striking tools.
d. Remove the spacer “3”.
e. Apply lithium-soap-based grease to the spacer, new bearings and oil seals.
f. Install the spacer to the steering knuckle.
g. Install the new bearings.

TIP
Install the wheel side bearing first.

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

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”.

4-57
d. Measure the ball joint bore inside diameter “a”.
   Out of specification → Replace the steering knuckle.

- Ball joint bore inside diameter
  32.90–32.95 mm (1.295–1.297 in)

e. Attach the special tools and a 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 or rubber boot.

<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></td>
<td></td>
<td>YM-01474</td>
</tr>
<tr>
<td>7</td>
<td>Body</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Guide bolt</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Installer washer</td>
<td>90890-01477</td>
</tr>
<tr>
<td></td>
<td></td>
<td>YM-01477</td>
</tr>
<tr>
<td>10</td>
<td>Base plate 35 mm</td>
<td>90890-01553</td>
</tr>
<tr>
<td></td>
<td></td>
<td>YM-01553</td>
</tr>
<tr>
<td>11</td>
<td>Ball joint installer attachment 39 mm</td>
<td>90890-01555</td>
</tr>
<tr>
<td></td>
<td></td>
<td>YS-01881-A</td>
</tr>
</tbody>
</table>

f. Hold the base plate “10” in place while turning in the long bolt “6” to install the new ball joint “5” into the steering knuckle “4”.

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

Order | Job/Parts to remove | Q'ty | Remarks
--- | --- | --- | ---
Front wheel | | | Refer to “FRONT AND REAR WHEELS” on page 4-25.
1 | Front arm protector | 1 | 45 Nm (4.5 m-kgf, 33 ft-lbf)
2 | Front brake hose holder | 1 | 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
3 | Front brake hose holder | 1 | 30 Nm (3.0 m-kgf, 22 ft-lbf)
4 | Nut | 2 | 45 Nm (4.5 m-kgf, 33 ft-lbf)
5 | Nut/Bolt (front shock absorber assembly) | 2/2 | 30 Nm (3.0 m-kgf, 22 ft-lbf)
6 | Front shock absorber assembly | 1 | 7 Nm (0.7 m-kgf, 5.1 ft-lbf)
7 | Nut/Bolt (front upper arm) | 2/2 | 45 Nm (4.5 m-kgf, 33 ft-lbf)
8 | Front upper arm | 1 | 30 Nm (3.0 m-kgf, 22 ft-lbf)
9 | Dust cover | 2 |
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>Nut/Bolt (front lower arm)</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Front lower arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Dust cover</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Bushing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Ball joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Bushing</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
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.

HANDLING THE FRONT SHOCK ABSORBER ASSEMBLIES

These front shock absorber assemblies contain highly compressed nitrogen gas. Before handling the front shock absorber assemblies, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the front shock absorber assemblies.
- Do not tamper or attempt to open the front shock absorber assemblies.
- Do not subject the front shock absorber assemblies to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.
- Do not deform or damage the front shock absorber assemblies in any way. If the front shock absorber assemblies are damaged, damping performance will suffer.

DISPOSING OF A FRONT SHOCK ABSORBER ASSEMBLY
Gas pressure must be released before disposing of a front shock absorber assembly. To release the gas pressure, drill a 2–3 mm (0.08–0.12 in) hole through the front shock absorber at a point 60–70 mm (2.4–2.8 in) from its end as shown.

WARNING
Oil and metal chips may be expelled together with the gas from the shock absorber assembly; therefore, wear eye protection to prevent eye damage.

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/gas leaks → Replace the front shock absorber assembly.
   • Front shock absorber rod
      Bends/damage → Replace the front shock absorber assembly.
   • Spring
      Move the spring up and down.
EAS29770
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.

TIP
• Always use a new ball joint.
• Do not tap or damage the top of the ball joint or rubber boot.

<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 YM-01474</td>
</tr>
<tr>
<td>7</td>
<td>Body</td>
<td>YM-01474</td>
</tr>
<tr>
<td>8</td>
<td>Guide bolt</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Installer washer</td>
<td>90890-01477 YM-01477</td>
</tr>
<tr>
<td>10</td>
<td>Base plate 35 mm</td>
<td>90890-01553 YM-01553</td>
</tr>
<tr>
<td>11</td>
<td>Ball joint installer at-attachment 39 mm</td>
<td>90890-01555 YS-01881-A</td>
</tr>
</tbody>
</table>

a. Clean the surface of the front upper arm.
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 front upper arm “4”.

d. Attach the special tools and a new ball joint “5” to the front upper arm “4”.
e. Hold the base plate “10” 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.
   - Temporarily tighten the front upper and lower arm nuts “4”.

b. Install the front shock absorber assembly “5”, bolts “6”, and nuts “7”.

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

TIP
   - Install the front shock absorber assembly so that the warning label is facing out.
   - Be sure to position the front shock absorber bolts “6” so that the bolt heads face forward.

Steering knuckle nut
30 Nm (3.0 m·kgf, 22 ft·lbf)

c. Install the steering knuckle and nuts “8”.

d. Install new cotter pins.
e. Tighten the front upper and lower arm nuts “4” to specification.

Front arm nut
45 Nm (4.5 m·kgf, 33 ft·lbf)
REAR KNUCKLES AND STABILIZER

Removing the rear knuckles and stabilizer

<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>The following procedure applies to both of the rear knuckles.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rear wheel hub</td>
<td></td>
<td>Refer to “FRONT AND REAR WHEELS” on page 4-25.</td>
</tr>
<tr>
<td>1</td>
<td>Rear brake disc cleaning plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake disc guard</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear knuckle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spacer cover</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spacer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oil seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Bearing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Stabilizer joint</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
Removing the rear knuckles and stabilizer

<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>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>

For installation, reverse the removal procedure.
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.

2. Check:
   - Rear wheel bearings “1”
     Rough movement/excessive free play → Replace.
   - Oil seals “2”
     Damage → Replace.

---

a. Clean the surface of the rear knuckle.
b. Remove the oil seals.
c. Drive out the bearings.

**WARNING**

Eye protection is recommended when using striking tools.

d. Remove the spacer “3”.

e. Apply lithium-soap-based grease to the spacer, new bearings and oil seals.
f. Install the spacer to the rear knuckle.
g. Install the new bearings.

**TIP**

Install the wheel side bearing first.

---

**NOTICE**

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

h. Install the new oil seals.

---

CHECKING THE STABILIZER

1. Check:
   - Stabilizer
     Bends/cracks/damage → Replace.

---

INSTALLING THE STABILIZER

1. Install:
   - Stabilizer “1”
   - Bushing “2”
   - Stabilizer holder “3”

**TIP**

Install the bushing with its slit “a” facing downward.
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 wheel**
- Refer to “FRONT AND REAR WHEELS” on page 4-25.

**Stabilizer joint**
- Refer to “REAR KNUCKLES AND STABILIZER” on page 4-64.

<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 arm protector</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rear brake hose holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Nut/Bolt (rear shock absorber)</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rear shock absorber</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Nut/Bolt (rear upper arm — rear knuckle)</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Nut/Bolt (rear upper arm — frame)</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rear upper arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Dust cover</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
Removing the rear arms and rear 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>9</td>
<td>Nut/Bolt (rear lower arm – rear knuckle)</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Nut/Bolt (rear lower arm – frame)</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Rear lower arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Dust cover</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Bushing</td>
<td>4</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>
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.

HANDLING THE REAR SHOCK ABSORBER ASSEMBLIES
WARNING
These rear shock absorber assemblies contain highly compressed nitrogen gas. Before handling the rear shock absorber assemblies, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the rear shock absorber assemblies.
• Do not tamper or attempt to open the rear shock absorber assemblies.
• Do not subject the rear shock absorber assemblies to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.
• Do not deform or damage the rear shock absorber assemblies in any way. If the rear shock absorber assemblies are damaged, damping performance will suffer.

DISPOSING OF A REAR SHOCK ABSORBER ASSEMBLY
Gas pressure must be released before disposing of a rear shock absorber assembly. To release the gas pressure, drill a 2–3 mm (0.08–0.12 in) hole through the rear shock absorber at a point 40–50 mm (1.6–2.0 in) from its end as shown.

  WARNING
Oil and metal chips may be expelled together with the gas from the shock absorber assembly; therefore, wear eye protection to prevent eye damage.

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/gas 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 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 forward.
   • Temporarily tighten the rear upper and lower arm nuts “4”.

   b. Install the rear shock absorber assembly “5”, bolts “6”, and nuts “7”.

   Rear shock absorber assembly nut
   82 Nm (8.2 m·kgf, 59 ft·lbf)

   TIP
   • Install the rear shock absorber assembly so that the warning label is facing rearward.
   • Be sure to position the rear shock absorber bolts “6” so that the bolt heads face forward.

   c. Install the rear knuckle bolts “8”, and nuts “9”.

   Rear knuckle nut
   85 Nm (8.5 m·kgf, 61 ft·lbf)

   d. Tighten the rear upper and lower arm nuts “4” to specification.

   Rear arm nut
   45 Nm (4.5 m·kgf, 33 ft·lbf)
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Removing the muffler and exhaust pipe

<table>
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<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exhaust pipe heat protector plate</td>
<td>1</td>
<td>Lift the cargo bed.</td>
</tr>
<tr>
<td>2</td>
<td>Muffler heat protector plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Spring</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Muffler</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Muffler mount</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Exhaust pipe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Gasket</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

Torque Specifications:

- 17 Nm (1.7 m-kgf, 12 ft-lbf)
- 20 Nm (2.0 m-kgf, 14 ft-lbf)
- 23 Nm (2.3 m-kgf, 17 ft-lbf)
- 8 Nm (0.8 m-kgf, 5.8 ft-lbf)
INSTALLING THE EXHAUST PIPE AND MUFFLER

1. Install:
   - Gasket “1” New (muffler side)

   NOTICE
   Be careful not to damage the muffler contact surface of the gasket.

   TIP
   Install the gasket completely onto the exhaust pipe “2” by pushing the side “a” of the gasket. If the gasket is difficult to install, tap lightly on the gasket with a soft-face hammer.

   ![Diagram of Gasket Installation]

2. Install:
   - Muffler mount “1”

   **Installed length “a”**
   34 mm (1.34 in)

3. Install:
   - Springs “1”

   **TIP**
   Install the springs so that the spring ends are pointing inward as shown in the illustration.
**ENGINE REMOVAL**

**Disconnecting the couplers and leads**

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cargo bed/Frame cross member/Seat frames/Rear panels/Center passenger compartment</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>panel/V-belt cooling ducts</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drive select lever shift cable</td>
<td></td>
<td>Disconnect. Refer to “SHIFT LEVER” on page 5-45.</td>
</tr>
<tr>
<td></td>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-8.</td>
</tr>
<tr>
<td></td>
<td>Thermostat outlet hose</td>
<td></td>
<td>Disconnect. Refer to “THERMOSTAT” on page 6-8.</td>
</tr>
<tr>
<td></td>
<td>Water pump inlet hose</td>
<td></td>
<td>Disconnect. Refer to “WATER PUMP” on page 6-11.</td>
</tr>
<tr>
<td></td>
<td>Oil cooler outlet hose</td>
<td></td>
<td>Disconnect. Refer to “OIL COOLER” on page 6-1.</td>
</tr>
<tr>
<td></td>
<td>Air induction system hose (air cut-off valve to reed valve cover)</td>
<td></td>
<td>Disconnect. Refer to “AIR INDUCTION SYSTEM” on page 7-15.</td>
</tr>
</tbody>
</table>

- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
- 4.9 Nm (0.49 m-kgf, 3.5 ft-lbf)

---

5-3
## Disconnecting the couplers and leads

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Spark plug cap</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Coolant temperature sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Reverse switch coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Gear position switch coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Engine ground lead</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Starter motor lead</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Speed sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>Crankshaft position sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>9</td>
<td>AC magneto coupler</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
</tbody>
</table>

### Torque Specifications

- **10 Nm (1.0 m-kgf, 7.2 ft-lbf)**
- **4.9 Nm (0.49 m-kgf, 3.5 ft-lbf)**

For installation, reverse the removal procedure.
## Removing the Engine

**Order** | **Job/Parts to remove** | **Q’ty** | **Remarks**
--- | --- | --- | ---
1 | Engine mounting bolt (front) | 2 | 
2 | Engine mounting bolt (front) | 2 | 
3 | Engine bracket nut (rear) | 2 | 
4 | Engine | 1 | **NOTICE**
| | | | Make sure that the engine does not strike the brake pipe when removing it.
| | | | **TIP**
| | | | Remove the engine from the top of the vehicle.
5 | Engine bracket nut (front) | 2 | 
6 | Engine bracket (front) | 2 | 
7 | Engine mounting bolt (rear) | 2 |
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>8</td>
<td>Engine mounting bolt (rear)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Engine bracket (rear)</td>
<td>2</td>
<td>For installation, reverse the removal proce-</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
INSTALLING THE ENGINE

1. Install:
   - Engine brackets (rear) “1” (onto the engine)
   - Engine mounting bolts (rear) (M10) “2”
   - Engine mounting bolts (rear) (M6) “3”

   **TIP**
   Before installing the engine, tighten the engine mounting bolts (rear) to specification.

   **NOTICE**
   Make sure that the engine does not strike the brake pipe when installing it.

   **TIP**
   Do not fully tighten the bolts and nuts.

2. Install:
   - Engine brackets (front) “4” (onto the frame)
   - Engine bracket nuts (front) “5”
   - Engine “6”
   - Engine bracket nuts (rear) “7”
   - Engine mounting bolts (front) (M10) “8”
   - Engine mounting bolts (front) (M6) “9”

   **LOCTITE®

   Engine mounting bolt (rear) (M10)
   42 Nm (4.2 m-kgf, 30 ft-lbf)
   Engine mounting bolt (rear) (M6)
   10 Nm (1.0 m-kgf, 7.2 ft-lbf)

3. Tighten:
   - Engine bracket nuts (front) “5”
   - Engine bracket nuts (rear) “7”
   - Engine mounting bolts (front) (M10) “8”
   - Engine mounting bolts (front) (M6) “9”

   **LOCTITE®

   Engine bracket nuts (front)
   42 Nm (4.2 m-kgf, 30 ft-lbf)
   Engine bracket nuts (rear)
   42 Nm (4.2 m-kgf, 30 ft-lbf)
   Engine mounting bolt (front) (M10)
   42 Nm (4.2 m-kgf, 30 ft-lbf)
   Engine mounting bolt (front) (M6)
   10 Nm (1.0 m-kgf, 7.2 ft-lbf)
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></td>
<td>Right rear panel/Frame cross member</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Exhaust pipe</td>
<td></td>
<td>Refer to “ENGINE REMOVAL” on page 5-1.</td>
</tr>
<tr>
<td></td>
<td>Engine oil</td>
<td></td>
<td>Disconnect.</td>
</tr>
<tr>
<td></td>
<td>Oil pipe (crankcase to cylinder head)</td>
<td></td>
<td>Refer to “OIL COOLER” on page 6-1.</td>
</tr>
<tr>
<td></td>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-8.</td>
</tr>
<tr>
<td></td>
<td>Thermostat/Coolant temperature sensor</td>
<td></td>
<td>Refer to “THERMOSTAT” on page 6-8.</td>
</tr>
<tr>
<td></td>
<td>Throttle body assembly</td>
<td></td>
<td>Refer to “THROTTLE BODY” on page 7-8.</td>
</tr>
<tr>
<td></td>
<td>Reed valve assembly</td>
<td></td>
<td>Refer to “AIR INDUCTION SYSTEM” on page 7-15.</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>Cylinder head breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
</tbody>
</table>
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>4</td>
<td>Camshaft sprocket cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Tappet cover</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oil check bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Timing chain tensioner cap bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Timing chain tensioner</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Timing chain tensioner gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Camshaft sprocket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Decompressor assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Cylinder head</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Cylinder head gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
REMOVING THE CYLINDER HEAD

1. Align:
   • “I” mark “a” on the AC magneto rotor (with the stationary pointer “b” on the AC magneto cover)

2. Loosen:
   • Camshaft sprocket bolts “1”
   • Decompressor assembly bolts “2”

TIP
While holding the AC magneto rotor nut with a wrench, loosen the camshaft sprocket bolts and decompressor assembly bolts.

3. Loosen:
   • Timing chain tensioner cap bolt

4. Remove:
   • Timing chain tensioner (along with the gasket)
   • Camshaft sprocket
   • Timing chain

TIP
To prevent the timing chain from falling into the crankcase, fasten it with a wire.

5. Remove:
   • 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.

CHECKING THE CYLINDER HEAD

1. Eliminate:
   • Combustion chamber carbon deposits (with a rounded scraper)
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](image)
   - Warpage limit
     0.03 mm (0.0012 in)

\[ \begin{align*}
\text{Warpage limit} & \quad 0.03 \text{ mm (0.0012 in)} \\
\end{align*} \]

a. Place a straightedge “1” and a thickness gauge “2” across the cylinder head.

\[ \begin{align*}
a & \quad 1/4 \text{ tooth} \\
b & \quad \text{Correct} \\
\end{align*} \]

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.

\[ \begin{align*}
\text{TIP} & \quad \text{To ensure an even surface, rotate the cylinder head several times.}
\end{align*} \]

**CHECKING THE CAMSHAFT SPROCKET**

1. Check:
   - Camshaft sprocket
     More than 1/4 tooth wear “a” → Replace the camshaft sprocket and the timing chain as a set.

**CHECKING THE TAPPET COVERS AND CAMSHAFT SPROCKET COVER**
The following procedure applies to both of the tappet covers.

1. Check:
   - Tappet cover
     Damage/wear → Replace.
   - Camshaft sprocket cover
     Damage/wear → Replace.

**CHECKING THE TIMING CHAIN TENSIONER**

1. Check:
   - Timing chain tensioner
     Cracks/damage → Replace.
2. Check:
   - One-way cam operation
     Rough movement → Replace the timing chain tensioner.
3. Check:
   - Timing chain tensioner cap bolt
     Damage/wear → Replace.
• Spring
• One-way cam
• Timing chain tensioner rod
  Damage/wear → Replace the timing chain tensioner.

INSTALLING THE CYLINDER HEAD
1. Install:
   • Dowel pins
   • Cylinder head gasket
2. Install:
   • Cylinder head
   • Cylinder head bolts

<table>
<thead>
<tr>
<th>Cylinder head bolt “1”</th>
<th>Length: 135 mm (5.31 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 Nm (3.5 m·kgf, 25 ft·lbf)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cylinder head bolt “2”</th>
<th>Length: 145 mm (5.71 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 Nm (3.5 m·kgf, 25 ft·lbf)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cylinder head bolt “3”</th>
<th>Length: 39 mm (1.54 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>38 Nm (3.8 m·kgf, 27 ft·lbf)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cylinder head bolt “4”</th>
<th>Length: 30 mm (1.18 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Nm (1.0 m·kgf, 7.2 ft·lbf)</td>
<td></td>
</tr>
</tbody>
</table>

TIP
• Lubricate the threads and mating surface of the cylinder head bolts “1” and “2” with molybdenum disulfide grease.
• Lubricate the threads and mating surface of the cylinder head bolts “3” with engine oil.
• Tighten the cylinder head bolts in the proper tightening sequence as shown (1, 2, and so on) and torque them in two stages.

3. Install:
   • Decompressor assembly
   • Camshaft sprocket
     (onto the camshaft)

a. Install the decompressor assembly onto the camshaft, and then finger tighten the decompressor assembly bolts “1”.
b. Turn the crankshaft counterclockwise.
c. Align the “I” mark “a” on the AC magneto rotor with the stationary pointer “b” on the AC magneto cover.
d. Align the “I” mark “c” on the camshaft sprocket with the stationary pointer “d” on the cylinder head.
e. Install the timing chain “2” onto the camshaft sprocket “3”, and install the camshaft sprocket onto the camshaft, and then finger tighten the camshaft sprocket bolts “4”.

T R.
Cylinder head bolt “1”
35 Nm (3.5 m·kgf, 25 ft·lbf)
Cylinder head bolt “2”
35 Nm (3.5 m·kgf, 25 ft·lbf)
Cylinder head bolt “3”
38 Nm (3.8 m·kgf, 27 ft·lbf)
Cylinder head bolt “4”
10 Nm (1.0 m·kgf, 7.2 ft·lbf)
When installing the camshaft sprocket, be sure to keep the timing chain as tight as possible on the exhaust side.

**TIP**

**NOTICE**

Do not turn the crankshaft when installing the camshaft to avoid damage or improper valve timing.

f. Remove the wire from the timing chain.

4. Install:
   • Timing chain tensioner

a. Remove the timing chain tensioner cap bolt, copper washer, and spring.

b. Release the timing chain tensioner one-way cam “1” and push the timing chain tensioner rod “2” all the way into the timing chain tensioner housing.

c. Install the timing chain tensioner housing “3” and a new gasket “4” onto the cylinder.

d. Install the spring “5”, a new copper washer “6”, and the timing chain tensioner cap bolt “7”.

5. Turn:
   • Crankshaft (several turns counterclockwise)

6. Check:
   • “I” mark “a”
     Align the “I” mark on the AC magneto rotor with the stationary pointer “b” on the AC magneto cover.
   • “I” mark “c”
     Align the “I” mark on the camshaft sprocket with the stationary pointer “d” on the cylinder head.

Out of alignment → Correct.
    Refer to the installation steps above.

**Timing chain tensioner cap bolt**

- **20 Nm (2.0 m-kgf, 14 ft-lbf)**

**TIP**

Install the gasket with its beaded side facing the timing chain tensioner.
7. Tighten:
- Camshaft sprocket bolts “1”
- Decompressor assembly bolts “2”

**NOTICE**

Be sure to tighten the camshaft sprocket bolts to specification to avoid the possibility of the bolts coming loose and damaging the engine.

**TIP**

- While holding the AC magneto rotor nut with a wrench, tighten the camshaft sprocket bolts and decompressor assembly bolts.
- After tightening the decompressor assembly bolts, check that decompressor assembly moves smoothly.

8. Measure:
- Valve clearance
  Out of specification → Adjust.
  Refer to “ADJUSTING THE VALVE CLEARANCE” on page 3-3.

---

**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 3-3.

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

3. Lift the cargo bed.

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. Attach:
   - Compression gauge “1”

---

**Standard compression pressure**
(at sea level)
500 kPa (5.0 kgf/cm², 71.1 psi)
Minimum–maximum
440–560 kPa (4.4–5.6 kgf/cm², 62.6–79.6 psi)
a. With the throttle wide open, crank the engine until the reading on the compression gauge stabilizes.

**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>Compression pressure (with oil applied into the cylinder)</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>

8. Install:

- Spark plug

**TIP**

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

9. Connect:

- Spark plug cap

10. Lower the cargo bed.
Removing the rocker arms and camshaft

<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</td>
<td></td>
<td>Refer to “CYLINDER HEAD” on page 5-8.</td>
</tr>
<tr>
<td>2</td>
<td>Bearing retainer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rocker arm shaft</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Intake rocker arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Exhaust rocker arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Locknut</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Valve adjusting screw</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Camshaft</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
| 9     | Decompressor lever      | 1    | **NOTICE**
Do not disassemble the camshaft assembly. |
| 10    | Decompressor lever pin  | 1    |                                              |
| 11    | Bearing                 | 1    | For installation, reverse the removal proce-|

**NOTICE**

- 14 Nm (1.4 m-kgf, 10 ft-lbf)
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
Removing the Rocker Arms and Camshaft

1. Loosen:
   - Locknuts
   - Valve adjusting screws
2. Remove:
   - Intake rocker arm shaft
   - Exhaust rocker arm shaft
   - Intake rocker arm
   - Exhaust rocker arm

**Tip**
Remove the rocker arm shafts with the slide hammer bolt “1” and weight “2”.

### Slide hammer bolt
- 90890-01083
- YU-01083-1
### Weight
- 90890-01084
- YU-01083-3

Checking the Camshaft

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 runout
     - Out of specification → Replace the camshaft.

### Camshaft lobe dimensions
- **Intake A**
  - 42.985–43.085 mm (1.6923–1.6963 in)
  - Limit
    - 42.885 mm (1.6884 in)
- **Intake B**
  - 36.950–37.050 mm (1.4547–1.4587 in)
  - Limit
    - 36.850 mm (1.4572 in)
- **Exhaust A**
  - 43.490–43.590 mm (1.7122–1.7161 in)
  - Limit
    - 43.390 mm (1.7083 in)
- **Exhaust B**
  - 36.950–37.050 mm (1.4547–1.4587 in)
  - Limit
    - 36.850 mm (1.4572 in)

### Camshaft runout limit
- 0.015 mm (0.0006 in)
CHECKING THE DECOMPRESSION SYSTEM

1. Check:
   • Decompression system

   a. Check the decompression system with the camshaft sprocket installed on the decompressor lever and the decompressor lever pin “1” installed in the camshaft.
   b. Check that the decompressor lever pin “1” projects from the camshaft.
   c. Check that the decompressor cam “2” moves smoothly.

CHECKING THE ROCKER ARMS AND ROCKER ARM SHAFTS

The following procedure applies to all of the rocker arms and rocker arm shafts.

1. Check:
   • Rocker arm
     Damage/wear → Replace.

2. Check:
   • Rocker arm shaft
     Blue discoloration/excessive wear/pitting/scratches → Replace or check the lubrication system.

3. Measure:
   • Rocker arm inside diameter
     Out of specification → Replace.

4. Measure:
   • Rocker arm shaft outside diameter
     Out of specification → Replace.

   Rocker arm inside diameter
   12.000–12.018 mm (0.4724–0.4731 in)

   Rocker arm shaft outside diameter
   11.981–11.991 mm (0.4717–0.4721 in)

5. Calculate:
   • Rocker-arm-to-rocker-arm-shaft clearance
     Out of specification → Replace the defective part(s).

   Rocker-arm-to-rocker-arm-shaft clearance
   0.009–0.037 mm (0.0004–0.0015 in)

   TIP
   Calculate the clearance by subtracting the rocker arm shaft outside diameter from the rocker arm inside diameter.

INSTALLING THE CAMSHAFT AND ROCKER ARMS

1. Install:
   • Bearing “1”
     (into the cylinder head “2”)
TIP
- Apply engine oil to the bearing.
- Install the bearing so that the seal “a” is facing the camshaft.

2. Lubricate:
   - Camshaft
   - Decompressor lever pin
   - Decompressor lever

3. Install:
   - Decompressor lever pin “1”
   - Decompressor lever “2”

TIP
Install the decompressor lever pin and decompressor lever into the camshaft “3” as shown in the illustration.

b. Installed depth

2. Lubricate:
   - Camshaft
   - Decompressor lever pin
   - Decompressor lever

3. Install:
   - Decompressor lever pin “1”
   - Decompressor lever “2”

TIP
Install the camshaft so that the pins “a” become horizontal.

5. Lubricate:
   - Rocker arms
   - Rocker arm shafts

   Recommended lubricant
   - Rocker arm inner surface
     Molybdenum disulfide grease
   - Rocker arm shaft
     Engine oil

   a. Installed depth

   0 mm (0 in)

6. Install:
   - Exhaust rocker arm “1”
   - Exhaust rocker arm shaft “2”
   - Intake rocker arm
   - Intake rocker arm shaft

TIP
- Use a slide hammer bolt “3” to install the rocker arm shaft.
- Make sure the rocker arm shafts are completely pushed into the cylinder head.

   Slide hammer bolt
   90890-01083
   Slide hammer bolt 6 mm
   YU-01083-1

4. Install:
   - Camshaft “1”
## Removing the valves and valve springs

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Valve cotter</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Valve spring retainer</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Valve spring</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Exhaust valve</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Intake valve</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Valve stem seal</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Valve spring seat</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Valve guide</td>
<td>4</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

Refer to “CYLINDER HEAD” on page 5-8.

Refer to “ROCKER ARMS AND CAMSHAFT” on page 5-16.
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. 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 5-23.

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”.

2. 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”.

3. 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”
2. Replace:
- Valve guide

TIP
To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C (212 °F) in an oven.

a. Remove the valve guide with the valve guide remover “1”.

b. Install a new valve guide with the valve guide installer “2” and valve guide remover “1”.

c. After installing the valve guide, bore the valve guide with the valve guide reamer “3” to obtain the proper valve-stem-to-valve-guide clearance.

TIP
After replacing the valve guide, reface the valve seat.

<table>
<thead>
<tr>
<th>Valve guide position</th>
<th>12.7–13.1 mm (0.50–0.52 in)</th>
</tr>
</thead>
</table>

3. Eliminate:
- Carbon deposits (from the valve face and valve seat)

<table>
<thead>
<tr>
<th>Valve guide remover (ø6)</th>
<th>90890-04064</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve guide remover (6.0 mm)</td>
<td>YM-04064-A</td>
</tr>
<tr>
<td>Valve guide installer (ø6)</td>
<td>90890-04065</td>
</tr>
<tr>
<td>Valve guide installer (6.0 mm)</td>
<td>YM-04065-A</td>
</tr>
<tr>
<td>Valve guide reamer (ø6)</td>
<td>90890-04066</td>
</tr>
<tr>
<td>Valve guide reamer (6.0 mm)</td>
<td>YM-04066</td>
</tr>
</tbody>
</table>
4. Check:
   • Valve face
     Pitting/wear → Grind the valve face.
   • Valve stem end
     Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.

5. Measure:
   • Valve margin thickness "a"
     Out of specification → Replace the valve.

   Valve margin thickness D (intake)
   0.80–1.20 mm (0.0315–0.0472 in)
   Limit
   0.4 mm (0.016 in)

   Valve margin thickness D (exhaust)
   0.80–1.20 mm (0.0315–0.0472 in)
   Limit
   0.4 mm (0.016 in)

6. Measure:
   • Valve stem runout
     Out of specification → Replace the valve.

TIP
   • When installing a new valve, always replace the valve guide.
   • If the valve is removed or replaced, always replace the valve stem seal.

   Valve stem runout
   0.040 mm (0.0016 in)

CHECKING THE VALVE SEATS
The following procedure applies to all of the valves and valve seats.

1. Eliminate:
   • Carbon deposits
     (from the valve face and valve seat)

2. Check:
   • Valve seat
     Pitting/wear → Replace the cylinder head.

3. Measure:
   • Valve seat width C “a”
     Out of specification → Replace the cylinder head.

   Valve seat width C (intake)
   1.00–1.20 mm (0.0394–0.0472 in)
   Limit
   1.60 mm (0.0630 in)

   Valve seat width C (exhaust)
   1.00–1.20 mm (0.0394–0.0472 in)
   Limit
   1.60 mm (0.0630 in)

a. Apply blue layout fluid "b" onto the valve face.

b. Install the valve into the cylinder head.

c. Press the valve through the valve guide and onto the valve seat to make a clear impression.

d. Measure the valve seat width.
TIP
Where the valve seat and valve face contacted one another, the blue layout fluid will have been removed.

4. Lap:
   • Valve face
   • Valve seat

TIP
After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve face should be lapped.

a. Apply a coarse lapping compound “a” to the valve face.

NOTICE
Do not let the lapping compound enter the gap between the valve stem and the valve guide.

b. Apply molybdenum disulfide oil onto the valve stem.

c. Install the valve into the cylinder head.

d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

TIP
For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

e. Apply a fine lapping compound to the valve face and repeat the above steps.

f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.

g. Apply 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 free length “a”
   Out of specification → Replace the valve spring.
### VALVES AND VALVE SPRINGS

<table>
<thead>
<tr>
<th>Measure</th>
<th>Specification</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressed valve spring force “a”</td>
<td>Out of specification</td>
<td>Replace the valve spring</td>
</tr>
<tr>
<td>Valve spring tilt “a”</td>
<td>Out of specification</td>
<td>Replace the valve spring</td>
</tr>
</tbody>
</table>

#### EAS24340

**INSTALLING THE VALVES**

The following procedure applies to all of the valves and related components.

1. Deburr:
   - Valve stem end (with an oil stone)

2. Lubricate:
   - Valve stem “1”
   - Valve stem seal “2” New (with the recommended lubricant)

3. Install:
   - Valve spring seat “1”
   - Valve stem seal “2” New

---

**Installed compression spring force**

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake</td>
<td>171.00–197.00 N (17.44–20.09 kgf, 38.44–44.29 lbf)</td>
</tr>
<tr>
<td>Exhaust</td>
<td>171.00–197.00 N (17.44–20.09 kgf, 38.44–44.29 lbf)</td>
</tr>
</tbody>
</table>

**Installed length**

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake</td>
<td>35.00 mm (1.38 in)</td>
</tr>
<tr>
<td>Exhaust</td>
<td>35.00 mm (1.38 in)</td>
</tr>
</tbody>
</table>

**Spring tilt**

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake</td>
<td>2.5°/1.8 mm (2.5°/0.07 in)</td>
</tr>
<tr>
<td>Exhaust</td>
<td>2.5°/1.8 mm (2.5°/0.07 in)</td>
</tr>
</tbody>
</table>

**Recommended lubricant**

- Molybdenum disulfide oil
VALVES AND VALVE SPRINGS

- Valve “3”
- Valve spring “4”
- Valve spring retainer “5”
  (into the cylinder head)

**TIP**
- Make sure each valve is installed in its original place.
- Install the valve springs with the larger pitch “a” facing up.

4. Install:
- Valve cotters

**TIP**
Install the valve cotters by compressing the valve spring with the valve spring compressor “1” and the valve spring compressor attachment “2”.

5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

**NOTICE**
Hitting the valve tip with excessive force could damage the valve.

---

**Valve spring compressor**
90890-04019
YM-04019

**Valve spring compressor attachment**
90890-01243
YM-01253-1
Removing the cylinder and piston

For installation, reverse the removal procedure.
**REMOVING THE PISTON**

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

**NOTICE**

Do not use a hammer to drive the piston pin out.

**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.
- 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”.

2. Remove:
   - Top ring
   - 2nd ring
   - Oil ring

**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

**TIP**

Measure the cylinder bore by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

**Cylinder bore**

- 102.000–102.010 mm (4.0157–4.0161 in)
- Wear limit 102.080 mm (4.0189 in)
- Taper limit 0.05 mm (0.002 in)
- Out of round limit 0.05 mm (0.002 in)
b. If out of specification, replace the cylinder, and replace the piston and piston rings as a set.

c. Measure piston skirt diameter “a” with a micrometer.

cylinder bore = maximum of D₁–D₆

taper limit = maximum of D₁ or D₂ - maximum of D₅ or D₆

out of round limit = maximum of D₁, D₃ or D₅ - minimum of D₂, D₄ or D₆

b. If out of specification, replace the cylinder, and replace the piston and piston rings as a set.

c. Measure piston skirt diameter “a” with a micrometer.

TIP
Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.

- Top ring
  - Ring side clearance
    0.030–0.070 mm (0.0012–0.0028 in)
    limit
  0.12 mm (0.0047 in)

- 2nd ring
  - Ring side clearance
    0.030–0.070 mm (0.0012–0.0028 in)
    limit
  0.13 mm (0.0051 in)

2. Install:
- Piston ring
  (into the cylinder)

TIP
Level the piston ring into the cylinder with the piston crown.

- Piston-to-cylinder clearance
  0.030–0.055 mm (0.0012–0.0022 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.

- Piston-to-cylinder clearance
  0.030–0.055 mm (0.0012–0.0022 in)

- Top ring
  - Ring side clearance
    0.030–0.070 mm (0.0012–0.0028 in)
    limit
    0.12 mm (0.0047 in)

- 2nd ring
  - Ring side clearance
    0.030–0.070 mm (0.0012–0.0028 in)
    limit
    0.13 mm (0.0051 in)

2. Install:
- Piston ring
  (into the cylinder)

TIP
Level the piston ring into the cylinder with the piston crown.

- Piston-to-cylinder clearance
  0.030–0.055 mm (0.0012–0.0022 in)

f. If out of specification, replace the cylinder, and 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)

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.

### Top ring
- **End gap (installed)**: 0.20–0.35 mm (0.008–0.014 in)
- **Limit**: 0.60 mm (0.024 in)

### 2nd ring
- **End gap (installed)**: 0.75–0.90 mm (0.03–0.04 in)
- **Limit**: 1.25 mm (0.049 in)

### Oil ring
- **End gap (installed)**: 0.20–0.70 mm (0.01–0.03 in)

---

**EAS24440**

### 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.

### Piston pin outside diameter
- **22.991–23.000 mm (0.9052–0.9055 in)**
- **Limit**: 22.971 mm (0.9044 in)

---

3. **Measure:**
   - Piston pin bore diameter “b”
     - Out of specification → Replace the piston.

### Piston pin bore inside diameter
- **23.004–23.015 mm (0.9057–0.9061 in)**
- **Limit**: 23.045 mm (0.9073 in)

---

4. **Calculate:**
   - Piston-pin-to-piston-pin-bore clearance
     - Out of specification → Replace the piston pin and piston as a set.

   - Piston-pin-to-piston-pin-bore clearance = Piston pin bore diameter “b” - Piston pin outside diameter “a”

### Piston-pin-to-piston-pin-bore clearance
- **0.004–0.024 mm (0.0002–0.0009 in)**
- **Limit**: 0.074 mm (0.0029 in)

---

**EAS24440**

### INSTALLING THE PISTON AND CYLINDER
1. **Install:**
   - Lower oil ring rail “1”
   - Oil ring expander “2”
   - Upper oil ring rail “3”
   - 2nd ring “4”
   - Top ring “5”

   **TIP**
   - Be sure to install the piston rings so that the manufacturer marks or numbers face up.

2. **Install:**
   - Piston “1”
   - Piston pin “2”
   - Piston pin clips “3”

   **TIP**
   - Apply engine oil to the piston pin.
3. Install:
   - Cylinder gasket
   - Dowel pins

4. Lubricate:
   - Piston
   - Piston rings
   - Cylinder (with the recommended lubricant)

5. Offset:
   - Piston ring end gaps

6. Install:
   - Cylinder “1”
   - Timing chain guide (exhaust side)

   **TIP**
   - While compressing the piston rings with one hand, install the cylinder with the other hand.

7. Install:
   - Cylinder bolts “1”
   - Cylinder bolts (timing chain side) “2”

   **TIP**
   - Lubricate the threads and mating surface of the cylinder bolts “1” with engine oil.
   - Finger tighten the bolts.

8. Tighten:
   - Cylinder bolts “1”
   - Cylinder bolts (timing chain side) “2”

   **Recommended lubricant**
   - Engine oil

   **Cylinder bolt**
   - 1st
     - 15 Nm (1.5 m·kgf, 11 ft·lbf)
   - 2nd
     - 50 Nm (5.0 m·kgf, 36 ft·lbf)
   - Cylinder bolt (timing chain side)
     - 10 Nm (1.0 m·kgf, 7.2 ft·lbf)

   a. Upper oil ring rail
   b. Top ring
   c. Oil ring expander
   d. Lower oil ring rail
   e. 2nd ring
   A. Exhaust side
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>1</td>
<td>Stator coil coupler</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Crankshaft position sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>AC magneto cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Oil pipe (AC magneto cover)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>AC magneto cover gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Lead holder</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

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

Refer to “CHANGING THE ENGINE OIL” on page 3-13.

Refer to “CHANGING THE COOLANT” on page 3-8.

Refer to “WATER PUMP” on page 6-11.
Removing the AC magneto and starter clutch

For installation, reverse the removal procedure.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Crankshaft position sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Stator coil</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Torque limiter</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Starter idle gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Starter idle gear shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>AC magneto rotor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Starter clutch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Woodruff key</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Starter wheel gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Bushing</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
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 sheave holder “3” while loosening the AC magneto rotor nut.
• Do not allow the sheave holder to touch the projection on the rotor.

3. Remove:
   • AC magneto rotor “1” (with the starter clutch)
   • Woodruff key

REMOVING THE STARTER CLUTCH

1. Remove:
   • Starter clutch bolts “1”

TIP
• Hold the AC magneto rotor “2” with the sheave holder “3” while removing the starter clutch bolts.
• Do not allow the sheave holder to touch the projection on the AC magneto rotor.

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.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A

Flywheel puller
90890-01362
Heavy duty puller
YU-33270-B

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A
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

   a. Install the starter wheel gear onto the starter clutch, and then hold the starter clutch.
   b. When turning the starter wheel gear counterclockwise “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 clockwise “B”, it should turn freely; otherwise, the starter clutch is faulty and must be replaced.

TIP
- Be sure to install the starter clutch (outer ring) so that its side with the arrow mark “a” is facing outward.
- While holding the AC magneto rotor “2” with the sheave holder “3”, tighten the starter clutch bolts.
- Do not allow the sheave holder to touch the projection on the AC magneto rotor.

CHECKING THE TORQUE LIMITER
1. Check:
   • Torque limiter
     Damage/wear → Replace.

TIP
Do not disassemble the torque limiter.

INSTALLING THE STARTER CLUTCH
1. Install:
   • Starter clutch
   • Starter clutch bolts “1”

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 with engine oil.

TIP
- Be sure to install the starter clutch (outer ring) so that its side with the arrow mark “a” is facing outward.
- While holding the AC magneto rotor “2” with the sheave holder “3”, tighten the starter clutch bolts.
- Do not allow the sheave holder to touch the projection on 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.

2. Tighten:
   - AC magneto rotor nut “1”

   **TIP**
   - Hold the AC magneto rotor “2” with the sheave holder “3” while tightening the AC magneto rotor nut.
   - Do not allow the sheave holder to touch the projection on the AC magneto rotor.

3. Apply:
   - Sealant
     (onto the crankshaft position sensor/stator assembly lead grommet)

   **TIP**
   - Align the slot “a” in the impeller shaft “1” with the projection “b” on the oil pump shaft “2”.
   - Tighten the AC magneto cover bolts in stages, using a crisscross pattern.

4. Install:
   - AC magneto cover
**ELECTRIC STARTER**

### Removing 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>Negative battery lead</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Starter motor lead</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Starter motor</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

Frame cross member

Air intake silencer

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

Refer to “THROTTLE BODY” on page 7-8.

- **10 Nm (1.0 m-kgf, 7.2 ft-lbf)**
- **4.9 Nm (0.49 m-kgf, 3.5 ft-lbf)**
**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>Washer kit</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>Brush set</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Starter motor yoke</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.

- 4.9 Nm (0.49 m-kgf, 3.5 ft-lbf)
- 11 Nm (1.1 m-kgf, 8.0 ft-lbf)
CHECKING THE STARTER MOTOR

1. Check:
   • Commutator
     Dirt → Clean with 600-grit sandpaper.

2. Measure:
   • Commutator diameter “a”
     Out of specification → Replace the starter motor.

3. 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.

4. Measure:
   • Armature assembly resistances (commutator and insulation)
     Out of specification → Replace the starter motor.

5. Measure:
   • Brush length “a”
     Out of specification → Replace the brush set.

6. Measure:
   • Brush spring force
     Out of specification → Replace the brush set.

Commutator diameter
28.0 mm (1.10 in)
Limit
27.0 mm (1.06 in)

Mica undercut (depth)
0.70 mm (0.03 in)

TIP
The mica of the commutator must be undercut to ensure proper operation of the commutator.

Armature coil
Commutator resistance “1”
0.0250–0.0350 Ω
Insulation resistance “2”
Above 1 MΩ

Brush overall length
12.5 mm (0.49 in)
Limit
5.00 mm (0.20 in)

Digital circuit tester
90890-03174
Model 88 Multimeter with tachometer
YU-A1927
**ASSEMBLING THE STARTER MOTOR**

1. Install:
   - Brush set “1”

**TIP**
Align the tab “a” on the brush set with the slot “b” in the starter motor yoke.

2. Install:
   - Starter motor yoke “1”
   - Starter motor front cover “2”
   - Starter motor rear cover “3”

**TIP**
Align the match marks “a” on the starter motor yoke with the match marks “b” on the starter motor front and rear covers.

**Brush spring force**
7.65–10.01 N (780–1021 gf, 27.54–36.03 oz)

**Starter motor cover bolt**
4.9 Nm (0.49 m·kgf, 3.5 ft·lbf)
Removing the balancer gears and oil pump gears

<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>Right rear panel</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-8.</td>
</tr>
<tr>
<td></td>
<td>Water pump housing</td>
<td></td>
<td>Refer to “WATER PUMP” on page 6-11.</td>
</tr>
<tr>
<td></td>
<td>Starter wheel gear</td>
<td></td>
<td>Refer to “AC MAGNETO AND STARTER CLUTCH” on page 5-32.</td>
</tr>
<tr>
<td>1</td>
<td>Lock washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Balancer driven gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lock washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Oil pump drive gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Oil pump driven sprocket</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- 85 Nm (8.5 m-kgf, 61 ft-lbf)
- 22 Nm (2.2 m-kgf, 16 ft-lbf)
Removing the balancer gears and oil pump gears

<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>Chain</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Straight key</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Balancer drive gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Spring</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Pin</td>
<td>4</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>
BALANCER GEARS AND OIL PUMP GEARS

REMOVING THE BALANCER DRIVEN GEAR AND OIL PUMP DRIVEN SPROCKET
1. Straighten the lock washer tabs.
2. Loosen:
   • Balancer driven gear nut “1”
   • Oil pump driven sprocket nut “2”

TIP
Place a aluminum plate “3” between the teeth of the balancer drive gear “4” and balancer driven gear “5”, and then loosen the nuts.

CHECKING THE OIL PUMP GEARS
1. Check:
   • Oil pump drive gear
   • Oil pump driven sprocket

Cracks/wear/damage → Replace.

CHECKING THE BALANCER GEARS
1. Check:
   • Balancer drive gear
   • Balancer driven gear

Damage/wear → Replace the balancer drive gear and balancer driven gear as a set.
Excessive noise during operation → Replace the balancer drive gear and balancer driven gear as a set.

INSTALLING THE BALANCER DRIVE GEAR, BALANCER DRIVEN GEAR, AND OIL PUMP DRIVEN SPROCKET
1. Install:
   • Balancer drive gear (onto the buffer boss)
   • Pins
   • Springs

TIP
• Align the punch mark “a” on the balancer drive gear with the hole “b” in the buffer boss.
• Be sure to install a pin to every other spring.

2. Install:
   • Spacer
   • Oil pump drive gear
   • Oil pump driven sprocket “1”
   • Chain “2”

TIP
Install the oil pump driven sprocket with the “3B4” mark “a” facing out.

3. Install:
   • Balancer driven gear “1”

TIP
Align the punch mark “a” on the balancer drive gear “2” with the punch mark “b” on the balancer driven gear.

4. Install:
   • Oil pump driven sprocket nut “1”
   • Balancer driven gear nut “2”
   • Lock washers New
TIP

- Apply the engine oil to the threads of shafts and nuts.
- Place a aluminum plate “3” between the teeth of the balancer drive gear “4” and balancer driven gear “5”, and then tighten the nuts.

5. Bend the lock washer tabs along the balancer driven gear nut and oil pump driven sprocket nut.
Removing the drive select lever unit and drive select lever shift cable

**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></td>
<td>Sun top/Side frames/Hood/Front fender/Instrument panel</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td>1</td>
<td>Drive select lever shift cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Drive select lever unit</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
| 3     | Drive select lever shift cable bracket       | 1    | For installation, reverse the removal proce-

**Torque Specifications**

- 13 Nm (1.3 m-kgf, 9.4 ft-lbf)
- 16 Nm (1.6 m-kgf, 12 ft-lbf)
- 39 Nm (3.9 m-kgf, 28 ft-lbf)
### Disassembling the drive select lever unit

For installation, reverse the removal procedure.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drive select lever knob</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Drive select lever guide</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Dust cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Drive select lever unit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Shift arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Drive select lever unit housing</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
## Removing the shift levers and stopper lever

**Order** | **Job/Parts to remove**                  | **Q’ty** | **Remarks**                  |
---|----------------------------------------|---------|-----------------------------|
     | Right rear panel                       |         | Refer to “GENERAL CHASSIS” on page 4-1. |
1   | Drive select lever shift cable         | 1       | Disconnect.                 |
2   | Shift arm                              | 1       |                             |
3   | Drive select lever shift cable bracket | 1       |                             |
4   | Shift lever cover                      | 1       |                             |
5   | Shift lever cover gasket               | 1       |                             |
6   | Dowel pin                              | 1       |                             |
7   | Shift lever 1                          | 1       |                             |
8   | Stopper lever spring                   | 1       |                             |
9   | Shift lever 2                          | 1       |                             |
10  | Stopper lever                          | 1       |                             |

For installation, reverse the removal procedure.
**SHIFT LEVER**

**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:
   - 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.

2. 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”.

3. Install:
   - Oil seal “1” New
     (into the shift lever cover “2”)

   **Installed depth “a”**
   1.0–1.5 mm (0.04–0.06 in)

   **TIP**
   Align the slit “a” in the shift arm with the projection “b” on shift lever 1.

4. Install:
   - Shift arm “1”

**ADJUSTING THE DRIVE SELECT LEVER**

**WARNING**

Before moving the drive select lever, bring the vehicle to a complete stop and take your foot off the accelerator pedal. Otherwise the transmission may be damaged.

1. Check:
   - Drive select lever free play “a”
     Out of specification → Adjust the drive select lever shift cable.

   **Drive select lever free play**
   Less than 4 mm (0.16 in)
2. Check:
   • Drive select lever shift cable length “a” Out of specification → Adjust.

   Drive select lever shift cable length
   165 mm (6.50 in)

   TIP
   When checking the drive select lever shift cable length, shift the drive select lever into “N” (neutral).

3. Adjust:
   • Drive select lever shift cable length

   a. Loosen the drive select lever shift cable bracket bolts “1”.
   b. Set the drive select lever “2” and shift lever “3” in “N” (neutral) position.
   c. Loosen the locknut “4”.
   d. Turn the adjusting nut “5” in direction “a” or “b” until the specified cable length is obtained.

   Direction “a”
   Shift cable length is increased.
   Direction “b”
   Shift cable length is decreased.

   e. Tighten the locknut to specification.

   Drive select lever shift cable locknut
   39 Nm (3.9 m·kgf, 28 ft·lbf)

   f. Tighten the drive select lever shift cable bracket bolts to specification.

   Drive select lever shift cable bracket bolt
   16 Nm (1.6 m·kgf, 12 ft·lbf)

   g. Turn the main switch to “ ” (on), 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.
Removing the primary and secondary sheaves

**Order** | **Job/Parts to remove** | **Q'ty** | **Remarks**
--- | --- | --- | ---
1 | Drive belt cover | 1 | Refer to “GENERAL CHASSIS” on page 4-1.
2 | Rubber gasket | 1 |  
3 | Bearing housing | 1 |  
4 | Dowel pin | 2 |  
5 | Primary sheave assembly | 1 |  
6 | V-belt | 1 |  
7 | Primary fixed sheave | 1 |  
8 | Secondary sheave assembly | 1 |  
9 | Drive belt case | 1 |  
10 | Rubber gasket | 1 |  
11 | Rubber gasket | 1 | For installation, reverse the removal procedure.
Disassembling the primary sheave

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>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>

For assembly, reverse the disassembly procedure.

* Apply Yamaha Grizzly grease or Yamaha grease F.
Disassembling the secondary sheave

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Secondary sheave spring 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>

For assembly, reverse the disassembly procedure.

* Apply Yamaha grease H or POLYREX EM®
**Removing the Primary and Secondary Sheaves**

1. Loosen:
   - Primary sheave assembly nut “1”

**TIP**
Use the sheave holder “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”

**TIP**
- 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 holder**
90890-01701

**Primary clutch holder**
YS-01880-A

**Sheave fixed block**
90890-04135

**Sheave fixed bracket**
YM-04135

**Locknut wrench**
90890-01348
YM-01348

**Sheave spring compressor**
90890-04134
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
33.0–33.6 mm (1.30–1.32 in)
Limit
32.5 mm (1.28 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.

Free length
130.6 mm (5.14 in)
Limit
128.0 mm (5.04 in)

ASSEMBLING THE PRIMARY SHEAVE
1. Clean:
   • Primary sliding sheave “1”
   • Spacer “2”
   • Primary sheave weights “3”
   • Primary sheave cam

TIP
Remove any excess grease.

2. Install:
   • Oil seals “1” New (into the primary sliding sheave “2”)

   Installed depth “a”
   0 mm (0 in)

3. Lubricate:
   • Spacer inner surface
   • Primary sliding sheave inner surface

   Recommended lubricant
   Yamaha Grizzly grease or Yamaha grease F

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”)

2. Lubricate:
   - Secondary sliding sheave “1”
   - Secondary fixed sheave “2” (with the recommended lubricant)

TIP
Apply Yamaha grease H or POLYREX EM® to the inner surfaces of the secondary sheaves.

3. Install:
   - Secondary sliding sheave

4. Install:
   - Guide pins “1”

5. Lubricate:
   - Guide pin grooves “1” (with the recommended lubricant)

TIP
Apply Yamaha grease H or POLYREX EM® (5.0 g) to the guide pin grooves.

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.

**TIP**

Install the secondary sheave spring retaining nut “4” with its tapered side “a” facing the secondary sheaves.

**INSTALLING THE PRIMARY AND SECONDARY SHEAVES**

1. Install:
   - Secondary sheave
   - V-belt
   - Primary fixed sheave
   - Primary sheave

**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”.
- Tightening the bolts “3” (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”

   **TIP**
   Use the sheave holder “2” to hold the primary sheave.

4. Tighten:
   • Secondary sheave assembly nut “1”

   **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 oil seal inner surface

   **TIP**
   Apply 2.3 g or more of lithium-soap-based grease to the groove in the oil seal as shown in the illustration.
## Removing the clutch

**Order** | **Job/Parts to remove** | **Q’ty** | **Remarks**
---|---|---|---
Drive belt case |  |  | Refer to “PRIMARY AND SECONDARY SHEAVES” on page 5-50.
1 | Clutch housing assembly | 1 |
2 | Clutch housing assembly gasket | 1 |
3 | Dowel pin | 2 |
4 | Clutch carrier assembly nut | 1 | Left-hand threads
5 | Clutch carrier assembly | 1 |

**Notes:**
- 10 Nm (1.0 m-kgf, 7.2 ft-lbf)
- 190 Nm (19 m-kgf, 137 ft-lbf)

**For installation, reverse the removal procedure.**
### 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>

For assembly, reverse the disassembly procedure.
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 clutch holding tool “2” to hold the clutch carrier assembly.

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.

   After sanding the glazed areas, clean the clutch with a cloth.

2. Measure:
   • Clutch shoe thickness
     Out of specification → Replace.

<table>
<thead>
<tr>
<th>Clutch shoe thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 mm (0.06 in)</td>
</tr>
<tr>
<td>Limit</td>
</tr>
<tr>
<td>1.0 mm (0.04 in)</td>
</tr>
</tbody>
</table>
CLUTCH

ASSEMBLING THE CLUTCH HOUSING

1. Install:
   • Bearing “1”
     (into the clutch housing “2”)

   Installed depth “a”
   2.5–2.7 mm (0.10–0.11 in)

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” New
     (into the bearing housing “2”)

   Installed depth “a”
   0 mm (0 in)

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 as-
     sembly nut with molybdenum disulfide grease.
   • Use a clutch holding tool “2” to hold the clutch
     carrier assembly.

   Universal clutch holder
   90890-04086
   YM-91042

2. Lock the threads with a drift punch.

3. Install:
   • Dowel pins
   • Gasket New
   • Clutch housing assembly

   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

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine</td>
<td>Refer to “ENGINE REMOVAL” on page 5-1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil cooler</td>
<td>Refer to “OIL COOLER” on page 6-1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cylinder head</td>
<td>Refer to “CYLINDER HEAD” on page 5-8.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piston</td>
<td>Refer to “CYLINDER AND PISTON” on page 5-27.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starter wheel gear</td>
<td>Refer to “AC MAGNETO AND STARTER CLUTCH” on page 5-32.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starter motor</td>
<td>Refer to “ELECTRIC STARTER” on page 5-37.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balancer gears/Oil pump gears</td>
<td>Refer to “BALANCER GEARS AND OIL PUMP GEARS” on page 5-41.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shift levers</td>
<td>Refer to “SHIFT LEVERS” on page 5-45.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive belt case</td>
<td>Refer to “PRIMARY AND SECONDARY SHEAVES” on page 5-50.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clutch carrier assembly</td>
<td>Refer to “CLUTCH” on page 5-60.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Timing chain guide (intake side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Timing chain stopper guide (lower)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Separating the crankcase

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Timing chain</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Speed sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dipstick</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Relief valve assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Reverse switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Gear position switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Thermostat outlet hose guide</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Engine bracket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Left crankcase</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Right crankcase</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
Removing the crankcase bearings

For installation, reverse the removal procedure.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>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>

Refer to "CRANKSHAFT AND OIL PUMP" on page 5-71.

Refer to "TRANSMISSION" on page 5-76.

Refer to "MIDDLE GEAR" on page 5-83.

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. Check:
   - Timing chain guide (intake side)
     Damage/wear → Replace.

CHECKING THE RELIEF VALVE
1. Check:
   - Spring seat “1”
   - Spring “2”
   - Relief valve body “3”
   - Relief valve “4”
     Damage/wear → Replace the defective part(s).

CHECKING THE BEARINGS
1. Check:
   - Bearings
     Clean and lubricate, then rotate the inner race with a finger.
     Roughness → Replace.

CHECKING THE TIMING CHAIN AND TIMING CHAIN GUIDE
1. Check:
   - Timing chain
     Damage/stiffness → Replace the timing chain and camshaft sprocket as a set.
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 left crankcase “2”)

   Installed depth “a”
   1.0–1.5 mm (0.04–0.06 in)

2. Thoroughly clean the crankcase mating surfaces.
3. Apply:
   - Sealant “1”
     (onto the crankcase mating surfaces)

   Yamaha bond No. 1215
   90890-85505
   (Three Bond No.1215®)

TIP
   - Apply two coats of sealant to the area “a” shown in the illustration.
   - Do not allow any sealant to come into contact with the oil gallery.

4. Install:
   - Dowel pins “2”

5. Fit the left crankcase onto the right crankcase. Tap lightly on the crankcase with a soft hammer.

NOTICE
Before installing and torquing the crankcase bolts, be sure to check whether the transmission is functioning properly by manually rotating the shift drum in both directions.

6. Install:
   - Crankcase bolts

7. Tighten:
   - Crankcase bolts

   Crankcase bolt “1”
   26 Nm (2.6 m·kgf, 19 ft·lbf)
   Crankcase bolt “2”, “3”
   10 Nm (1.0 m·kgf, 7.2 ft·lbf)

   M8 x 40 mm “1”
   M6 x 60 mm “2”
   M6 x 30 mm “3”

TIP
Tighten the bolts in stages, using a crisscross pattern.
8. Apply:
- 4-stroke engine oil
  (onto the crankshaft pin, bearings and oil delivery hole)

9. Check:
- Crankshaft and transmission operation
  Rough operation → Repair.
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>1</td>
<td>Crankcase</td>
<td></td>
<td>Separate. Refer to “CRANKCASE” on page 5-65.</td>
</tr>
<tr>
<td>2</td>
<td>Oil pump</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oil pump gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Balancer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Crankshaft</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

10 Nm (1.0 m-kgf, 7.2 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>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oil pump shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Oil pump inner rotor</td>
<td>1</td>
<td></td>
</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>

For assembly, reverse the disassembly procedure.

5 Nm (0.5 m-kgf, 3.6 ft-lbf)
CRANKSHAFT AND OIL PUMP

REMOVING THE CRANKSHAFT
1. Remove:
   • Crankshaft “1”

   TIP
   • Remove the crankshaft 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.

   Crankcase separating tool
   90890-01135
   Crankcase separator
   YU-01135-B

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”
   • Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance “c”
     Out of specification → Replace the oil pump.

   Inner-rotor-to-outer-rotor-tip clearance
   Less than 0.12 mm (0.0047 in)
   Limit 0.20 mm (0.0079 in)

   Outer-rotor-to-oil-pump-housing clearance
   0.090–0.170 mm (0.0035–0.0067 in)
   Limit 0.24 mm (0.0094 in)

   Oil-pump-housing-to-inner-and-outer-rotor clearance
   0.03–0.10 mm (0.0012–0.0039 in)
   Limit 0.17 mm (0.0067 in)

1. Inner rotor
2. Outer rotor
3. Oil pump housing

3. Check:
   • Oil pump operation
     Rough movement → Replace the oil pump.
CHECKING THE OIL STRAINER
1. Check:
   • Oil strainer
     Damage → Replace the oil pump.
     Contaminants → Clean with solvent.

CHECKING THE CRANKSHAFT
1. Measure:
   • Crankshaft width A "a"
     Out of specification → Replace the crankshaft.

<table>
<thead>
<tr>
<th>Width A</th>
</tr>
</thead>
<tbody>
<tr>
<td>74.92–75.00 mm (2.950–2.953 in)</td>
</tr>
</tbody>
</table>

2. Measure:
   • Crankshaft runout C "b"
     Out of specification → Replace the crankshaft.

<table>
<thead>
<tr>
<th>Runout limit C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.030 mm (0.0012 in)</td>
</tr>
</tbody>
</table>

3. Measure:
   • Big end side clearance D "c"
     Out of specification → Replace the crankshaft.

<table>
<thead>
<tr>
<th>Big end side clearance D</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.350–0.650 mm (0.0138–0.0256 in)</td>
</tr>
</tbody>
</table>

4. Check:
   • Crankshaft sprocket
     Damage/wear → Replace the crankshaft.
   • Bearing
     Cracks/damage/wear → Replace the crankshaft.

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)

<table>
<thead>
<tr>
<th>Recommended lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine oil</td>
</tr>
</tbody>
</table>

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”.

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 5-73.

INSTALLING THE CRANKSHAFT

1. Install:
   • Crankshaft “1”

TIP
Install the crankshaft with the crankshaft installer pot “2”, crankshaft installer bolt “3”, adapter (M16) “4”, spacer (crankshaft installer) “5”, and spacer “6”.

Apply engine oil to each bearing to protect the crankshaft against scratches and to make installation easier.

TIP
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.
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 5-65.</td>
</tr>
<tr>
<td></td>
<td>Middle driven gear</td>
<td></td>
<td>Refer to “MIDDLE GEAR” on page 5-83.</td>
</tr>
<tr>
<td>1</td>
<td>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 “L”</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Shift fork guide bar</td>
<td>1</td>
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</tr>
<tr>
<td>10</td>
<td>Secondary shaft</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

18 Nm (1.8 m-kgf, 13 ft-lbf)

New
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>11</td>
<td>Drive axle assembly</td>
<td>1</td>
<td></td>
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<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>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

18 Nm (1.8 m-kgf, 13 ft-lbf)
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>
</tbody>
</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>17</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Drive axle</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>
REMOVING THE TRANSMISSION

1. Remove:
   - Shift drum “1”
   - Shift fork assembly “2”

- Pull out the guide bar from the right crank-case, and then remove the shift fork cam followers.
- Remove the shift drum.
- Remove the shift fork assembly.

DISASSEMBLING THE DRIVE AXLE

1. Remove:
   - Collar “1”
   - Drive axle “2”

TIP

Press the drive axle end and remove the collar.

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).

5. Check:
   • Circlips
     Bends/damage/looseness → Replace.

CHECKING THE SECONDARY SHAFT

1. Check:
   • Gear teeth
     Blue discoloration/pitting/wear → Replace.

ASSEMBLING THE DRIVE AXLE ASSEMBLY

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 ASSEMBLY

1. Install:
   • Shift fork guide bar “1”
   • Shift fork “L” “2”
   • Spring “3”
   • Shift fork “R” “4”
   • Circlips “5” New

TIP
   Install the shift forks with the “28P” mark “a” and “5B4” mark “b” facing each other.
EAS1X01115

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 right 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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crankcase</td>
<td></td>
<td>Separate. Refer to “CRANKCASE” on page 5-65.</td>
</tr>
<tr>
<td>1</td>
<td>Middle drive shaft/bearing housing assembly</td>
<td>1</td>
<td></td>
</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 5-92.</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>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<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>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bearing retainer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the middle 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>13</td>
<td>Bearing housing</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

- 190 Nm (19 m-kgf, 137 ft-lbf)
- 32 Nm (3.2 m-kgf, 23 ft-lbf)
- 29 Nm (2.9 m-kgf, 21 ft-lbf)
Removing the middle driven 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>Crankcase</td>
<td></td>
<td></td>
<td>Separate. Refer to “CRANKCASE” on page 5-65.</td>
</tr>
<tr>
<td>1</td>
<td>Rear drive shaft yoke nut (middle gear side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rear drive shaft yoke (middle gear side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Middle driven pinion gear assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Middle driven pinion gear shim</td>
<td>1</td>
<td>Refer to “ALIGNING THE MIDDLE GEAR” on page 5-92.</td>
</tr>
<tr>
<td>5</td>
<td>Front drive shaft yoke nut (middle gear side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Front drive shaft yoke (middle gear side)</td>
<td>1</td>
<td></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>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Middle driven pinion gear bearing retainer</td>
<td>1</td>
<td>Left-hand threads</td>
</tr>
<tr>
<td>11</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
</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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<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 threads</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>

For installation, reverse the removal procedure.
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:
   • Rear drive shaft yoke nut “1”
   • Washer
   • Rear drive shaft yoke “2”

TIP
Use the coupling gear/middle shaft tool “3” to hold the rear drive shaft coupling sleeve.

2. Remove:
   • Front drive shaft yoke nut “1”
   • Washer
   • Front drive shaft yoke “2”

TIP
Use the coupling gear/middle shaft tool “3” to hold the front drive shaft coupling sleeve.

3. Remove:
   • Bearing housing assembly “1”

▼▼▼ ▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼▼▼
   a. Clean the surface of the bearing housing assembly.
   b. Place the bearing housing assembly onto a hydraulic press.

NOTICE
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.
MIDDLE GEAR

• 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”.

5. Remove:
   • Oil seal “1”
   • Middle driven shaft bearing retainer “2”

TIP
Attach the ring nut wrench “3”.

6. Remove:
   • Middle driven shaft “1” (with bearing)

CHECKING THE PINION GEARS

1. Check:
   • Drive pinion gear teeth
   • Driven pinion gear teeth
   Pitting/galling/wear → Replace.

2. Check:
   • O-ring
   Damage → Replace.
• Bearings
  Pitting/damage → Replace.

EAS1XD1119
INSTALLING THE BEARING AND OIL SEALS
1. Install:
   • Bearing “1”
   • Oil seal “2” New
     (into the bearing housing “3”)

   ! 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”)

   ! Installed depth “a” of oil seal
     1.0–1.5 mm (0.039–0.059 in)

EAS1XD1120
INSTALLING THE MIDDLE DRIVEN SHAFT
1. Install:
   • Middle driven shaft bearing retainer “1”

<table>
<thead>
<tr>
<th>TIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attach the ring nut wrench “2”.</td>
</tr>
</tbody>
</table>

NOTICE
ECA1XD1024
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”.

   ! 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)

   ! Middle driven pinion gear bearing retainer
     130 Nm (13 m·kgf, 94 ft·lbf)
     LOCTITE®

   Bearing retainer wrench
   90890-04128
   Middle gear bearing retainer
   YM-04128

   ▼▼▼ ▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼▼▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼▼▼
   c. Tighten the bearing retainer.

   ! Middle driven pinion gear bearing retainer
     130 Nm (13 m·kgf, 94 ft·lbf)
     LOCTITE®

   Bearing retainer wrench
   90890-04128
   Middle gear bearing retainer
   YM-04128

   ▼▼▼ ▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼▼▼

   ! Ring nut wrench
   90890-01430
   YM-38404
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

   **TIP**
   Install the shim(s) so that the tabs are positioned as shown in the illustration.

4. Install:
   - Front drive shaft yoke “1”
   - Washer
   - Front drive shaft yoke nut “2”

   **TIP**
   Use the coupling gear/middle shaft tool “3” to hold the front drive shaft yoke.

5. 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 yoke.

---

**Front drive shaft yoke nut (middle gear side)**
190 Nm (19 m-kgf, 137 ft-lbf) LOCTITE®

**Rear drive shaft yoke nut (middle gear side)**
190 Nm (19 m-kgf, 137 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. Tighten:
   • Bearing retainer bolts “1” New

   **Middle drive shaft bearing retainer bolt**
   29 Nm (2.9 m·kgf, 21 ft·lbf)
   LOCTITE®

   **TIP**
   Stake the bearing retainer bolts at the cutouts “a” in the bearing retainers “2”.

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 5-92.

   **Middle gear backlash**
   0.10–0.30 mm (0.004–0.012 in)

   a. Temporarily install the right crankcase.
b. Wrap a rag “1” around a screwdriver “2”, and then insert it into the installation hole “a” of the right 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

   a. 39.3 mm (1.55 in)
b. 25.3 mm (1.00 in)

d. Measure the gear lash while rotating the middle driven shaft back and forth.

   **TIP**
   Measure the gear lash at 4 positions. Rotate the middle driven gear 90° each time.
e. If the gear lash is incorrect, adjust the gear lash by middle driven pinion gear shim(s).

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”

A. Middle drive pinion gear shim thickness
B. Middle driven pinion gear shim thickness

a. Position the middle gears with the appropriate shim(s) that has had its respective thickness calculated from information marked on the crankcase, bearing housings, and pinion gears.

b. To find middle drive pinion gear shim thickness “A”, use the following formula.

Middle drive pinion gear shim thickness

\[ A = e + d + a' - c - b - k \]

“a” = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from “0.9”
“b” = 17.0
“c” = 55.0
“d” = a numeral (usually a decimal number) on the left crankcase specifies a thickness of “65.0”
“e” = a numeral (usually a decimal number) on the right crankcase specifies a thickness of “9.0”
“k” = 1.5
Example:
If the bearing housing is marked “+01”, “a” is 0.91
“b” is 17.0
“c” is 55.0
If the left crankcase is marked “64.96”, “d” is 64.96
If the right crankcase is marked “9.01”, “e” is 9.01
“k” is 1.5
Therefore, “A” is 1.38.
“A” = 9.01 + 64.96 + 0.91 - 55.0 - 17.0 - 1.5
= 1.38
Round off hundredths digit and select appropriate shim(s).
In the above example, the calculated shim thickness is 1.38 mm. The following chart instructs you, however, to round off 8 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.

<table>
<thead>
<tr>
<th>Middle drive pinion gear shim thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.50 0.55 0.60 0.70 0.80 0.90 1.00</td>
</tr>
</tbody>
</table>

“f” = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from “89.5”

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 “61.0”

“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 right crankcase specifies a thickness of “99.98”

“j” = a numeral (usually a decimal number) on the left crankcase specifies a thickness of “8.12”

Example:
If the bearing housing is marked “+03”, “f” is 89.53
If the driven pinion gear is marked "+02", “g” is 61.02

If the driven pinion gear is marked "+02", “h” is 80.52

If the right crankcase is marked “99.98”, “i” is 99.98

If the left crankcase is marked “8.12”, “j” is 8.12

Therefore, “B” is 0.93.

\[
B = 89.53 - 61.02 + 80.52 - 99.98 - 8.12 = 0.93
\]

Round off hundredth digit and select appropriate shim(s).

In the above example, the calculated shim thickness is 0.93 mm. The chart instructs you, however, to round off 3 to 5.

<table>
<thead>
<tr>
<th>Hundredth</th>
<th>Rounded value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 1, 2</td>
<td>0</td>
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<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.

<table>
<thead>
<tr>
<th>Middle driven pinion gear shim Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10 0.15 0.20 0.30 0.40 0.50 0.60</td>
</tr>
</tbody>
</table>

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

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  INSTALLING THE OIL COOLER .....................................................................6-3

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Removing the oil cooler

**Job/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>Rear skid plate/Right rear panel/Center passenger panel</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td>2</td>
<td>Air filter case</td>
<td></td>
<td>Refer to “AIR FILTER CASE” on page 7-5.</td>
</tr>
<tr>
<td>4</td>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-8.</td>
</tr>
<tr>
<td>5</td>
<td>Water pump outlet pipe/Oil cooler inlet hose</td>
<td></td>
<td>Refer to “WATER PUMP” on page 6-11.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
<th>Q’ty</th>
<th>Torque (Nm/ft-lbf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oil filter cartridge</td>
<td>1</td>
<td>10 (1.0/7.2)</td>
</tr>
<tr>
<td>2</td>
<td>Oil filter cartridge union bolt</td>
<td>1</td>
<td>20 (2.0/14)</td>
</tr>
<tr>
<td>3</td>
<td>Oil cooler</td>
<td>1</td>
<td>35 (3.5/25)</td>
</tr>
<tr>
<td>4</td>
<td>Oil cooler outlet hose</td>
<td>1</td>
<td>17 (1.7/12)</td>
</tr>
<tr>
<td>5</td>
<td>Oil filter cartridge</td>
<td>1</td>
<td>18 (1.8/13)</td>
</tr>
<tr>
<td>6</td>
<td>Oil filter cartridge union bolt</td>
<td>1</td>
<td>18 (1.8/13)</td>
</tr>
<tr>
<td>7</td>
<td>Oil cooler</td>
<td>1</td>
<td>30 (3.0/22)</td>
</tr>
</tbody>
</table>

**New**

**T.R.**
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>5</td>
<td>Oil pipe (crankcase to cylinder head)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oil pipe (AC magneto cover)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
CHECKING THE OIL COOLER
1. Check:
   • Oil cooler
     Cracks/damage → Replace.
2. Check:
   • Oil cooler outlet hose
   • Oil pipe (crankcase to cylinder head)
   • Oil pipe (AC magneto cover)
     Cracks/damage/wear → Replace.

INSTALLING THE OIL COOLER
1. Clean:
   • Mating surfaces of the oil cooler and the crankcase
     (with a cloth dampened with lacquer thinner)
2. Install:
   • Oil cooler outlet hose “1”
     (to the oil cooler)
   TIP
   Install the oil cooler outlet hose with the white paint mark “a” facing in the direction shown in the illustration.

3. Install:
   • Gasket New
   • Oil cooler “1”
   • Oil filter cartridge union bolt “2”
   TIP
   Fit the projection “a” on the oil cooler between the projections “b” on the crankcase.

4. Fill:
   • Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-8.
   • Crankcase
     (with the specified amount of the recommended engine oil)
     Refer to “CHANGING THE ENGINE OIL” on page 3-13.
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.
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>1</td>
<td>Radiator cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Coolant reservoir hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Coolant reservoir breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Coolant reservoir cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Coolant reservoir</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Radiator inlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Radiator inlet pipe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Radiator outlet hose</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

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

Refer to “AIR FILTER CASE” on page 7-5.

Drain.

Refer to “CHANGING THE COOLANT” on page 3-8.

7 Nm (0.7 m-kgf, 5.1 ft-lbf)

8 Nm (0.8 m-kgf, 5.8 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>9</td>
<td>Radiator outlet pipe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Radiator fan motor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>11</td>
<td>Horn</td>
<td>1</td>
<td>For Europe and Oceania</td>
</tr>
<tr>
<td>12</td>
<td>Radiator bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Radiator</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Radiator fan</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Radiator fan motor breather hose</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

7 Nm (0.7 m·kgf, 5.1 ft·lbf) 7 Nm (0.7 m·kgf, 5.1 ft·lbf) 8 Nm (0.8 m·kgf, 5.8 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
   • Radiator pipes
     Cracks/damage/wear → Replace.

3. Measure:
   • Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.

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 9-29.

INSTALLING THE RADIATOR

1. Fill:
   • Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-8.

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.

a. Install the radiator cap tester “1” and radiator cap tester adapter “2” to the radiator cap “3”.

b. Follow the instructions for radiator cap tester and horn nut.

INSTALLING THE HORN (for Europe and Oceania)

1. Install:
   • Horn “1”

   TIP
   Fit the slot “a” in the horn with the projection “b” on the radiator bracket.
Removing the thermostat

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to &quot;CHANGING THE COOLANT&quot; on page 3-8.</td>
</tr>
<tr>
<td>1</td>
<td>Thermostat outlet hose</td>
<td>1</td>
<td></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>

For installation, reverse the removal procedure.
CHECKING THE THERMOSTAT
1. Check:
   • Thermostat
     Does not open at 69–73 °C (156–163°F) → Replace.

2. Check:
   • Thermostat cover
   • Thermostat housing (cylinder head)
   • Thermostat outlet hose
     Cracks/damage → Replace.

INSTALLING THE THERMOSTAT
1. Install:
   • Copper washer New
   • Coolant temperature sensor

2. Install:
   • Thermostat “1”
   • O-ring “2” New
   • Thermostat cover “3”

TIP
Install the thermostat with its breather hole “a” facing up.

THERMOSTAT cover bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

NOTICE
Use extreme care when handling the coolant temperature sensor. Replace any part that was dropped or subjected to a strong impact.

TIP
If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

A. Fully closed
B. Fully open

7 mm (0.28 in)

71±2°C (159±3°F) 85°C (185°F)

3. Fill:
   • Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-8.

4. Check:
   • Cooling system
     Leak → 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

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center compartment panel/Right side cover/Right rear cover/Rear skid plate</td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air filter case</td>
<td>Refer to “AIR FILTER CASE” on page 7-5.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coolant</td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-8.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Water pump inlet hose</td>
<td>1</td>
<td></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 inlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Water pump breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Water pump housing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Gasket</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the water 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>9</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Drive select lever shift cable bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>AC magneto coupler</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>12</td>
<td>Crankshaft position sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>13</td>
<td>AC magneto cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>AC magneto cover gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Impeller shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Mechanical seal (impeller side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Mechanical seal (housing side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
DISASSEMBLING THE WATER PUMP
1. Remove:
   • Mechanical seal (impeller side) “1”
     (from the impeller, with a thin, flat-head screwdriver)

   **TIP**
   Do not scratch the impeller shaft.

2. Remove:
   • Mechanical seal (housing side) “1”

   **TIP**
   Remove the mechanical seal (housing side) from the inside of the AC magneto cover.

3. 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 shaft
   • Oil cooler inlet hose
   • Water pump outlet pipe
   • Water pump outlet hose
     Cracks/damage/wear → Replace.

2. Check:
   • Bearing
     Rough movement → Replace.

ASSEMBLING THE WATER PUMP
1. Install:
   • Oil seal “1” New
     (into the AC magneto cover)

   **TIP**
   • Before installing the oil seal, apply tap water or coolant onto its outer surface.
   • Install the oil seal with a socket that matches its outside diameter.

   **INSTALLED DEPTH OF OIL SEAL “A”**
   8.1–8.7 mm (0.32–0.34 in)

2. Install:
   • Mechanical seal (housing side) “1” New

   **NOTICE**
   Never lubricate the mechanical seal (housing side) surface with oil or grease.

   **TIP**
   Use the special tools and a press to press the mechanical seal (housing side) straight in until it touches the water pump housing.
3. Install:
   - Mechanical seal (impeller side) “1” New

**TIP**
Before installing the mechanical seal (impeller side), apply tap water or coolant onto its outer surface.

4. Measure:
   - Impeller shaft tilt
     Out of specification → Repeat steps (3) and (4).

**NOTICE**
Make sure the mechanical seal (impeller side) is flush with the impeller.

**TIP**
If the surface “a” of the mechanical seal (impeller side) that contacts the mechanical seal (housing side) is dirty, clean it.

**Impeller shaft tilt limit**
0.15 mm (0.006 in)

1. Straightedge
2. Impeller

5. Install:
   - Impeller “1”
   - Circlip New

**TIP**
After installation, check that the impeller shaft rotates smoothly.

**INSTALLING THE AC MAGNETO COVER**
1. Install:
   - Dowel pins “1”
   - AC magneto cover gasket “2” New
   - AC magneto cover “3”

**TIP**
Align the slit “a” on the impeller shaft with the projection “b” on the oil pump driven sprocket.
2. Install:
   - Dowel pins “1”
   - Gasket “2” New
   - Water pump housing “3”

**TIP**
Install the bolt “4” to the water pump housing, and then install the water pump housing to the AC magneto cover.

3. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-8.

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.
# FUEL SYSTEM

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- Checking the Fuel Tank Breather Hose Joint .............................. 7-2
- Installing the Fuel Pump ................................................................. 7-3
- Installing the Fuel Tank ................................................................. 7-3
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- Checking the Throttle Body ....................................................... 7-11
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Removing the fuel tank

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

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Outer passenger seat frame/Right side panel/Right rear cover</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td>2</td>
<td>Fuel tank breather hose</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fuel tank breather hose joint</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</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Fuel hose connector holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fuel tank retainer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Damper</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Fuel tank</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Damper</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Fuel pump</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
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**

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**

- To disconnect the fuel hose from the fuel pump, remove the fuel hose connector holder, insert a slotted head screwdriver, etc., in the slot part “a” of the fuel hose connector cover “1”, slide the cover in the direction of the arrow, and then disconnect the fuel hose.
- To disconnect the fuel hose from the injector fuel rail, 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 disconnect the hose.
- Before removing the hose, place a few rags in the area under where it will be removed.

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.

CHECKING THE FUEL TANK BREather HOse JOINT
1. Check:
   - Fuel tank breather hose joint
     - Damage/faulty → Replace.

**TIP**

- Check that air flows smoothly in the direction of the arrow shown when the hose joint is positioned as shown in the illustration “A”.
- Check that air does not flow in the direction of the arrow shown when the hose joint is positioned as shown in the illustration “B”.
INSTALLING THE FUEL PUMP

1. Install:
   - Fuel pump gasket “1”  

TIP
   - Always use a new fuel pump gasket.
   - Install the fuel pump gasket with the lip side “a” facing upward.

2. Install:
   - 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.
   - 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 projection “b” on the fuel tank.
   - Tighten the nuts to specification in the proper tightening sequence as shown.

INSTALLING THE FUEL TANK

1. Install:
   - Dampers “1”  

TIP
   - Fit the projections “a” on the dampers into the holes “b” in the frame.

2. Install:
   - Fuel tank “1”  
   - Fuel tank bolts “2”  
   - Fuel tank retainer “3”  
   - Fuel tank retainer bolts “4”  

TIP
   - Finger tighten the fuel tank bolts and fuel tank retainer bolts.

3. Tighten:
   - Fuel tank bolts “1”–“3”  
   - Fuel tank retainer bolts “4”, “5”
FUEL TANK

TIP
Tighten the bolts in the proper tightening sequence as shown.

4. 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 connector cover 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 injector fuel rail, slide the fuel hose connector cover “2” on the end of the hose in direction of the arrow shown.

CHECKING THE FUEL PRESSURE
1. Check:
• Fuel pressure

a. Remove the frame cross member.
   Refer to “GENERAL CHASSIS” on page 4-1.
b. Disconnect the fuel hose “1” from the injector fuel rail.
   Refer to “REMOVING THE THROTTLE BODY ASSEMBLY” on page 7-11.
c. Connect the pressure gauge “2” and adapter “3” to the fuel injector rail and fuel hose.

d. Start the engine.
e. Measure the fuel pressure.
   Out of specification → Replace the fuel pump.

Fuel line pressure at idling
300–390 kPa (3.0–3.9 kgf/cm², 42.7–55.5 psi)
Removing the air filter case and air intake duct

<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>Air filter case cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Air filter element holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Air filter element</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Air filter element frame</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Intake air temperature sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Air filter case joint clamp screw</td>
<td>2</td>
<td>Loosen.</td>
</tr>
<tr>
<td>7</td>
<td>Air filter case joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Air intake duct joint clamp screw</td>
<td>2</td>
<td>Loosen.</td>
</tr>
<tr>
<td>9</td>
<td>Air intake duct joint</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Refer to “GENERAL CHASSIS” on page 4-1.
Removing the air filter case and air intake duct

<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>Intake air temperature sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Air filter case</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Air intake duct</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
INSTALLING THE AIR FILTER CASE

1. Install:
   • Air filter case joint “1”
     (to the air filter case)
   • Air filter case

**TIP**
Align the projection “a” on the air filter case joint with the slot “b” on the air intake silencer “2”.

![Diagram of air filter case installation](image-url)
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>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>Throttle body breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fuel injector coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>ISC unit coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Throttle cable housing cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Throttle cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>Fuel hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>9</td>
<td>Cylinder head breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Air intake silencer joint clamp screw</td>
<td>2</td>
<td>Loosen.</td>
</tr>
<tr>
<td>11</td>
<td>Air intake silencer joint</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Refer to “GENERAL CHASSIS” on page 4-1.
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>12</td>
<td>Throttle body joint clamp screw</td>
<td>2</td>
<td>Loosen.</td>
</tr>
<tr>
<td>13</td>
<td>Throttle body assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Throttle body joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Air induction system solenoid hose (air intake silencer to air induction system solenoid)</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>16</td>
<td>Air filter case joint clamp screw</td>
<td>1</td>
<td>Loosen.</td>
</tr>
<tr>
<td>17</td>
<td>Air intake silencer</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

2.0 Nm (0.20 m-kgf, 1.4 ft-lbf)  
2.8 Nm (0.28 m-kgf, 2.0 ft-lbf)  
3.5 Nm (0.35 m-kgf, 2.5 ft-lbf)
Disassembling the throttle body assembly

### Order Job/Parts to remove | Q’ty | Remarks
---|---|---
1 | Intake air pressure sensor | 1 |  
2 | Intake air pressure sensor hose | 1 |  
3 | Throttle position sensor | 1 |  
4 | Injector fuel rail | 1 |  
5 | Fuel injector | 1 |  
6 | Throttle body | 1 | NOTICE

**NOTICE**
The throttle body should not be disassembled.

For assembly, reverse the disassembly procedure.

3.5 Nm (0.35 m-kgf, 2.5 ft-lbf)

3.6 Nm (0.36 m-kgf, 2.6 ft-lbf)

5 Nm (0.5 m-kgf, 3.6 ft-lbf)
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 (injector fuel rail side) 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 injector fuel rail, 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:
     Obstruction → Replace and check the fuel pump/fuel supply system.
     Deposit → Replace.
     Damage → Replace.
2. Check:
   • Injector resistance
     Refer to “CHECKING THE FUEL INJECTOR” on page 9-106.

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.

CHECKING THE THROTTLE BODY JOINT
1. Check:
   • Throttle body joint “1”
     Cracks/damage → Replace.

INSTALLING THE THROTTLE BODY ASSEMBLY
1. Install:
   • Throttle body joint “1”

TIP
Align the projection “a” on the cylinder head with the slot “b” in the throttle body joint.
3. Install:
   • Throttle body assembly “1”

   **TIP**
   Align the projection “a” on the throttle body assembly between the tabs “b” on the throttle body joint.

4. Connect:
   • Fuel hose

   **NOTICE**
   ECA1XD1044
   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**
   • Connect the fuel hose securely onto the injector fuel rail until a distinct “click” is heard.
   • To connect the fuel hose onto the injector fuel rail, slide the fuel hose connector cover “1” on the end of the hose in direction of the arrow shown.

5. Install:
   • Air intake silencer “1”

   **TIP**
   Align the projection “a” on the air filter case joint “2” with the slot “b” on the air intake silencer.

6. Install:
   • Air intake silencer joint “1”

   **TIP**
   Align the projection “a” on the throttle body assembly between the tabs “b” on the air intake silencer joint.

---

**ADJUSTING THE THROTTLE POSITION SENSOR**

**WARNING**
EWA1XD1003

• 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.
1. Check:
   • Throttle position sensor
   Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 9-104.
2. Adjust:
   • Throttle position sensor angle

   a. Connect the test harness- TPS (3P) “1” to the throttle position sensor and wire harness as shown.
   b. Connect the digital circuit tester (DC 20V) to the test harness- TPS (3P).

```
<table>
<thead>
<tr>
<th>Test harness- TPS (3P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90890-03204</td>
</tr>
<tr>
<td>YU-03204</td>
</tr>
<tr>
<td>Digital circuit tester</td>
</tr>
<tr>
<td>90890-03174</td>
</tr>
<tr>
<td>Model 88 Multimeter with ta-</td>
</tr>
<tr>
<td>chometer</td>
</tr>
<tr>
<td>YU-A1927</td>
</tr>
</tbody>
</table>
```

   • Positive tester probe
     yellow (wire harness color)
   • Negative tester probe
     black/blue (wire harness color)

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.

```
<table>
<thead>
<tr>
<th>Throttle position sensor output voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.63–0.73 V</td>
</tr>
</tbody>
</table>
```
f. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws “2”.

```
<table>
<thead>
<tr>
<th>Throttle position sensor screw</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)</td>
</tr>
</tbody>
</table>
```
1. Air intake silencer
2. Air induction system hose (air intake silencer to air cut-off valve)
3. Air cut-off valve
4. Air induction system hose (air cut-off valve to reed valve cover)
5. Reed valve
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>1</td>
<td>Air induction system solenoid coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Air induction system hose (air cut-off valve joint to reed valve cover)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Air induction system hose (air intake silencer to air cut-off valve)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Air cut-off valve</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
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></td>
<td>Air induction system hose (air cut-off valve to reed valve cover)</td>
<td></td>
<td>Disconnect. Refer to &quot;Removing the air cut-off valve&quot;.</td>
</tr>
<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>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

\[10 \text{ Nm (1.0 m-kgf, 7.2 ft-lbf)}\]
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.
DRIVE TRAIN

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  CHECKING NOISES ................................................................................. 8-1
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  ASSEMBLING THE FRONT CONSTANT VELOCITY SHAFT
  ASSEMBLIES ......................................................................................... 8-10
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  ASSEMBLIES ......................................................................................... 8-23
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  ASSEMBLIES ......................................................................................... 8-24
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  ADJUSTING THE FINAL GEAR BACKLASH ....................................... 8-27
  ASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY .......... 8-27
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TROUBLESHOOTING

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 &quot;rolling rumble&quot; noticeable at low speed; a high-pitched whine; a &quot;clunk&quot; 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 train mechanism, no power transmitted from the engine to the front and/or rear wheels.</td>
<td>C. Gear tooth damage.</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 8-2.

    b. A "whining" noise that varies with acceleration and deceleration. Diagnosis: Possible incorrect reassembly, too little gear backlash. Refer to “MEASURING THE DIFFERENTIAL GEAR BACKLASH” on page 8-15 or “MEASURING THE FINAL GEAR BACKLASH” on page 8-26.

**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.

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

    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.

**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.

**Symptoms Possible Causes**

1. A pronounced hesitation or “jerky” movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.)
2. A “rolling rumble” noticeable at low speed; a high-pitched whine; a “clunk” from a shaft drive component or area.
3. A locked-up condition of the shaft drive train mechanism, no power transmitted from the engine to the front and/or rear wheels.

A. Bearing damage.
B. Improper gear backlash.
C. Gear tooth damage.
D. Broken drive shaft.
E. Broken gear teeth.
F. Seizure due to lack of lubrication.
G. Small foreign objects lodged between the moving parts.

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.

A. Bearing damage.
B. Improper gear backlash.
C. Gear tooth damage.
D. Broken drive shaft.
E. Broken gear teeth.
F. Seizure due to lack of lubrication.
G. Small foreign objects lodged between the moving parts.
TROUBLESHOOTING

TIP
- An apparent oil leak on a new or nearly new vehicle may be the result of a rust-preventative coating or excessive seal lubrication.
- Always clean the vehicle and recheck the suspected location of an apparent leakage.

TROUBLESHOOTING CHART
When basic conditions (a) and (b) described in “CHECKING NOISES” exist, check the following points:

<table>
<thead>
<tr>
<th>Step</th>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Elevate and spin both wheels. Feel for wheel bearing damage.</td>
<td>YES</td>
<td>Replace the wheel bearing. (Refer to “STEERING KNUCKLES” on page 4-56 and “REAR KNUCKLES AND STABILIZER” on page 4-64.)</td>
</tr>
<tr>
<td>NO</td>
<td>Torque to specification. (Refer to “FRONT AND REAR WHEELS” on page 4-25.)</td>
<td></td>
</tr>
<tr>
<td>2. Check the wheel nuts and axle nuts for tightness.</td>
<td>YES</td>
<td>Constant velocity shaft bearings and differential bearings are probably not damaged. Repeat the test or remove the individual components.</td>
</tr>
<tr>
<td>NO</td>
<td>Adjust per instructions. (Refer to “ADJUSTING THE PARKING BRAKE LEVER” on page 3-20.)</td>
<td></td>
</tr>
<tr>
<td>3. Check the front constant velocity shaft assemblies. Feel for bearing damage.</td>
<td>YES</td>
<td>Constant velocity shaft bearings and final gear bearings are probably not damaged. Repeat the test or remove the individual components.</td>
</tr>
<tr>
<td>NO</td>
<td>Remove the shaft drive components.</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>1</td>
<td>Sun top/Side frames/Front fender/Front guard/Instrument panel/Center passenger compartment panel/Center floor board/Front skid plate</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td>2</td>
<td>Air filter case</td>
<td></td>
<td>Refer to “AIR FILTER CASE” on page 7-5.</td>
</tr>
<tr>
<td>3</td>
<td>Steering knuckles</td>
<td></td>
<td>Refer to “STEERING KNUCKLES” on page 4-56.</td>
</tr>
<tr>
<td>4</td>
<td>Differential gear oil</td>
<td></td>
<td>Drain. Refer to “CHANGING THE DIFFERENTIAL GEAR OIL” on page 3-16.</td>
</tr>
<tr>
<td>1</td>
<td>Front constant velocity shaft assembly</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Differential motor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Differential assembly breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Differential assembly</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>5</td>
<td>Support bearing bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Front drive shaft (differential side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Universal joint</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Universal joint yoke</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Front drive shaft (middle gear side)</td>
<td>1</td>
<td></td>
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<tr>
<td>11</td>
<td>Support bearing housing</td>
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<td>Support bearing rubber</td>
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<td>13</td>
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<td>14</td>
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</tr>
<tr>
<td>15</td>
<td>Bearing</td>
<td>1</td>
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</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

- 18 Nm (1.8 m-kgf, 13 ft-lbf)
- 150 Nm (15 m-kgf, 108 ft-lbf)
- 60 Nm (6.0 m-kgf, 43 ft-lbf)
- 105 Nm (10.5 m-kgf, 76 ft-lbf)
- 60 Nm (6.0 m-kgf, 43 ft-lbf)
Disassembling the front 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>1</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Double offset joint</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>Ball bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

The following procedure applies to both of the front constant velocity shaft assemblies.
Disassembling the front 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>10</td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Constant velocity joint</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>Constant velocity shaft</td>
<td>1</td>
<td>For assembly, reverse the disassembly pro-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cedure.</td>
</tr>
</tbody>
</table>

A: Wheel side  
B: Differential side
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>
</table>
| 1     | Differential motor                       | 1    | ECA1X01002
|       | **NOTICE**                               |      | **Do not disassemble the differential motor or remove the differential motor pinion gear.** |
| 2     | Front drive shaft yoke nut (differential case side) | 1    |         |
| 3     | Front drive shaft yoke (differential case side) | 1    |         |
| 4     | Bracket                                   | 1    |         |
| 5     | Differential case cover                   | 1    |         |
| 6     | Differential gear assembly                | 1    |         |
| 7     | Differential gear assembly shim           | 1    | Refer to “ADJUSTING THE DIFFERENTIAL GEAR BACKLASH” on page 8-16. |
| 8     | Bearing                                   | 1    |         |
| 9     | Bearing                                   | 1    |         |
| 10    | Oil seal                                  | 1    |         |
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>11</td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Differential pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Bearing</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>Oil seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Differential case</td>
<td>1</td>
<td>For assembly, reverse the disassembly pro-</td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.

* SAE 80 API GL-4 Hypoid gear oil
FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

DISASSEMBLING THE UNIVERSAL JOINTS

1. Remove:
   • Universal joint

   a. Remove the circlips “1”
   b. Place the universal joint in a press.
   c. With a suitable diameter pipe “2” beneath the universal joint yoke “3”, press the bearing “4” into the pipe as shown.

   TIP
   It may be necessary to lightly tap the universal joint yoke with a punch.

   d. Repeat the steps for the opposite bearing.
   e. Remove the universal joint.

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”

   TIP
   Use the boot band installation tool “2”.

   Boots band installation tool
   90890-01526
   YM-01526

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.

CONDITION

Always use new boot bands.

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 a new 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 plastic 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

   **TIP**
   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.

---

**Removing the Front Drive Shaft Yoke**

1. Remove:
   - Front drive shaft yoke

   **TIP**
   Use the universal joint holder “1” to hold the front drive shaft yoke, then loosen the front drive shaft yoke nut.
FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

REMOVING THE DIFFERENTIAL GEAR ASSEMBLY

1. Remove:
   - Differential gear assembly “1”

NOTICE

The differential gear assembly is 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 FRONT DRIVE SHAFT

1. Check:
   - Drive shaft splines
   - Coupling sleeve splines
     Wear/damage → Replace.

WARNING

Do not attempt to straighten a bent shaft; this may dangerously weaken it.

2. Check:
   - Support bearing
     Damage → Replace.

3. Check:
   - Support bearing housing
   - Support bearing rubber
     Cracks/damage → Replace.

CHECKING THE DIFFERENTIAL ASSEMBLY

1. Check:
   - Differential case
   - Differential case cover
     Cracks/damage → Replace.

TIP

When the differential case and/or the differential case cover are replaced, be sure to adjust the shim of the differential gear assembly.

2. Check:
   - Gear teeth
     Pitting/galling/wear → Replace.

TIP

When the differential pinion gear and/or the differential assembly are replaced, be sure to adjust the shim of the differential gear assembly.

3. Check:
   - Bearings
     Damage → Replace.

CHECKING THE DIFFERENTIAL MOTOR OPERATION

1. Check:
   - Differential motor operation
     Does not operate → Replace.

NOTICE

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).

NOTICE

- 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.
ASSEMBLING THE DIFFERENTIAL ASSEMBLY

1. Install:
   • Oil seals “1”
   • Oil seal “2”

2. Measure:
   • Gear backlash
     Refer to “MEASURING THE DIFFERENTIAL GEAR BACKLASH” on page 8-15.

3. Install:
   • Differential motor

a. Slide the shift fork sliding gear “1”, which is installed to the differential case cover, to the right front constant velocity shaft assembly side 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 “a” on the differential motor pinion gear is aligned with the mark “b” on the differential motor case.

NOTICE
Do not use a 12 V battery to operate the differential motor pinion gear.
c. Insert 6 mm bolts “4” into the differential motor “5” and use them as a guide to set the motor on the differential case cover “6” so that the shift fork sliding gear “7” does not move.

**NOTICE**
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.

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)

4. 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.

5. Install:
- Front drive shaft yoke
- Washer
- Front drive shaft yoke nut

### Front drive shaft yoke nut
62 Nm (6.2 m·kgf, 45 ft·lbf)

**TIP**
- Apply locking agent (LOCTITE®) to the nut threads.
- Use the universal joint holder “1” to hold the front drive shaft yoke, then tighten the front drive shaft yoke nut.

### Universal joint holder
90890-04062
YM-04062

---

**ASSEMBLING THE UNIVERSAL JOINT**

1. Install:
   • Universal joint

### Universal joint

---

**EAS1XD1010**

---

**8-14**
b. Apply lithium-soap-based grease to the bearings.
c. Install the bearing “1” onto the front drive shaft yoke.

**NOTICE**
Check each bearing. The needles can easily fall out of their races. Slide the universal joint back and forth on the bearings; the universal joint will not go all the way onto a bearing if a needle is out of place.

d. Press each bearing into the front drive shaft yoke using a suitable socket.

**TIP**
The bearing must be inserted far enough into the universal joint yoke and front drive shaft yoke so that the circlip can be installed.
e. Install new circlips “2” into the groove of each bearing.

---

**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)

**NOTICE**
Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.

4. Attach:
   - Gear lash measurement tool “2”
   - Dial gauge “3”

5. Measure:
   - Gear backlash
     Gently rotate the differential pinion gear from engagement to engagement.
     a. Measuring point is 31.0 mm (1.22 in)

**TIP**
Measure the gear backlash at four positions. Rotate the differential pinion gear 90° each time.
ADJUSTING THE DIFFERENTIAL GEAR BACKLASH

1. Remove:
   - Differential gear assembly shim(s) “1”
   - Differential gear assembly “2”

2. Adjust:
   - Gear backlash

   a. Select the suitable shims using the following chart.

   | Thinner shim | Differential gear backlash is increased. |
   | Thicker shim  | Differential gear backlash is decreased. |

   b. Measure the differential gear backlash again.
Removing the rear constant velocity shaft assemblies, final drive assembly, and rear 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>Rear skid plate</td>
<td>Refer to &quot;GENERAL CHASSIS&quot; on page 4-1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rear knuckles</td>
<td>Refer to &quot;REAR KNUCKLES AND STABILIZER&quot; on page 4-64.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parking brake caliper</td>
<td>Refer to &quot;PARKING BRAKE&quot; on page 4-42.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muffler</td>
<td>Refer to &quot;ENGINE REMOVAL&quot; on page 5-1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final gear oil</td>
<td>Drain. Refer to &quot;CHANGING THE FINAL GEAR OIL&quot; on page 3-15.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Rear constant velocity shaft assembly</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Final drive assembly breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Final drive assembly bracket (upper side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Final drive assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spring</td>
<td>1</td>
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</table>
Removing the rear constant velocity shaft assemblies, final drive assembly, and rear drive shaft

<table>
<thead>
<tr>
<th>Order</th>
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<th>Remarks</th>
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<tbody>
<tr>
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<tr>
<td>7</td>
<td>Damper</td>
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<td>8</td>
<td>Rear drive shaft coupling sleeve</td>
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</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>
<tr>
<td>11</td>
<td>Final drive assembly bracket (lower side)</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

- 33 Nm (3.3 m-kgf, 24 ft-lbf)
- 105 Nm (10.5 m-kgf, 76 ft-lbf)
Disassembling the rear constant velocity shaft assemblies

The following procedure applies to both of 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>1</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Double offset joint</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>Ball bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Boot band</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>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Constant velocity joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Clip</td>
<td>1</td>
<td></td>
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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>13</td>
<td>Constant velocity shaft</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>

A: Wheel side
B: Final drive side
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>Rear drive shaft yoke (final drive assembly side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Final drive pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Final drive pinion gear shim</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Final drive pinion gear bearing housing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Ring gear stopper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Final drive case cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Final drive case cover gasket</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>Final drive ring gear</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Parking brake disc

1. Final drive pinion gear assembly
2. Rear drive shaft yoke (final drive assembly side)
3. Final drive pinion gear
4. Final drive pinion gear shim
5. Collar
6. Oil seal
7. Bearing
8. Final drive pinion gear bearing housing
9. Ring gear stopper
10. Final drive case cover
11. Final drive case cover gasket
12. Oil seal
13. Final drive ring gear

Refer to “PARKING BRAKE” on page 4-42.
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>14</td>
<td>Final drive ring gear shim (final drive case cover side)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Final drive ring gear shim (final drive case side)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Bearing</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>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Final drive case</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Oil seal</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>

* SAE 80 API GL-4 Hypoid gear oil
DISASSEMBLING THE REAR CONSTANT VELOCITY SHAFT ASSEMBLIES
The following procedure applies to both of the rear 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 bands “1”
   - 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 new boot bands.

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” [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 plastic 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]
REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

TIP

The dust boots should be fastened with the boot bands “3” and “5” at the grooves in the constant velocity shaft.

---

Tip

The dust boots should be fastened with the boot bands “3” and “5” at the grooves in the constant velocity shaft.

---

a. Install the dust boots.
b. Install the dust boot bands “4” and “5”. Use the boot band installation tool “6”.

---

5. Check:
   • Thrust movement free play
     Excessive play → Replace the constant velocity shaft assembly.

---

2. Remove:
   • Final drive pinion gear “1”

---

Notice

Never directly press the gear end with a hydraulic press, this will result in damage to the gear thread.

---

EAS30150

CHECKING THE REAR DRIVE SHAFT

1. Check:
   • Drive shaft splines
   • Coupling sleeve splines
     Wear/damage → Replace.
WARNING
Do not attempt to straighten a bent shaft; this may dangerously weaken it.

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 ring gear.

2. Check:
   • Gear teeth
     Pitting/galling/wear → Replace the final drive pinion gear and ring gear as a set.

   TIP
   When the final drive pinion gear and ring gear are replaced, be sure to adjust the shim of the final drive pinion gear and/or ring gear.

3. Check:
   • Bearings
     Damage → Replace.

ADJUSTING THE RING GEAR STOPPER
1. Install:
   • Ring gear stopper “1”
   • Nut

   TIP
   • Apply Yamaha bond No.1215 to the ring gear stopper threads.
   • Apply LOCTITE® to the nut threads.

2. Adjust:
   • Ring gear stopper clearance

     a. Finger tighten the ring gear stopper until it contacts the ring gear “2”.

     b. Turn the ring gear stopper 120° counterclockwise.

     c. Tighten the ring gear stopper nut “3”.

MEASURING THE FINAL GEAR BACKLASH
1. Remove:
   • Filler plug
   • Gasket

2. Install:
   • Ring gear fix bolt (M10 × 1.5) “1”
     (into the drain plug hole)

   NOTICE
   Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.

3. Attach:
   • Gear lash measurement tool “1”
   • Dial gauge “2”
REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

a. Measuring point is 31.5 mm (1.24 in)

4. Measure:
   • Gear backlash
     Gently rotate the final drive pinion gear from engagement to engagement.

| Final gear backlash | 0.13–0.23 mm (0.005–0.009 in) |

**TIP**

Measure the gear backlash at four positions. Rotate the final drive pinion gear 90° each time.

ADJUSTING THE FINAL GEAR BACKLASH

1. Remove:
   • Final drive ring gear “1”
   • Bearings “2”
   • Final drive ring gear shim (final drive case cover side) “3”
   • Final drive ring gear shim (final drive case side) “4”

2. Adjust:
   • Gear backlash

a. Select a suitable shim(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 drive ring 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 drive ring 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 drive ring 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 drive ring gear shim (final drive case side) “2” and thrust washer “3” are decreased.

Final drive ring gear shims (final drive case cover side) “3”
Thickness (mm)
0.2 0.3

**TIP**

Be sure to use one of each of the final drive ring gear shim (final drive case cover side) “3” and final drive ring gear shim (final drive case side) “4” to obtain the shim thickness.

Final drive ring gear shims (final drive case side) “4”
Thickness (mm)
0.2 0.3

ASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY

1. Apply:
   • Sealant
     (onto the washer contact surface and splines of the final drive pinion gear)

Yamaha bond No. 1215
90890-85505
(Three Bond No.1215®)
2. Install:
   - Rear drive shaft yoke (final drive case side) “1”

   **TIP**
   - Secure the rear differential assembly in a vise.
   - Use the coupling gear holding tool (35) “2” to hold the rear drive shaft yoke.

   **TIP**
   - Tighten the bolts and nuts to specification in the proper tightening sequence shown.

   **Rear drive shaft yoke nut (final drive assembly side)**
   - 97 Nm (9.7 m·kgf, 70 ft·lbf)
   - LOCTITE®

   **Coupling gear holding tool (35)**
   - 90890-01571
   - YM-01571

---

**INSTALLING THE FINAL DRIVE ASSEMBLY**

1. Install
   - Final drive assembly bracket (upper side) “1”

   **Final drive assembly bracket (upper side) bolt**
   - 33 Nm (3.3 m·kgf, 24 ft·lbf)

   - Final drive assembly “2”

   **Final drive assembly nut (upper side)**
   - 105 Nm (10.5 m·kgf, 76 ft·lbf)

   - Final drive assembly bracket (lower side) “3”

   **Final drive assembly bolt (lower side)**
   - 105 Nm (10.5 m·kgf, 76 ft·lbf)

   **Final drive assembly bracket bolt (lower side)**
   - 33 Nm (3.3 m·kgf, 24 ft·lbf)

---

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5. Frame ground
6. Main switch
7. Engine ground
8. Battery
9. Main fuse
21. ECU (engine control unit)
22. Ignition coil
23. Spark plug
30. Lean angle sensor
33. Joint coupler
59. Ignition fuse
B. Wire harness
C. Negative battery sub-wire harness
### TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

#### TIP

- Before troubleshooting, remove the following part(s):
  1. Hood
  2. Right side panel
  3. Right rear panel

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>NG →</th>
<th>OK ↓</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuses. (Main and ignition) Refer to “CHECKING THE FUSES” on page 9-92.</td>
<td>Replace the fuse(s).</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-93.</td>
<td>• Clean the battery terminals. • Recharge or replace the battery.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Check the spark plug. Refer to “CHECKING THE SPARK PLUG” on page 3-5.</td>
<td>Re-gap or replace the spark plug.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Check the ignition spark gap. Refer to “CHECKING THE IGNITION SPARK GAP” on page 9-99.</td>
<td>Ignition system is OK.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Check the spark plug cap. Refer to “CHECKING THE SPARK PLUG CAP” on page 9-98.</td>
<td>Replace the spark plug cap.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Check the ignition coil. Refer to “CHECKING THE IGNITION COIL” on page 9-98.</td>
<td>Replace the ignition coil.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Check the crankshaft position sensor. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 9-99.</td>
<td>Replace the crankshaft position sensor/stator assembly.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Check the main switch. Refer to “CHECKING THE SWITCHES” on page 9-87.</td>
<td>Replace the main switch.</td>
<td></td>
</tr>
</tbody>
</table>
9. Check the lean angle sensor.  
Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 9-100.  

   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 replace the wire harness.  

   OK ↓

Replace the ECU.
4. Load control relay
5. Frame ground
6. Main switch
7. Engine ground
8. Battery
9. Main fuse
11. Starter relay
12. Starter motor
17. Gear position switch
21. ECU (engine control unit)
33. Joint coupler
55. Brake light switch
59. Ignition fuse
61. Signaling system fuse
B. Wire harness
C. Negative battery sub-wire harness
STARTING CIRCUIT CUT-OFF SYSTEM OPERATION
If the main switch is set to "( )" (start), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral circuit of the gear position switch is closed).
- The brake pedal is pressed (the brake light switch circuit is closed).
1. Battery
2. Main fuse
3. Ignition fuse
4. Main switch
5. Load control relay
6. Signaling system fuse
7. Brake light switch
8. ECU (engine control unit)
9. Gear position switch
10. Starter relay
11. Starter motor
ELECTRIC STARTING SYSTEM

TROUBLESHOOTING
The starter motor fails to turn.

TIP
• Before troubleshooting, remove the following part(s):
  1. Hood
  2. Air intake silencer

<table>
<thead>
<tr>
<th>Step</th>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuses. (Main, ignition, and signaling system)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE FUSES” on page 9-92.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Replace the fuse(s).</td>
<td>OK ↓</td>
</tr>
<tr>
<td>2.</td>
<td>Check the battery.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-93.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>• Clean the battery terminals.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Recharge or replace the battery.</td>
<td>OK ↓</td>
</tr>
<tr>
<td>3.</td>
<td>Check the starter motor operation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE STARTER MOTOR OPERATION” on page 9-100.</td>
<td>OK →</td>
</tr>
<tr>
<td></td>
<td>Starter motor is OK. Perform the electric starting system troubleshooting, starting with step 5.</td>
<td>NG ↓</td>
</tr>
<tr>
<td>4.</td>
<td>Check the starter motor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE STARTER MOTOR” on page 5-39.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Repair or replace the starter motor.</td>
<td>OK ↓</td>
</tr>
<tr>
<td>5.</td>
<td>Check the starter relay.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE RELAYS” on page 9-95.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Replace the starter relay.</td>
<td>OK ↓</td>
</tr>
<tr>
<td>6.</td>
<td>Check the load control relay.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE RELAYS” on page 9-95.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Replace the load control relay.</td>
<td>OK ↓</td>
</tr>
<tr>
<td>7.</td>
<td>Check the main switch.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE SWITCHES” on page 9-87.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Replace the main switch.</td>
<td>OK ↓</td>
</tr>
<tr>
<td>8.</td>
<td>Check the brake light switch.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE SWITCHES” on page 9-87.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Replace the brake light switch.</td>
<td>OK ↓</td>
</tr>
</tbody>
</table>
9. Check the gear position switch. Refer to "CHECKING THE SWITCHES" on page 9-87.

NG → Replace the gear position switch.

OK ↓

10. Check the entire starting system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-5.

NG → Properly connect or replace the wire harness.

OK ↓

Replace the ECU.
2. AC magneto
3. Rectifier/regulator
5. Frame ground
8. Battery
9. Main fuse
B. Wire harness
C. Negative battery sub-wire harness
**TROUBLESHOOTING**

The battery is not being charged.

**TIP**

- Before troubleshooting, remove the following part(s):
  1. Hood
  2. Right side panel
  3. Right rear panel

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
</table>
| 1. Check the fuse.  
(Main)  
Refer to “CHECKING THE FUSES” on page 9-92. | NG →  
Replace the fuse. |
| 2. Check the battery.  
Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-93. | NG →  
- Clean the battery terminals.  
- Recharge or replace the battery. |
| 3. Check the stator coil.  
Refer to “CHECKING THE STATOR COIL” on page 9-101. | NG →  
Replace the crankshaft position sensor/stator assembly. |
| 4. Check the rectifier/regulator.  
Refer to “CHECKING THE RECTIFIER/REGULATOR” on page 9-101. | NG →  
Replace the rectifier/regulator. |
| 5. Check the entire charging system wiring.  
Refer to “CIRCUIT DIAGRAM” on page 9-11. | NG →  
Properly connect or replace the wire harness. |

The charging system circuit is OK.
4. Load control relay
5. Frame ground
6. Main switch
8. Battery
9. Main fuse
51. Light switch
52. Headlight relay
53. Headlight
56. Tail/brake light
59. Ignition fuse
62. Headlight fuse
B. Wire harness
C. Negative battery sub-wire harness
TROUBLESHOOTING

Any of the following fail to light: headlight or taillight.

TIP

• Before troubleshooting, remove the following part(s):
  1. Cargo bed left panel
  2. Cargo bed right panel
  3. Hood

1. Check the condition of each bulb and bulb socket.
   Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 9-90.
   NG → Replace the bulb(s) and bulb socket(s).

2. Check the fuses.
   (Main, ignition, and headlight)
   Refer to "CHECKING THE FUSES" on page 9-92.
   NG → Replace the fuse(s).

3. Check the battery.
   Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-93.
   NG → • Clean the battery terminals.
   • Recharge or replace the battery.

4. Check the main switch.
   Refer to "CHECKING THE SWITCHES" on page 9-87.
   NG → Replace the main switch.

5. Check the light switch.
   Refer to "CHECKING THE SWITCHES" on page 9-87.
   NG → Replace the light switch.

6. Check the headlight relay.
   Refer to "CHECKING THE RELAYS" on page 9-95.
   NG → Replace the headlight relay.

7. Check the load control relay.
   Refer to "CHECKING THE RELAYS" on page 9-95.
   NG → Replace the load control relay.
8. Check the entire lighting system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-15.

NG →

Properly connect or replace the wire harness.

OK ↓

The lighting system circuit is OK.
4. Load control relay
5. Frame ground
6. Main switch
7. Engine ground
8. Battery
9. Main fuse
17. Gear position switch
21. ECU (engine control unit)
26. Coolant temperature sensor
27. Speed sensor
31. Parking brake switch
32. Reverse switch
33. Joint coupler
34. Seat belt switch
36. Helmet indicator light
37. Seat belt indicator light
39. Multi-function meter
41. Coolant temperature warning light
42. Park indicator light
43. Reverse indicator light
44. Neutral indicator light
45. High-range indicator light
46. Low-range indicator light
48. Fuel sender
55. Brake light switch
56. Tail/brake light
59. Ignition fuse
60. Backup fuse
61. Signaling system fuse
67. Backup light
68. Backup light relay
A. Optional
B. Wire harness
C. Negative battery sub-wire harness
CIRCUIT DIAGRAM (for Europe and Oceania)
4. Load control relay
5. Frame ground
6. Main switch
7. Engine ground
8. Battery
9. Main fuse
17. Gear position switch
21. ECU (engine control unit)
26. Coolant temperature sensor
27. Speed sensor
31. Parking brake switch
32. Reverse switch
33. Joint coupler
34. Seat belt switch
35. Helmet indicator light
36. Seat belt indicator light
39. Multi-function meter
41. Coolant temperature warning light
42. Park indicator light
43. Reverse indicator light
44. Neutral indicator light
45. High-range indicator light
46. Low-range indicator light
48. Fuel sender
55. Brake light switch
56. Tail/brake light
59. Ignition fuse
60. Backup fuse
61. Signaling system fuse
67. Horn switch
68. Horn
69. Backup light
70. Backup light relay
A. Optional
B. Wire harness
C. Negative battery sub-wire harness
TROUBLESHOOTING

• Any of the following fail to light: warning light, brake light or an indicator light.
• The horn fails to sound. (For Europe and Oceania)
• The fuel meter fails to come on.
• The speedometer fails to operate.

TIP

• Before troubleshooting, remove the following part(s):
  1. Hood
  2. Cargo bed left panel
  3. Cargo bed right panel
  4. Right/center passenger seat frame
  5. Right/center passenger compartment panel
  6. Right side panel
  7. Right rear panel
  8. Fuel tank
  9. Air intake silencer
  10. Sun top
  11. Side frames
  12. Front fender

1. Check the fuses.
   (Main, ignition, signaling system, and backup)
   Refer to “CHECKING THE FUSES” on page 9-92.
   NG → Replace the fuse(s).
   OK ↓

2. Check the battery.
   Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-93.
   NG →
   • Clean the battery terminals.
   • Recharge or replace the battery.
   OK ↓

3. Check the main switch.
   Refer to “CHECKING THE SWITCHES” on page 9-87.
   NG → Replace the main switch.
   OK ↓

4. Check the load control relay.
   Refer to “CHECKING THE RELAYS” on page 9-95.
   NG → Replace the load control relay.
   OK ↓
Checking the signaling system

The tail/brake lights fail to come on.

1. Check the tail/brake light bulbs and sockets.
   Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 9-90.
   NG → Replace the tail/brake light bulb, socket or both.
   OK ↓

2. Check the brake light switch.
   Refer to “CHECKING THE SWITCHES” on page 9-87.
   NG → Replace the brake light switch.
   OK ↓

3. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM (for CDN)” on page 9-19 and “CIRCUIT DIAGRAM (for Europe and Oceania)” on page 9-21.
   NG → Properly connect or replace the wire harness.
   OK ↓

   This circuit is OK.

The neutral, 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 9-87.
   NG → Replace the gear position switch.
   OK ↓
### SIGNALING SYSTEM

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the reverse switch. Refer to “CHECKING THE SWITCHES” on page 9-87.</td>
</tr>
<tr>
<td></td>
<td>NG → Replace the reverse switch.</td>
</tr>
<tr>
<td>2.</td>
<td>Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM (for CDN)” on page 9-19 and “CIRCUIT DIAGRAM (for Europe and Oceania)” on page 9-21.</td>
</tr>
<tr>
<td></td>
<td>NG → Properly connect or replace the wire harness.</td>
</tr>
<tr>
<td>OK ↓</td>
<td>Replace the meter assembly or ECU.</td>
</tr>
</tbody>
</table>

The reverse indicator light fails to come on.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the parking brake switch. Refer to “CHECKING THE SWITCHES” on page 9-87.</td>
</tr>
<tr>
<td></td>
<td>NG → Replace the parking brake switch.</td>
</tr>
<tr>
<td>2.</td>
<td>Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM (for CDN)” on page 9-19 and “CIRCUIT DIAGRAM (for Europe and Oceania)” on page 9-21.</td>
</tr>
<tr>
<td></td>
<td>NG → Properly connect or replace the wire harness.</td>
</tr>
<tr>
<td>OK ↓</td>
<td>Replace the meter assembly or ECU.</td>
</tr>
</tbody>
</table>

The park indicator light fails to come on.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the coolant temperature sensor. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 9-103.</td>
</tr>
<tr>
<td></td>
<td>NG → Replace the coolant temperature sensor.</td>
</tr>
<tr>
<td>2.</td>
<td>Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM (for CDN)” on page 9-19 and “CIRCUIT DIAGRAM (for Europe and Oceania)” on page 9-21.</td>
</tr>
<tr>
<td></td>
<td>NG → Properly connect or replace the wire harness.</td>
</tr>
<tr>
<td>OK ↓</td>
<td>Replace the meter assembly or ECU.</td>
</tr>
</tbody>
</table>

The coolant temperature warning light fails to come on.
The fuel meter fails to come on.

1. Check the fuel sender.
   Refer to "CHECKING THE FUEL SENDER" on page 9-101.
   NG → Replace the fuel pump assembly.

2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM (for CDN)” on page 9-19 and “CIRCUIT DIAGRAM (for Europe and Ocean- ia)” on page 9-21.
   NG → Properly connect or replace the wire harness.

Replace the meter assembly.

The speedometer fails to come on.

1. Check the speed sensor.
   Refer to "ELECTRICAL COMPONENTS" on page 9-81.
   NG → Replace the speed sensor.

2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM (for CDN)” on page 9-19 and “CIRCUIT DIAGRAM (for Europe and Ocean- ia)” on page 9-21.
   NG → Properly connect or replace the wire harness.

Replace the meter assembly or ECU.

The helmet/seat belt indicator light fails to come on.

1. Check the seat belt switch.
   Refer to “CHECKING THE Switches” on page 9-87.
   NG → Replace the driver seat belt buckle.

Replace the meter assembly.
The horn fails to sound (for Europe and Oceania).

1. Check the horn switch.
   Refer to “CHECKING THE SWITCHES” on page 9-87.
   NG → Replace the horn switch.
   OK ↓

2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM (for Europe and Oceania)” on page 9-21.
   NG → Properly connect or replace the wire harness.
   OK ↓

   Replace the horn.
5. Frame ground
6. Main switch
8. Battery
9. Main fuse
21. ECU (engine control unit)
26. Coolant temperature sensor
33. Joint coupler
57. Radiator fan motor fuse
59. Ignition fuse
64. Radiator fan motor
65. Radiator fan motor circuit breaker
66. Radiator fan motor relay
B. Wire harness
C. Negative battery sub-wire harness
# TROUBLESHOOTING

The radiator fan motor fails to turn.

**TIP**

- Before troubleshooting, remove the following part(s):
  1. Hood
  2. Front skid plate
  3. Frame cross member

<table>
<thead>
<tr>
<th>NG →</th>
<th>OK ↓</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check the fuses. (Main, ignition, and radiator fan motor) Refer to “CHECKING THE FUSES” on page 9-92.</td>
<td>Replace the fuse(s).</td>
</tr>
<tr>
<td>2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-93.</td>
<td>• Clean the battery terminals. • Recharge or replace the battery.</td>
</tr>
<tr>
<td>3. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 9-87.</td>
<td>Replace the main switch.</td>
</tr>
<tr>
<td>4. Check the radiator fan motor. Refer to “CHECKING THE RADIATOR FAN MOTOR” on page 9-103.</td>
<td>Replace the radiator fan motor.</td>
</tr>
<tr>
<td>5. Check the radiator fan motor relay. Refer to “CHECKING THE RELAYS” on page 9-95.</td>
<td>Replace the radiator fan motor relay.</td>
</tr>
<tr>
<td>6. Check the radiator fan motor circuit breaker. Refer to “CHECKING THE RADIATOR FAN MOTOR CIRCUIT BREAKER” on page 9-103.</td>
<td>Replace the radiator fan motor circuit breaker.</td>
</tr>
<tr>
<td>7. Check the coolant temperature sensor. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 9-103.</td>
<td>Replace the coolant temperature sensor.</td>
</tr>
</tbody>
</table>
8. Check the entire cooling system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-29.

   OK ↓

   Replace the ECU.

NG →

   Properly connect or replace the wire harness.
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Crankshaft position sensor</td>
</tr>
<tr>
<td>4</td>
<td>Load control relay</td>
</tr>
<tr>
<td>5</td>
<td>Frame ground</td>
</tr>
<tr>
<td>6</td>
<td>Main switch</td>
</tr>
<tr>
<td>7</td>
<td>Engine ground</td>
</tr>
<tr>
<td>8</td>
<td>Battery</td>
</tr>
<tr>
<td>9</td>
<td>Main fuse</td>
</tr>
<tr>
<td>10</td>
<td>Fuel injection system fuse</td>
</tr>
<tr>
<td>13</td>
<td>Fuel injection system relay</td>
</tr>
<tr>
<td>14</td>
<td>Air induction system solenoid</td>
</tr>
<tr>
<td>17</td>
<td>Gear position switch</td>
</tr>
<tr>
<td>19</td>
<td>Yamaha diagnostic tool coupler</td>
</tr>
<tr>
<td>20</td>
<td>ISC (idle speed control) unit</td>
</tr>
<tr>
<td>21</td>
<td>ECU (engine control unit)</td>
</tr>
<tr>
<td>22</td>
<td>Ignition coil</td>
</tr>
<tr>
<td>23</td>
<td>Spark plug</td>
</tr>
<tr>
<td>24</td>
<td>Fuel injector</td>
</tr>
<tr>
<td>25</td>
<td>Intake air temperature sensor</td>
</tr>
<tr>
<td>26</td>
<td>Coolant temperature sensor</td>
</tr>
<tr>
<td>27</td>
<td>Speed sensor</td>
</tr>
<tr>
<td>28</td>
<td>TPS (throttle position sensor)</td>
</tr>
<tr>
<td>29</td>
<td>Intake air pressure sensor</td>
</tr>
<tr>
<td>30</td>
<td>Lean angle sensor</td>
</tr>
<tr>
<td>33</td>
<td>Joint coupler</td>
</tr>
<tr>
<td>39</td>
<td>Multi-function meter</td>
</tr>
<tr>
<td>40</td>
<td>Engine trouble warning light</td>
</tr>
<tr>
<td>49</td>
<td>Fuel pump</td>
</tr>
<tr>
<td>59</td>
<td>Ignition fuse</td>
</tr>
<tr>
<td>60</td>
<td>Backup fuse</td>
</tr>
<tr>
<td>61</td>
<td>Signaling system fuse</td>
</tr>
<tr>
<td>66</td>
<td>Radiator fan motor relay</td>
</tr>
<tr>
<td>B</td>
<td>Wire harness</td>
</tr>
<tr>
<td>C</td>
<td>Negative battery sub-wire harness</td>
</tr>
</tbody>
</table>
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 when the main switch is being turned 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>Fuel injection 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 main switch is turned to “ ” (on):

12: Crankshaft position sensor
30: Lean angle sensor (latch up detected)
33: Faulty ignition
39: Fuel injector (open or short-circuit)
41: Lean angle sensor (open or short-circuit)
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 multi-function meter.
   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.

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 9-38.

4. Turn the main switch to “O” (off) and back to “I” (on), then check that no fault code number is displayed.

TIP ___________________________________________________________________________

5. Erase the malfunction history in the diagnostic mode (code No. 62). Refer to “SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE” on page 10-5.

TIP ___________________________________________________________________________

Turning the main switch to “O” (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 9-38 and “SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE” on page 10-5.

   01: Throttle position sensor signal (throttle angle)
   30: Ignition coil
   36: 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.

<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 9-38. Monitor the operation of the sensors and actuators in the diagnostic mode. Refer to “TROUBLESHOOTING DETAILS (FUEL INJECTION SYSTEM)” on page 9-38 and “SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE” on page 10-5.</td>
<td>Check and repair.</td>
</tr>
</tbody>
</table>
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.
TROUBLESHOOTING DETAILS (FUEL INJECTION SYSTEM)

This section describes the measures per fault code number displayed on the 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 multi-function meter display according to the “Confirmation of service completion”.

Fault code No.:
Fault code number displayed on the 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 10-5.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.</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>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).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Crank the engine. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.</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. | Crank the engine. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 3. |

| 3    | 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 | Crank the engine. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 4. |
### FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.</td>
</tr>
<tr>
<td>4</td>
<td>Installed condition of crankshaft position sensor. Check for looseness or pinching.</td>
</tr>
<tr>
<td></td>
<td>Improperly installed sensor → Reinstall or replace the sensor.</td>
</tr>
<tr>
<td></td>
<td>Crank 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.</td>
</tr>
<tr>
<td></td>
<td>Check the crankshaft position sensor. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 9-99. Replace if defective.</td>
</tr>
<tr>
<td></td>
<td>Crank 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.</td>
</tr>
<tr>
<td></td>
<td>Replace the ECU.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Intake air pressure 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>03</td>
</tr>
<tr>
<td>Indicated</td>
<td>Displays the intake air pressure.</td>
</tr>
<tr>
<td>Procedure</td>
<td>Turn and hold the main switch in the “○” (start) position, then press the accelerator pedal. (If the display value changes, the performance is OK.)</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 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>Fault code No.</td>
<td>Item</td>
<td>Intake air pressure sensor: open or short circuit detected.</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>------</td>
<td>----------------------------------------------------------</td>
<td></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 &quot; &quot; (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 &quot; &quot; (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 intake air pressure sensor.</td>
<td>Execute the diagnostic mode. (Code No. 03) When engine is stopped: Atmospheric pressure at the current altitude and weather conditions is indicated. At sea level: Approx. 101 kPa (757.6 mmHg, 29.8 inHg) 1000 m (3300 ft) above sea level: Approx. 90 kPa (675.1 mmHg, 26.6 inHg) 2000 m (6700 ft) above sea level: Approx. 80 kPa (600.0 mmHg, 23.6 inHg) 3000 m (9800 ft) above sea level: Approx. 70 kPa (525.0 mmHg, 20.7 inHg) When engine is cranking: Make sure that the indication value changes. The value does not change when engine is cranking. → Check the intake air pressure sensor. Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 9-105.</td>
<td>Turn the main switch to &quot; &quot; (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.</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>
If fault code numbers “13” and “14” are both indicated, take the actions specified for fault code number “13” first.

<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>Diagnostic code No.</td>
<td>03</td>
</tr>
<tr>
<td>Indicated</td>
<td>Displays the intake air pressure.</td>
</tr>
<tr>
<td>Procedure</td>
<td>Turn and hold the main switch in the “)” (start) position, then press the accelerator pedal. (If the display value changes, the performance is OK.)</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>Condition of intake air pressure sensor hose. Check the intake air pressure sensor hose condition.</td>
<td>Clogged or detached hose → Repair or replace the sensor hose.</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>Defective intake air pressure sensor.</td>
<td>Execute the diagnostic mode. (Code No. 03) When engine is stopped: Atmospheric pressure at the current altitude and weather conditions is indicated. At sea level: Approx. 101 kPa (757.6 mmHg, 29.8 inHg) 1000 m (3300 ft) above sea level: Approx. 90 kPa (675.1 mmHg, 26.6 inHg) 2000 m (6700 ft) above sea level: Approx. 80 kPa (600.0 mmHg, 23.6 inHg) 3000 m (9800 ft) above sea level: Approx. 70 kPa (525.0 mmHg, 20.7 inHg) When engine is cranking: Make sure that the indication value changes. The value does not change when engine is cranking. → Check the intake air pressure sensor. Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 9-105.</td>
<td></td>
</tr>
</tbody>
</table>
**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>Fault code No.</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
<td>Throttle position sensor: open or short circuit detected.</td>
</tr>
<tr>
<td><strong>Fail-safe system</strong></td>
<td>Able to start engine</td>
</tr>
<tr>
<td></td>
<td>Able to drive vehicle</td>
</tr>
<tr>
<td><strong>Diagnostic code No.</strong></td>
<td>01</td>
</tr>
<tr>
<td><strong>Indicated</strong></td>
<td>Throttle position sensor signal</td>
</tr>
<tr>
<td></td>
<td>• 14–20 (fully closed position)</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>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>
<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 throttle position sensor coupler and ECU coupler. yellow–yellow Between throttle position 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 throttle position sensor. Check for looseness or pinching.</td>
<td>Improperly installed sensor → Reinstall or adjust the sensor. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-12.</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. 15

#### Item

**Throttle position sensor resistance.**

Measure the throttle position sensor resistance. Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 9-104.

Turn the main switch to " " (on).

Fault code number is not displayed → Service is finished.

Fault code number is displayed → Go to item 6.

**Defective throttle position sensor.**

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.

Turn the main switch to " " (on).

Fault code number is not displayed → Service is finished.

Fault code number is displayed → Go to item 7.

**Malfunction in ECU.**

Replace the ECU.

---

**TIP**

If fault code numbers “15” and “16” are both indicated, take the actions specified for fault code number “15” first.

---

### Fault code No. 16

#### Item

**Throttle position sensor: stuck throttle position sensor is detected.**

**Fail-safe system**

- Able to start engine
- Able to drive vehicle

**Diagnostic code No.**

01

**Indicated**

Throttle position sensor signal • 14–20 (fully closed position)

**Procedure**

Check with throttle valve fully closed.

<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 pinching.</td>
<td>Improperly installed sensor → Reinstall or adjust the sensor. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-12.</td>
<td>Turn the main switch to &quot; &quot; (on), then press the accelerator pedal. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 2.</td>
</tr>
</tbody>
</table>
FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Throttle position sensor: stuck throttle position sensor is detected.</td>
</tr>
<tr>
<td>2</td>
<td>Defective throttle position sensor.</td>
</tr>
<tr>
<td></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></td>
<td>Turn the main switch to &quot; ¶ &quot; (on), then operate the throttle. 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>Malfunction in ECU.</td>
</tr>
<tr>
<td></td>
<td>Replace the ECU.</td>
</tr>
</tbody>
</table>

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>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Coolant 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>06</td>
</tr>
<tr>
<td>Indicated</td>
<td>Displays the coolant temperature.</td>
</tr>
<tr>
<td>Procedure</td>
<td>Compare the actually measured coolant temperature with the meter display 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 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).</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to &quot; ¶ &quot; (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 &quot; ¶ &quot; (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. 21

<table>
<thead>
<tr>
<th>Item</th>
<th>Coolant temperature sensor: open or short circuit detected.</th>
</tr>
</thead>
<tbody>
<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</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.</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 9-103.</td>
</tr>
<tr>
<td>6</td>
<td>Malfunction in ECU. Replace the ECU.</td>
</tr>
</tbody>
</table>

**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>22</th>
</tr>
</thead>
<tbody>
<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>
<tr>
<td>Item</td>
<td>Probable cause of malfunction and check</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------------</td>
</tr>
</tbody>
</table>

9-45
<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
<td><strong>Intake air temperature sensor: open or short circuit detected.</strong></td>
</tr>
<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). Improperly connected → Connect the coupler securely or replace the wire harness.</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.</td>
</tr>
<tr>
<td>3</td>
<td>Wire harness continuity. 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>
</tr>
<tr>
<td>4</td>
<td>Installed condition of intake air temperature sensor. Check for looseness or pinching. Improperly installed sensor → Reinstall or replace the sensor.</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 9-105.</td>
</tr>
<tr>
<td>6</td>
<td>Malfunction in ECU.</td>
</tr>
</tbody>
</table>
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>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Latch up detected.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fail-safe system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to start engine</td>
</tr>
<tr>
<td>Unable to drive vehicle</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>08</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lean angle sensor output voltage</td>
</tr>
<tr>
<td>• 3.6–4.4 (upright)</td>
</tr>
<tr>
<td>• 0.7–1.3 (overturned)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<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>1</td>
<td>The vehicle has overturned.</td>
<td>Raise the vehicle upright.</td>
<td>Turn the main switch to &quot; &quot; (on), then to &quot; &quot; (off), and then back to &quot; &quot; (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>Installed condition of lean angle sensor.</td>
<td>Check the installed direction and condition of the sensor.</td>
<td>Turn the main switch to &quot; &quot; (on), then to &quot; &quot; (off), and then back to &quot; &quot; (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>Defective lean angle sensor.</td>
<td>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 9-100.</td>
<td>Turn the main switch to &quot; &quot; (on) then to &quot; &quot; (off), and then back to &quot; &quot; (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>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Ignition coil: open or short circuit detected in the primary lead of the ignition coil.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fail-safe system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to start engine</td>
</tr>
<tr>
<td>Unable to drive vehicle</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
</tr>
</tbody>
</table>
**FUEL INJECTION SYSTEM**

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Ignition coil: open or short circuit detected in the primary lead of the ignition coil.</td>
</tr>
</tbody>
</table>

**Actuation**

Actuates the ignition coil five times at one-second intervals. The “CHECK” indicator and “ ” on the Yamaha diagnostic tool screen come on each time the ignition coil is actuated.

**Procedure**

Check that a spark is generated five times.
- Connect an ignition checker.

<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 ignition 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 9-98.</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>
</tbody>
</table>
| 6    | Malfunction in ECU. | Execute the diagnostic mode. (Code No. 30) No spark → Replace the ECU. | }
### Fault code No. 37

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Component other than ISC (idle speed control) unit is defective (ISC operating sound is heard).</td>
</tr>
<tr>
<td>B</td>
<td>Defective ISC (idle speed control) unit (ISC operating sound is not heard).</td>
</tr>
</tbody>
</table>

### Fail-safe system

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to start engine</td>
<td></td>
</tr>
<tr>
<td>Able to drive vehicle</td>
<td></td>
</tr>
</tbody>
</table>

### Diagnostic code No. 54

Actuation:
Actuates and fully closes the ISC valve, then opens it to the standby opening position when the engine is started. This operation takes approximately 3 seconds until it is completed. The “CHECK” indicator and “ ” 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>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 2. ISC operating sound is not heard → Go to item 2 in section B for the defective ISC (idle speed control) unit.</td>
</tr>
<tr>
<td>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 3.</td>
</tr>
<tr>
<td>3</td>
<td>Throttle valve does not fully close.</td>
<td>Check the throttle body. Refer to “THROTTLE BODY” on page 7-8. Check the throttle cable. Refer to “ADJUSTING THE ACCELERATOR PEDAL FREE PLAY” on page 3-21.</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 4.</td>
</tr>
<tr>
<td>4</td>
<td>ISC valve is not moving correctly.</td>
<td>Replace the throttle body assembly.</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 5.</td>
</tr>
<tr>
<td>5</td>
<td>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>
TIP
• Do not remove the ISC (idle speed control) valve.
• 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</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Component other than ISC (idle speed control) unit is defective (ISC operating sound is heard).</td>
</tr>
<tr>
<td>B</td>
<td>Defective ISC (idle speed control) unit (ISC operating sound is not heard).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fail-safe system</th>
<th>Able to start engine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Able to drive vehicle</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuation</td>
<td>Actuates and fully closes the ISC valve, then opens it to the standby opening position when the engine is started. This operation takes approximately 3 seconds until it is completed. The “CHECK” indicator and “.” on the Yamaha diagnostic tool screen come on during the operation.</td>
</tr>
</tbody>
</table>

| 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>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 2 in section A for the component other than ISC (idle speed control) unit is defective. ISC operating sound is not heard → Go to item 2.</td>
</tr>
<tr>
<td>2</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 8. ISC operating sound is not heard → Go to item 3.</td>
</tr>
<tr>
<td>3</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 8. ISC operating sound is not heard → Go to item 4.</td>
</tr>
<tr>
<td>Fault code No.</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>----</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Item</strong></td>
<td><strong>A</strong> Component other than ISC (idle speed control) unit is defective (ISC operating sound is heard).&lt;br&gt;<strong>B</strong> Defective ISC (idle speed control) unit (ISC operating sound is not heard).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4</strong> Wire harness continuity.</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 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 8. ISC operating sound is not heard → Go to item 5.</td>
<td></td>
</tr>
<tr>
<td><strong>5</strong> Installed condition of ISC (idle speed control) unit. Check for looseness or pinching.</td>
<td>Improperly installed ISC (idle speed control) unit → Reinstall the ISC (idle speed control) unit.</td>
<td>Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item 8. ISC operating sound is not heard → Go to item 6.</td>
<td></td>
</tr>
<tr>
<td><strong>6</strong> ISC valve is not moving correctly.</td>
<td>Replace the throttle body assembly.</td>
<td>Execute the diagnostic mode. (Code No. 54) ISC operating sound is heard → Go to item 8. ISC operating sound is not heard → Go to item 7.</td>
<td></td>
</tr>
<tr>
<td><strong>7</strong> Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>8</strong> Delete the fault code.</td>
<td></td>
<td>Start the engine and let it idle for approximately 10 seconds. Check that the fault code number is not displayed.</td>
<td></td>
</tr>
</tbody>
</table>

**TIP**
- Do not remove the ISC (idle speed control) valve.
- 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>39</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
<td>Injector: open or short circuit detected.</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>36</td>
</tr>
<tr>
<td><strong>Actuation</strong></td>
<td>Actuates injector five times at one-second intervals. The “CHECK” indicator and “乡村振兴” on the Yamaha diagnostic tool screen come on each time the fuel injector is actuated.</td>
</tr>
<tr>
<td><strong>Procedure</strong></td>
<td>Check that injector is actuated five times by listening for the operating sound.</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 injector coupler.</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Execute the diagnostic mode. (Code No. 36) Operating sound → Go to item 6. No operating sound → Go to item 2.</td>
</tr>
<tr>
<td></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).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Defective injector.</td>
<td>Measure the injector resistance. Replace if out of specification. Refer to “CHECKING THE FUEL INJECTOR” on page 9-106.</td>
<td>Execute the diagnostic mode. (Code No. 36) Operating sound → Go to item 6. No operating sound → Go to item 3.</td>
</tr>
<tr>
<td>3</td>
<td>Connection of ECU coupler.</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Execute the diagnostic mode. (Code No. 36) Operating sound → Go to item 6. No operating sound → Go to item 4.</td>
</tr>
<tr>
<td></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).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Wire harness continuity.</td>
<td>Open or short circuit → Replace the wire harness. Between injector coupler and ECU coupler. red–red Between injector coupler and joint coupler. red/blue–red/blue</td>
<td>Execute the diagnostic mode. (Code No. 36) Operating sound → Go to item 6. No operating sound → 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 let it idle for approximately 5 seconds. Check that the fault code number is not displayed.</td>
</tr>
</tbody>
</table>
## Fault code No. 41

### Lean angle sensor: open or short circuit detected.

**Fail-safe system**
- Unable to start engine
- Unable to drive vehicle

**Diagnostic code No. 08**

**Indicated**
- Lean angle sensor output voltage
  - 3.6–4.4 (upright)
  - 0.7–1.3 (overturned)

**Procedure**
- Remove the lean angle sensor and incline it more than 65 degrees.

<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 lean angle 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 &quot; &quot; (on), then to &quot; &quot; (off), and then back to &quot; &quot; (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 &quot; &quot; (on), then to &quot; &quot; (off), and then back to &quot; &quot; (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 lean angle sensor coupler and ECU coupler. yellow/green–yellow/green Between lean angle 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 &quot; &quot; (on), then to &quot; &quot; (off), and then back to &quot; &quot; (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 lean angle sensor.</td>
<td>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 9-100.</td>
<td>Turn the main switch to &quot; &quot; (on), then to &quot; &quot; (off), and then back to &quot; &quot; (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>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
<tr>
<td>Fault code No.</td>
<td>42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>----------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Speed sensor: no normal signals are received from the speed sensor.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Fail-safe system**

|  | Able to start engine |
|  | Able to drive vehicle |

**Diagnostic code No.**

| 07 |

**Indicated**

| Vehicle speed pulse 0–999 |

**Procedure**

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.

<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 &quot;Ⅴ&quot; (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 &quot;Ⅴ&quot; (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.</td>
<td>Open or short circuit → Replace the wire harness. Between speed sensor 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>Turn the main switch to &quot;Ⅴ&quot; (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.</td>
<td>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>Turn the main switch to &quot;Ⅴ&quot; (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>
</tbody>
</table>
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>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>5</td>
<td>Malfunction in ECU. Replace the ECU.</td>
</tr>
<tr>
<td>6</td>
<td>Delete the fault code.</td>
</tr>
</tbody>
</table>

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.

### TIP

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>43</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Fuel system voltage: incorrect voltage supplied to the fuel injector and fuel pump.</td>
</tr>
</tbody>
</table>

**Fail-safe system**
- Able to start engine
- Able to drive vehicle

**Diagnostic code No.**
- 09, 50

**Indicated**
- Fuel system voltage (battery voltage)
  - Approximately 12.0

**Procedure**
- 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.)

**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.)

**Procedure**
- Check that the fuel injection system relay 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>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>
<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 2.</td>
</tr>
</tbody>
</table>
### FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>43</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Fuel system voltage: incorrect voltage supplied to the fuel injector and fuel pump.</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.</td>
</tr>
<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 ECU coupler and joint coupler. red/white–red/white Between joint coupler and backup fuse. red/white–red/white Between main switch coupler and ECU coupler. brown/red–brown/red</td>
</tr>
<tr>
<td>4</td>
<td>Defective fuel injection system relay. Execute the diagnostic mode. (Code No. 50) No operating sound → Replace the fuel injection system relay.</td>
</tr>
<tr>
<td>5</td>
<td>Defective fuel injection system relay. Execute the diagnostic mode. (Code No. 09) Fuel system voltage is below 3 V → Replace the fuel injection system relay.</td>
</tr>
<tr>
<td>6</td>
<td>Malfunction in ECU. Replace the ECU.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>44</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>EEPROM fault code number: an error is detected while reading or writing on EEPROM.</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>60</td>
</tr>
</tbody>
</table>

9-56
### Fault code No. 44

**Item**
EEPROM fault code number: an error is detected while reading or writing on EEPROM.

**Indicated**
The fault code No. 44 detected EEPROM errors are indicated. 00 indication: Normal status

<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) 01 indication: Go to item 2</td>
<td>—</td>
</tr>
<tr>
<td>2</td>
<td>“01” is indicated in diagnostic mode (code No. 60). EEPROM data error for adjustment of CO concentration.</td>
<td>Change the CO concentration, and rewrite in EEPROM. Refer to “ADJUSTING THE EXHAUST GAS VOLUME (for Europe and Oceania)” on page 3-6. After this adjustment is made, the memory is not recovered when the main switch is turned to “○” (off).</td>
<td>Turn the main switch to “‖” (on). Fault code number is not displayed → Service is finished. Fault code number is displayed → Repeat item 1. If the same number is indicated, 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. 46

**Item**
Charging voltage is abnormal.

**Fail-safe system**
Able to start engine
Able to drive vehicle

**Diagnosis code No.**
—

**Indication**
—

**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>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>

**TIP**
If fault code numbers “37” and “46” are both indicated, take the actions specified for fault code number “46” first.
### Fault code No. 50

**Item**
Faulty ECU (engine control unit) memory. (When this malfunction is detected in the ECU, the fault code number might not appear.)

**Fail-safe system**
Unable to start engine
Unable to drive vehicle

**Diagnostic code No.**
—

**Indicated**
—

**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>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

**Item**
ECU (engine control unit) internal malfunction (output signal error): signals cannot be transmitted between the ECU and the multi-function meter.

**Fail-safe system**
Able to start engine (unable when ECU is malfunctioning)
Able to drive vehicle (unable when ECU is malfunctioning)

**Diagnostic code No.**
—

**Indicated**
—

**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>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>
</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 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>
</tr>
</tbody>
</table>
### Fault code No. Er-1

<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>4</td>
<td>Defective meter assembly.</td>
<td>Replace the meter assembly.</td>
<td>Turn the main switch to &quot; &quot; (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>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>

### Fault code No. Er-2

<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.</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to &quot; &quot; (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.</td>
<td>Improperly connected → Connect the coupler securely or replace the wire harness.</td>
<td>Turn the main switch to &quot; &quot; (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 meter assembly coupler and ECU coupler. yellow/blue–yellow/blue</td>
<td>Turn the main switch to &quot; &quot; (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>
<td>Replace the meter assembly.</td>
<td>Turn the main switch to &quot; &quot; (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. 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>Item</th>
<th>Maintenance job</th>
<th>Confirmation of service completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
</tr>
</tbody>
</table>

### Fault code No. Er-3

**Item**

ECU (engine control unit) internal malfunction (output signal error): data from the ECU cannot be received correctly.

<table>
<thead>
<tr>
<th>Fail-safe system</th>
<th>Indicated</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to start engine</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Able to drive vehicle</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>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]” (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]” (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 meter assembly coupler and ECU coupler. yellow/blue–yellow/blue</td>
<td>Turn the main switch to “[on]” (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>
<td>Replace the meter assembly.</td>
<td>Turn the main switch to “[on]” (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>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>

9-60
## Fault code No. Er-4

### Item
ECU (engine control unit) internal malfunction (input signal error): non-registered data has been received from the meter assembly.

### Fail-safe system
- Able to start engine
- Able to drive vehicle

### Diagnostic code No.
—

### Indicated
—

### 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>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>
</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 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>
</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>
</tr>
<tr>
<td>5</td>
<td>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>
5. Frame ground
6. Main switch
8. Battery
9. Main fuse
10. Fuel injection system fuse
13. Fuel injection system relay
21. ECU (engine control unit)
33. Joint coupler
49. Fuel pump
59. Ignition fuse
B. Wire harness
C. Negative battery sub-wire harness
TROUBLESHOOTING
If the fuel pump fails to operate.

TIP
• Before troubleshooting, remove the following part(s):
1. Outer passenger seat frame
2. Right passenger compartment panel
3. Right side panel
4. Right rear panel
5. Fuel tank

1. Check the fuses.
   (Main, ignition, and fuel injection system)
   Refer to “CHECKING THE FUSES” on page 9-92.
   NG → Replace the fuse(s).

2. Check the battery.
   Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-93.
   NG → • Clean the battery terminals.
       • Recharge or replace the battery.

3. Check the main switch.
   Refer to “CHECKING THE SWITCHES” on page 9-87.
   NG → Replace the main switch.

4. Check the fuel injection system relay.
   Refer to “CHECKING THE RELAYS” on page 9-95.
   NG → Replace the fuel injection system relay.

5. Check the fuel pump.
   Refer to “CHECKING THE FUEL PUMP BODY” on page 7-2.
   NG → Replace the fuel pump assembly.

6. Check the entire fuel pump system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 9-63.
   NG → Properly connect or replace the wire harness.

Replace the ECU.
2WD/4WD SELECTING SYSTEM

4. Load control relay
5. Frame ground
6. Main switch
8. Battery
9. Main fuse
15. Differential motor relay 1
16. Differential motor
18. On-Command four-wheel-drive switch
21. ECU (engine control unit)
33. Joint coupler
39. Multi-function meter
50. Differential motor relay 2
58. Differential motor fuse
59. Ignition fuse
61. Signaling system fuse
B. Wire harness
C. Negative battery sub-wire harness
TROUBLESHOOTING

- The On-Command differential gear lock indicator light/On-Command four-wheel-drive/differential gear lock indicator fails to come on.
- The On-Command differential gear lock indicator light/On-Command four-wheel-drive/differential gear lock indicator flashes.

**TIP**
- Before troubleshooting, remove the following part(s):
  1. Hood
  2. Front skid plate

The On-Command differential gear lock indicator light/On-Command four-wheel-drive/differential gear lock indicator fails to come on.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuses. (Main, ignition, signaling system, and differential motor) Refer to “CHECKING THE FUSES” on page 9-92.</td>
<td>NG</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-93.</td>
<td>NG</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Check the main switch. Refer to “CHECKING THE SWITCHES” on page 9-87.</td>
<td>NG</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Check the On-Command four-wheel-drive switch. Refer to “CHECKING THE SWITCHES” on page 9-87.</td>
<td>NG</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Check the differential motor relay 1. Refer to “CHECKING THE RELAYS” on page 9-95.</td>
<td>NG</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Check the differential motor relay 2. Refer to “CHECKING THE RELAYS” on page 9-95.</td>
<td>NG</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Check the load control relay. Refer to “CHECKING THE RELAYS” on page 9-95.</td>
<td>NG</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
</tbody>
</table>
### 2WD/4WD SELECTING SYSTEM

#### Steps and Actions:

**8. Check the differential motor operation.**
- Refer to “CHECKING THE DIFFERENTIAL MOTOR OPERATION” on page 8-12.
- **NG →** Replace the differential motor.

<table>
<thead>
<tr>
<th>NG</th>
<th>OK ↓</th>
</tr>
</thead>
</table>

**9. Check the entire 2WD/4WD selecting system wiring.**
- Refer to “CIRCUIT DIAGRAM” on page 9-67.
- **NG →** Properly connect or replace the 2WD/4WD selecting system wiring.

<table>
<thead>
<tr>
<th>NG</th>
<th>OK ↓</th>
</tr>
</thead>
</table>

Replace the meter assembly or ECU.

The On-Command differential gear lock indicator light/On-Command four-wheel-drive/differential gear lock indicator flashes.

**1. Check the differential motor position switch.**
- Refer to “CHECKING THE DIFFERENTIAL MOTOR POSITION SWITCH” on page 9-106.
- **NG →** Replace the differential motor.

<table>
<thead>
<tr>
<th>NG</th>
<th>OK ↓</th>
</tr>
</thead>
</table>

**2. Check the entire 2WD/4WD selecting system wiring.**
- Refer to “CIRCUIT DIAGRAM” on page 9-67.
- **NG →** Properly connect or replace the 2WD/4WD selecting system wiring.

<table>
<thead>
<tr>
<th>NG</th>
<th>OK ↓</th>
</tr>
</thead>
</table>

Replace the ECU.
CIRCUIT DIAGRAM
4. Load control relay
5. Frame ground
6. Main switch
8. Battery
9. Main fuse
10. EPS fuse
22. ECU (engine control unit)
28. Speed sensor
34. Joint coupler
35. EPS unit
36. EPS motor
37. EPS torque sensor
38. EPS self-diagnosis signal connector
39. EPS (electric power steering) control unit
54. EPS warning light
66. Ignition fuse
68. Signaling system fuse
B. Wire harness
C. Negative battery sub-wire harness
D. 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 “I” (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 “I” (on). If the warning light does not come on, the electrical circuit may be defective.

**TIP**

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.

**EPS WARNING LIGHT DURING NORMAL OPERATION**

The EPS warning light comes on initially for 2 seconds after the main switch is turned to “I” (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.
Setting the diagnostic mode (present and past malfunctions)
1. Turn the main switch to “ ” (on).
2. Disconnect the EPS self-diagnosis signal connector “1”.
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 EPS self-diagnosis signal connector within 5 seconds after setting the main switch to “ ” (on), and leave it grounded. The signaling mode is activated after 5 seconds.

- Past malfunction signaling mode
  While the present malfunction mode is activated, briefly disconnect the EPS self-diagnosis signal connector, ground it again, and leave it grounded. The signaling mode is activated after 5 seconds.

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

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

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.
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

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
<th>Symptom</th>
<th>Probable cause of malfunction</th>
</tr>
</thead>
</table>
| 11             | EPS torque sensor  | No normal signals are received from the torque sensor. | • Open or short circuit in wire harness.  
| 13             |                    |                                                     | • Malfunction in torque sensor.  
| 15             |                    |                                                     | • Malfunction in EPS control unit.      |
| 16             |                    |                                                     |                                                 |
| 21             | Speed sensor       | No normal signals are received from the speed sensor. | • Open or short circuit in wire harness.  
|                |                    |                                                     | • Malfunction in speed sensor.  
|                |                    |                                                     | • Malfunction in EPS control unit.      |
| 22             | Engine speed signal| No normal signals are received from the ECU.        | • Open or short circuit in wire harness.  
|                |                    |                                                     | • Malfunction in ECU.  
|                |                    |                                                     | • Malfunction in EPS control unit.      |
| 41             | EPS motor          | No normal signals are received from the EPS motor.  | • Open or short circuit in wire harness.  
| 42             |                    |                                                     | • Malfunction in EPS motor.  
| 43             |                    |                                                     | • Malfunction in EPS control unit.      |
| 45             |                    |                                                     |                                                 |
| 52             | EPS control unit   | Relay contacts in the EPS control unit are welded together. | Malfunction in EPS control unit.   |
### Troubleshooting Details (EPS System)

**Tip**

The malfunction history is stored even if the main switch is turned to "O" (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 9-74.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
<th>Symptom</th>
<th>Probable cause of malfunction</th>
</tr>
</thead>
</table>
| 53             | EPS control unit | Battery voltage has dropped. | • Faulty battery.  
• Malfunction in the charging system. Refer to “CHARGING SYSTEM” on page 9-11.  
• Malfunction in EPS control unit. |
| 54             | EPS control unit | Relay contacts in the EPS control unit are welded together. | Malfunction in EPS control unit. |
| 55             | EPS control unit | Battery voltage has increased. Abnormality exists between the EPS and the ECU. | • Malfunction in the charging system. Refer to “CHARGING SYSTEM” on page 9-11.  
• Malfunction in EPS control unit. |

#### Fault Code No. 11, 13, 15, 16

**Symptom**: EPS torque sensor: open or short circuit detected.

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
</table>
| 1     | Connections  
• EPS torque sensor coupler | • Check the coupler for any pins that may have pulled out.  
• Check the locking condition of the coupler.  
• If there is a malfunction, repair it and connect the coupler securely. | Turning the main switch to "O" (off). |
| 2     | Defective EPS torque sensor. | • Replace if defective. Refer to “CHECKING THE EPS TORQUE SENSOR (for EPS models)” on page 9-107. | |
| 3     | Open or short circuit in EPS torque sensor lead. | • 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 | |
### Fault code No. 21
**Symptom**: Speed sensor: open or short circuit detected.

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connections • Speed sensor coupler  • EPS control unit coupler at the wire harness</td>
<td>• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.</td>
<td>Starting the engine and activating the vehicle speed sensor by operating the vehicle above 5 km/h (3 mi/h), or turning the main switch to &quot;○&quot; (off), then to &quot;□&quot; (on), and then deleting the fault codes. Refer to “DIAGNOSTIC MODE” on page 9-74.</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 9-102.</td>
<td></td>
</tr>
</tbody>
</table>

### Fault code No. 22
**Symptom**: No normal signals are received from the ECU.

<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 • EPS control unit coupler at the wire harness • ECU coupler at the wire harness</td>
<td>• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.</td>
<td>Turning the main switch to &quot;○&quot; (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>
</tbody>
</table>
### EPS (ELECTRIC POWER STEERING) SYSTEM (for EPS models)

#### Fault code No. 41, 42, 43, 45

**Symptom**: EPS motor: open or short circuit detected.

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connections • EPS motor coupler</td>
<td>• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.</td>
<td>Turning the main switch to “気軽 (off).”</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. • Between EPS motor and EPS control unit coupler. red–red black–black</td>
<td></td>
</tr>
</tbody>
</table>

#### Fault code No. 52

**Symptom**: Relay contacts in the EPS control unit are welded together.

<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 “気軽 (off).”</td>
</tr>
</tbody>
</table>

#### Fault code No. 53

**Symptom**: Power supply to the EPS control unit is not normal (low battery voltage).

<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 9-93.</td>
<td>Turning the main switch to “気軽 (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 9-101.</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
Probable cause: Relay contacts in the EPS control unit are welded together.

<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
Probable cause: Power supply to the EPS control unit is not normal (high battery voltage). Malfunction in control unit.

<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. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-93.</td>
<td>Turning the main switch to “○” (off).</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. Radiator fan motor
2. Lean angle sensor
3. Parking brake switch
4. Ignition coil
5. Intake air pressure sensor
6. TPS (throttle position sensor)
7. Fuel injector
8. ISC (idle speed control)
9. Air induction system solenoid
10. Coolant temperature sensor
11. Reverse switch
12. Gear position switch
13. Speed sensor
14. Crankshaft position sensor
15. Intake air temperature sensor
16. Fuel sender
17. Fuel pump
18. Seat belt switch
19. Brake light switch
20. Differential motor
1. Auxiliary DC jack
2. Battery
3. Meter assembly
4. Indicator light assembly
5. Main switch
6. On-Command four-wheel-drive switch
7. Light switch
8. EPS torque sensor (for EPS models)
9. EPS motor (for EPS models)
10. EPS (electric power steering) control unit (for EPS models)
11. Radiator fan motor circuit breaker
12. Horn (for Europe and Oceania)
13. ECU (engine control unit)
14. Rectifier/regulator
1. Load control relay
2. Fuel injection system relay
3. Radiator fan motor relay
4. Headlight relay
5. Differential motor relay 1
6. Differential motor relay 2
7. Fuel injection system fuse
8. Spare fuse
9. Starter relay
10. EPS fuse (for EPS models)
11. Main fuse
12. Fuse box
13. Radiator fan motor fuse
14. Headlight fuse
15. Signaling system fuse
16. Auxiliary DC jack fuse
17. Differential motor fuse
18. Ignition fuse
19. Backup fuse
CHECKING THE SWITCHES
1. Brake light switch
2. Parking brake switch
3. Main switch
4. On-Command four-wheel-drive switch
5. Reverse switch
6. Gear position switch
7. Seat belt switch
8. Light switch
9. Horn switch (for Europe and Oceania)
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 the brown/red and red/black leads when the switch is set to “ ” (on).
CHECKING THE BULBS AND BULB SOCKETS

TIP Do not check any of the lights that use LEDs.

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

- Damage/wear → Repair or replace the bulb, bulb socket or both.
- Improperly connected → Properly connect.
- No continuity → Repair or replace the bulb, bulb socket or both.

Types of bulbs

The bulbs used on this vehicle are shown in the illustration.

- Bulbs “a” and “b” are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulbs “c” are used for tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.

Checking the condition of the bulbs

The following procedure applies to all of the bulbs.

1. Remove:
   - Bulb

   ![Bulb Illustrations]

2. Check:
   - Bulb (for continuity) (with the pocket tester)
     - No continuity → Replace.

   ![Pocket Tester Illustration]

   **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.

- Install a good bulb into the bulb socket.
- Connect the pocket tester probes to the respective leads of the bulb socket.
- Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

REPLACING THE HEADLIGHT BULBS
The following procedure applies to both of the headlight bulbs.
1. Remove:
   • Headlight rear cover “1”
2. Remove:
   • Headlight bulb holder cover “1”
3. Disconnect:
   • Headlight coupler “1”
4. Remove:
   • Headlight bulb holder “1”
   • Headlight bulb “2”

WARNING
Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.
TIP
Unhook the headlight bulb holder, and then remove the defective bulb.

5. Install:
   • Headlight bulb [New]
   Secure the new headlight bulb with the headlight bulb holder.

NOTICE
Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.
6. Install:
   • Headlight bulb holder
7. Connect:
   • Headlight coupler
8. Install:
   • Headlight bulb holder cover

**NOTICE**
Make sure the headlight bulb holder cover is securely fitted over the bulb holder and seated properly.

**TIP**
Pass the headlight lead “1” through the slot “a” in the headlight unit as shown, and then reinstall the bulb holder cover.

9. Install:
   • Headlight rear cover

**ADJUSTING THE HEADLIGHT BEAMS**
The following procedure applies to both of the headlights.
1. Adjust:
   • Headlight beam (vertically)
   ▼▼▼ ▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼
   a. Turn the adjusting screw “1” in direction “a” or “b”.

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

---

**CHECKING THE FUSES**
The following procedure applies to all of the fuses.

**NOTICE**
To avoid a short circuit, always turn the main switch to “ ” (off) when checking or replacing a fuse.

1. Remove:
   • Hood
   Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
   • Fuse

<table>
<thead>
<tr>
<th>No.</th>
<th>Fuses</th>
<th>Amperage rating</th>
<th>Q’ty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EPS (for EPS models)</td>
<td>40.0 A</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Main</td>
<td>40.0 A</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Radiator fan motor</td>
<td>25.0 A</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Headlight</td>
<td>15.0 A</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Backup</td>
<td>10.0 A</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Fuel injection system</td>
<td>10.0 A</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Ignition</td>
<td>10.0 A</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Differential motor</td>
<td>10.0 A</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Signaling system</td>
<td>10.0 A</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Auxiliary DC jack</td>
<td>10.0 A</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Spare</td>
<td>25.0 A</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Spare</td>
<td>15.0 A</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Spare</td>
<td>10.0 A</td>
<td>2</td>
</tr>
</tbody>
</table>
b. If the pocket tester indicates “∞”, replace the fuse.

3. Replace:
   • Blown fuse

4. Install:
   • Hood

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

**WARNING**

Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.

**CHECKING AND CHARGING THE BATTERY**

**WARNING**

Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid. Therefore, always follow these preventive measures:

- Wear protective eye gear when handling or working near batteries.
- Charge batteries in a well-ventilated area.
- Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).
- DO NOT SMOKE when charging or handling batteries.
- KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.

- Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.

**FIRST AID IN CASE OF BODILY CONTACT:**

**EXTERNAL**

- Skin — Wash with water.
- Eyes — Flush with water for 15 minutes and get immediate medical attention.

**INTERNAL**

- Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.

**NOTICE**

This is a VRLA (Valve Regulated Lead Acid) battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.

- Charging time, charging amperage and charging voltage for a VRLA battery are different from those of conventional batteries. The VRLA battery should be charged according to the appropriate charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

**TIP**

Since VRLA 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:
   • Hood

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

2. Disconnect:
   • Battery leads

   (from the battery terminals)

**NOTICE**

First, disconnect the negative battery lead “1”, and then positive battery lead “2”.

---

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C
3. Remove:
   • Battery
4. Check:
   • Battery charge

TIP

• Connect a pocket tester to the battery terminals.
  • Positive tester probe → positive battery terminal
  • Negative tester probe → negative battery terminal

Example
Open-circuit voltage = 12.0 V
Charging time = 6.5 hours
Charge of the battery = 20–30%

A. Open-circuit voltage (V)
B. Charging time (hours)
C. Relationship between the open-circuit voltage and the charging time at 20 °C (68 °F)

WARNING

Do not quick charge a battery.

NOTICE

• Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.
• If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.
• When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the negative battery lead from the battery terminal.)
• To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.
• Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.
• Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.

A. Open-circuit voltage (V)
B. Charging condition of the battery (%)
C. Ambient temperature 20 °C (68 °F)
• 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.

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 the battery’s charging voltage is 15 V.

---

**TIP**
Set the charging time at 20 hours (maximum).

6. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.8 V or more</td>
<td>Charging is complete.</td>
</tr>
<tr>
<td>12.7 V or less</td>
<td>Recharging is required.</td>
</tr>
<tr>
<td>Under 12.0 V</td>
<td>Replace the battery.</td>
</tr>
</tbody>
</table>

**NOTICE**
First, connect the positive battery lead “1”, and then the negative battery lead “2”.

---

**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.
### Starter relay

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

**Result**

- **Continuity (between “3” and “4”)**

### Load control relay

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

**Result**

- **Continuity (between “3” and “4”)**

### Headlight relay

**First step:**

1. Positive tester probe
2. Negative tester probe
3. Positive 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”)**
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”)

Differential 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”)
ELECTRICAL COMPONENTS

Differential motor relay 2

First step:

![Diagram of differential motor relay 2]

1. Positive tester probe
2. Negative tester probe
3. Negative tester probe

Result

<table>
<thead>
<tr>
<th>Continuity (between “1” and “2”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No continuity (between “1” and “3”)</td>
</tr>
</tbody>
</table>

Second step:

![Diagram of ignition coil]

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe
5. Negative tester probe

Result

<table>
<thead>
<tr>
<th>No continuity (between “3” and “4”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity (between “3” and “5”)</td>
</tr>
</tbody>
</table>

CHECKING THE SPARK PLUG CAP

1. Check:
   • Spark plug cap resistance
     Out of specification → Replace.

<table>
<thead>
<tr>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.5–12.5 kΩ</td>
</tr>
</tbody>
</table>

CHECKING THE IGNITION COIL

1. Check:
   • Primary coil resistance
     Out of specification → Replace.

<table>
<thead>
<tr>
<th>Primary coil resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.16–2.64 Ω</td>
</tr>
</tbody>
</table>

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

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

- Positive tester probe → brown/red “1”
- Negative tester probe → orange “2”
ELECTRICAL COMPONENTS

EAS5909

CHECKING THE IGNITION SPARK GAP
1. Check:
   • Ignition spark gap
     Out of specification → Perform the ignition system troubleshooting, starting with step 5.

c. Measure the secondary coil resistance.

Secondary coil resistance
8.64–12.96 kΩ

a. Disconnect the spark plug cap from the ignition coil.
b. Connect the pocket tester (Ω × 1k) to the ignition coil as shown.

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

• Positive tester probe → brown/red “1”
• Negative tester probe → Spark plug lead “2”

c. Measure the primary coil resistance.

2. Check:
   • Secondary coil resistance
     Out of specification → Replace.

Secondary coil resistance
8.64–12.96 kΩ

Pocke tester
90890-06754
Oppama pet-4000 spark checker
YM-34487

a. Disconnect the spark plug cap from the spark plug.
b. Connect the ignition checker “1” as shown.

c. Spark plug cap
d. Crank the engine by turning the main switch to “×” (start) and gradually increase the spark gap until a misfire occurs.

CHECKING THE CRANKSHAFT POSITION SENSOR
1. Disconnect:
   • Crankshaft position sensor coupler (from the wire harness)

2. Check:
   • Crankshaft position sensor resistance
     Out of specification → Replace the crankshaft position sensor/stator assembly.

Crankshaft position sensor resistance
408.0–612.0 Ω

If the ignition spark gap is within specification, the ignition system circuit is operating normally.

TIP

If the ignition spark gap is within specification, the ignition system circuit is operating normally.

Minimum ignition spark gap
6.0 mm (0.24 in)

TIP

Refer to “TROUBLESHOOTING” on page 9-3.
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 test harness- lean angle sensor (3P) “1” between the lean angle sensor and wire harness as shown.
b. Connect the pocket tester (DC 20 V) to the test harness- lean angle sensor (3P).

c. Turn the main switch to “ [] ” (on).
d. Turn 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 9-9.

---

a. Connect the positive battery terminal “1” and starter motor lead “2” with a jumper lead “3”.

---

**WARNING**

- A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.
- This check is likely to produce sparks, therefore, make sure no flammable gas or fluid is in the vicinity.
b. Check the starter motor operation.

CHECKING THE STATOR COIL
1. Disconnect:
   • Stator coil couplers
     (from the wire harness)
2. Check:
   • Stator coil resistance
     Out of specification → Replace the crankshaft position sensor/stator assembly.

Stator coil resistance
0.09–0.13 Ω

a. Connect the digital circuit tester to the stator coil coupler as shown.

Digital circuit tester
90890-03174
Model 88 Multimeter with tachometer
YU-A1927

• Positive tester probe →
  white “1”
• Negative tester probe →
  white “2”
• Positive tester probe →
  white “1”
• Negative tester probe →
  white “3”
• Positive tester probe →
  white “2”
• Negative tester probe →
  white “3”

b. Measure the stator coil resistance.

CHECKING THE RECTIFIER/REGULATOR
1. Check:
   • 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 battery as shown.

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

• Positive tester probe →
  positive battery terminal “1”
• Negative tester probe →
  negative battery terminal “2”

C. Start the engine and let it run at approximately 5000 r/min.
d. Measure the charging voltage.

CHECKING THE FUEL SENDER
1. Disconnect:
   • Fuel pump coupler
     (from the wire harness)
2. Remove:
   • Fuel pump assembly
     (from the fuel tank)
3. Check:
   • Fuel sender resistance
     Out of specification → Replace the fuel pump assembly.

b. Measure the stator coil resistance.
ELECTRICAL COMPONENTS

Sender unit resistance (full) 19.0–21.0 Ω
Sender unit resistance (empty) 139.0–141.0 Ω

a. Connect the pocket tester (Ω × 10 or Ω × 100) to the fuel sender terminals as shown.

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

• Positive tester probe → orange/black “1”
• Negative tester probe → black/white “2”

c. Measure the fuel sender resistance.

CHECKING THE FUEL METER/FUEL LEVEL WARNING LIGHT
This model is equipped with a self-diagnosis device for the fuel level detection circuit.

1. Check:
   • Fuel meter/fuel level warning light “1” (Turn the main switch to “ ” [on].)
     Warning light comes on for a few seconds, then goes off → Warning light is OK.
     Warning light does not come on → Replace the meter assembly.
     Warning light flashes eight times, then goes off for 3 seconds in a repeated cycle (malfunction detected in fuel sender) → Replace the fuel pump assembly.

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 test harness- speed sensor (3P) “1” between the speed sensor coupler and wire harness as shown.
b. Connect the pocket tester (DC 20 V) to the test harness- speed sensor (3P).
c. Turn the main switch to “I” (on).

d. Elevate the rear wheels and slowly rotate them.

e. Measure the voltage (DC 20 V) of white and black/blue. With each full rotation of the rear wheels, the voltage reading should cycle from 0.6 V to 4.8 V to 0.6 V to 4.8 V.

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.

   • Positive battery terminal → blue “1”
   • Negative battery terminal → black “2”

c. Check the radiator fan motor movement.

CHECKING THE RADIATOR FAN MOTOR CIRCUIT BREAKER

1. Remove:
   - Radiator fan motor circuit breaker (from the wire harness)

2. Check:
   - Radiator fan motor circuit breaker resistance
     Out of specification → Replace the radiator fan motor circuit breaker.

   • Radiator fan motor circuit breaker resistance
     0–0.05 Ω at 25 °C (77 °F)

   a. Connect the digital circuit tester to the radiator fan motor circuit breaker as shown.

   • Digital circuit tester
     90890-03174
     Model 88 Multimeter with tachometer
     YU-A1927

   b. Measure the radiator fan motor circuit breaker resistance.

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.

   Coolant temperature sensor resistance
   2.32–2.59 kΩ at 20 °C (68 °F)
   310–326 Ω at 80 °C (176 °F)

---

a. Connect the pocket tester (Ω × 1k or Ω × 100) to the coolant temperature sensor terminals as shown.

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

b. Immerse the coolant temperature sensor “1” in a container filled with coolant “2”.

TIP

Make sure the coolant temperature sensor terminals do not get wet.

c. Place a thermometer “3” in the coolant.

d. Heat the coolant or let it cool down to the specified temperatures.

e. Measure the coolant temperature sensor resistance.

---

3. Install:
   - Coolant temperature sensor

   Coolant temperature sensor
   18 Nm (1.8 m·kgf, 13 ft·lbf)

---

WARNING

- 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. Check:
   - Throttle position sensor maximum resistance
     Out of specification → Replace the throttle position sensor.

   Resistance
   2.64–6.16 kΩ

---

a. Connect the pocket tester (Ω × 1k) to the throttle position sensor terminals as shown.

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

b. Measure the throttle position sensor maximum resistance.

---

3. Install:
   - Throttle position sensor
ELECTRICAL COMPONENTS

TIP
When installing the throttle position sensor, adjust its angle properly. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-12.

CHECKING THE INTAKE AIR PRESSURE SENSOR

**WARNING**
- Handle the intake air pressure sensor with special care.
- Never subject the intake air pressure sensor to strong shocks. If the intake air pressure sensor is dropped, replace it.

1. Check:
   - Intake air pressure sensor output voltage Out of specification → Replace.

   **Intake air pressure sensor output voltage**
   3.594–3.684 V at 101 kPa (1.01 kgf/cm², 14 psi)

   ▼▼▼ ▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼▼▼
   a. Connect the test harness S-pressure sensor 5S7 (3P) “1” between the intake air pressure sensor and wire harness as shown.
   b. Connect the pocket tester (DC 20 V) to the test harness S-pressure sensor 5S7 (3P).

   **Test harness S-pressure sensor 5S7 (3P)**
   90890-03211
   YU-03211
   Pocket tester 90890-03112
   Analog pocket tester YU-03112-C

   ▼▼▼ ▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼▼▼
   • Positive tester probe → pink (wire harness color)
   • Negative tester probe → black/blue (wire harness color)

   ▲▲▲ ▲ ▲ ▲▲▲▲▲ ▲ ▲ ▲▲ ▲ ▲▲▲ ▲ ▲ ▲▲▲ ▲ ▲ ▲▲▲ ▲ ▲ ▲▲▲
   c. Turn the main switch to “ ■ ” (on).
   d. Measure the intake air pressure sensor output voltage.

   EWA1020
   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 × 1k or Ω × 100) to the intake air temperature sensor terminals 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 intake air temperature sensor terminals do not get wet.

   ▼▼▼ ▼ ▼ ▼▼▼▼▼ ▼ ▼ ▼▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼ ▼▼▼ ▼ ▼▼▼
   c. Place a thermometer “3” in the water.
d. Heat the water or let it cool down to the specified temperatures.
e. Measure the intake air temperature sensor resistance.

---

**CHECKING THE FUEL INJECTOR**

1. Check:
   - Fuel injector resistance
     Out of specification → Replace the fuel injector.

**Fuel injector resistance**

11.5–12.5 Ω

---

a. Disconnect the fuel injector coupler from wire harness.
b. Connect the pocket tester (Ω x 1) to the fuel injector terminals as shown.

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**

20–24 Ω

---

a. Disconnect the air induction system solenoid coupler from the wire harness.
b. Connect the pocket tester (Ω x 1) to the air induction system solenoid terminals as shown.
c. Measure the air induction system solenoid resistance.

---

**CHECKING THE DIFFERENTIAL MOTOR POSITION SWITCH**

1. Check:
   - Differential motor position switch
     Out of specification → Replace.

---

**Pocket tester**

90890-03112
Analog pocket tester
YU-03112-C
TIP

Check the differential motor position switch for continuity between the terminals “1” and “3” and between the terminals “2” and “3” when the On-Command four-wheel-drive switch is set to the “2WD”, “4WD”, and “DIFF LOCK” positions.

2WD position
No continuity  
(between “1” and “3”)  
(between “2” and “3”)

4WD position
Continuity  
(between “2” and “3”)
No continuity  
(between “1” and “3”)

DIFF LOCK position
Continuity  
(between “1” and “3”)  
No continuity  
(between “2” and “3”)

TIP

The pocket tester and the analog pocket tester readings are shown in the following table.

<table>
<thead>
<tr>
<th>Position</th>
<th>Continuity</th>
<th>No continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2WD</td>
<td>(between “1” and “3”)</td>
<td>(between “2” and “3”)</td>
</tr>
<tr>
<td>4WD</td>
<td>Continuity</td>
<td>No continuity</td>
</tr>
<tr>
<td>DIFF LOCK</td>
<td>Continuity</td>
<td>No continuity</td>
</tr>
</tbody>
</table>

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

EAS30300

CHECKING THE EPS MOTOR (for EPS models)
1. Remove:
   • EPS unit
2. Check:
   • EPS motor
   Out of specification → Replace the EPS unit.

EAS30310

CHECKING THE EPS TORQUE SENSOR (for EPS models)
1. Remove:
   • EPS unit
2. Check:
   • EPS torque sensor resistance
   Out of specification → Replace the steering column.

ECA1XD1014

NOTICE

Make sure do not remove the torque sensor and its protector from the EPS unit.
a. Connect the pocket tester (Ω × 1k) to the EPS torque sensor coupler terminals as shown.

b. Measure the EPS torque sensor resistance.
TROUBLESHOOTING

10-1

GENERAL INFORMATION

10-1

STARTING FAILURES

10-1

INCORRECT ENGINE IDLING SPEED

10-1

POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

10-2

FAULTY DRIVE TRAIN

10-2

FAULTY GEAR SHIFTING

10-2

SHIFT LEVER DOES NOT MOVE

10-2

JUMPS OUT OF GEAR

10-2

FAULTY CLUTCH

10-3

OVERHEATING

10-3

OVERCOOLING

10-4

POOR BRAKING PERFORMANCE

10-4

FAULTY SHOCK ABSORBER ASSEMBLY

10-4

UNSTABLE HANDLING

10-4

FAULTY LIGHTING OR SIGNALING SYSTEM

10-4

SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE

10-5
TROUBLESHOOTING

GENERAL INFORMATION

TIP

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

STARTING 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 breather hose joint
   • Clogged fuel tank breather hose joint 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
   • 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 generator rotor woodruff key
6. Switches and wiring
   • Faulty main switch
   • Broken or shorted wiring
   • Faulty gear position switch
   • Improperly grounded circuit
   • Loose connections
   • Faulty brake light switch
7. Starting system
   • Faulty starter motor
   • Faulty starter relay
   • Faulty starter clutch

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
   • Faulty air induction system

Electrical system
1. Battery
   • Discharged battery
TROUBLESHOOTING

1. 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 generator rotor woodruff key

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.

FAULTY GEAR SHIFTING

Shifting is difficult
Refer to “FAULTY CLUTCH” on page 10-3.

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

JUMPS OUT OF GEAR

Shift forks
- Worn shift fork

Shift drum
- Incorrect axial play
- Worn shift drum groove

Transmission
- Worn gear dog
TROUBLESHOOTING

FAULTY CLUTCH

Engine operates but vehicle will not move
1. V-belt
   • Bent, damaged or worn V-belt
   • Slipping V-belt
2. Primary pulley cam and primary pulley slider
   • Damaged or worn primary pulley cam
   • Damaged or worn primary pulley slider
3. Clutch spring(s)
   • Damaged clutch spring
4. Transmission gear(s)
   • Damaged transmission gear

Clutch slips
1. Clutch spring(s)
   • Damaged, loose or worn clutch spring
2. Clutch shoe(s)
   • 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

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. Oil cooler
   • Clogged or damaged oil cooler
6. Hose(s) and pipe(s)
   • Damaged hose
   • Improperly connected hose
   • Damaged pipe
   • Improperly connected pipe

Fuel system
1. Throttle body
   • Faulty throttle body
   • Damaged or loose throttle body joint
2. Air filter
   • Clogged air filter element

Chassis
1. Brake(s)
   • Dragging brake

Electrical system
1. Spark plug
   • Incorrect spark plug gap
   • Incorrect spark plug heat range
2. Ignition system
   • Faulty ECU
3. Radiator fan
   • Faulty fan motor
   • Disconnected circuit breaker terminal
   • Faulty coolant temperature sensor
TROUBLESHOOTING

OVERCOOLING

Cooling system
1. Thermostat
   • Thermostat stays open

POOR BRAKING PERFORMANCE

• Worn brake pad
• Worn brake disc
• Air in hydraulic brake system
• Leaking brake fluid
• Faulty brake caliper kit
• Faulty brake caliper seal
• Loose union bolt
• Damaged brake hose
• Oil or grease on the brake disc
• Oil or grease on the brake pad
• Incorrect brake fluid level

FAULTY 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. Steering wheel
   • Bent or improperly installed steering wheel
2. Steering components
   • Incorrect toe-in
   • Bent steering shaft
   • Improperly installed steering shaft
   • Damaged bearing or bearing race
   • Bent tie-rods
   • Deformed steering knuckles
3. Shock absorber assembly(-ies)
   • Faulty shock absorber spring
   • Leaking oil or gas
4. Tire(s)
   • Uneven tire pressures (left and right)
   • Incorrect tire pressure
   • Uneven tire wear
5. Wheel(s)
   • Incorrect wheel balance
   • Damaged wheel bearing
   • Bent or loose wheel axle
   • Excessive wheel runout

6. Frame
   • Bent frame
   • Damaged frame

FAULTY LIGHTING OR SIGNALING SYSTEM

Headlight does not come on
• Wrong headlight bulb
• Too many electrical accessories
• Hard charging
• Incorrect connection
• Improperly grounded circuit
• Poor contacts (main or light switch)
• Burnt-out headlight bulb

Headlight bulb burnt out
• Wrong headlight bulb
• Faulty battery
• Faulty rectifier/regulator
• Improperly grounded circuit
• Faulty main switch
• Faulty light switch
• Headlight bulb life expired

Tail/brake light does not come on
• Wrong tail/brake light bulb
• Too many electrical accessories
• Incorrect connection
• Burnt-out tail/brake light bulb

Tail/brake light bulb burnt out
• Wrong tail/brake light bulb
• Faulty battery
• Faulty brake light switch
• Tail/brake light bulb life expired
• Faulty rectifier/regulator
• Improperly grounded circuit
## Self-diagnostic function table

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
<th>Reference pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.</td>
<td>9-38</td>
</tr>
<tr>
<td>13</td>
<td>Intake air pressure sensor: open or short circuit detected.</td>
<td>9-39</td>
</tr>
<tr>
<td>14</td>
<td>Intake air pressure sensor: hose system malfunction (clogged or detached hose).</td>
<td>9-41</td>
</tr>
<tr>
<td>15</td>
<td>Throttle position sensor: open or short circuit detected.</td>
<td>9-42</td>
</tr>
<tr>
<td>16</td>
<td>Throttle position sensor: stuck throttle position sensor is detected.</td>
<td>9-43</td>
</tr>
<tr>
<td>21</td>
<td>Coolant temperature sensor: open or short circuit detected.</td>
<td>9-44</td>
</tr>
<tr>
<td>22</td>
<td>Intake air temperature sensor: open or short circuit detected.</td>
<td>9-45</td>
</tr>
<tr>
<td>30</td>
<td>Latch up detected.</td>
<td>9-47</td>
</tr>
<tr>
<td>33</td>
<td>Ignition coil: open or short circuit detected in the primary lead of the ignition coil.</td>
<td>9-47</td>
</tr>
<tr>
<td>37</td>
<td>Component other than ISC (idle speed control) unit is defective (ISC operating sound is heard).</td>
<td>9-49</td>
</tr>
<tr>
<td></td>
<td>Defective ISC (idle speed control) unit (ISC operating sound is not heard).</td>
<td>9-50</td>
</tr>
<tr>
<td>39</td>
<td>Injector: open or short circuit detected.</td>
<td>9-52</td>
</tr>
<tr>
<td>41</td>
<td>Lean angle sensor: open or short circuit detected.</td>
<td>9-53</td>
</tr>
<tr>
<td>42</td>
<td>Speed sensor: no normal signals are received from the speed sensor.</td>
<td>9-54</td>
</tr>
<tr>
<td>43</td>
<td>Fuel system voltage: incorrect voltage supplied to the fuel injector and fuel pump.</td>
<td>9-55</td>
</tr>
<tr>
<td>44</td>
<td>EEPROM fault code number: an error is detected while reading or writing on EEPROM.</td>
<td>9-56</td>
</tr>
<tr>
<td>46</td>
<td>Charging voltage is abnormal.</td>
<td>9-57</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>
<td>9-58</td>
</tr>
<tr>
<td>Fault code No.</td>
<td>Item</td>
<td>Reference pages</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------------------------------</td>
<td>-----------------</td>
</tr>
<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>
<td>9-58</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>
<td>9-59</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>
<td>9-60</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.</td>
<td>9-61</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 position sensor signal</td>
<td>14–20</td>
<td>Check with throttle valve fully closed.</td>
</tr>
<tr>
<td></td>
<td>• Fully closed position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>Intake air pressure</td>
<td>Displays the intake air pressure.</td>
<td>Turn and hold the main switch in the “☕” (start) position, then press the accelerator pedal. (If the display value changes, the performance is OK.)</td>
</tr>
<tr>
<td>05</td>
<td>Intake air temperature</td>
<td>When engine is cold: Displays temperature closer to ambient temperature. When engine is hot: Displays ambient temperature 20 °C (68 °F).</td>
<td>Compare the actually measured intake air temperature with the display value.</td>
</tr>
<tr>
<td>06</td>
<td>Coolant temperature</td>
<td>When engine is cold: Displays temperature closer to ambient temperature. When engine is hot: Displays current coolant temperature.</td>
<td>Compare the actually measured coolant temperature with the display 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>Diagnostic code No.</td>
<td>Item</td>
<td>Display</td>
<td>Procedure</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------------------------------------</td>
<td>--------------------------</td>
<td>----------------------------------------------------------------</td>
</tr>
<tr>
<td>08</td>
<td>Lean angle sensor</td>
<td>Lean angle sensor output voltage</td>
<td>Remove the lean angle sensor and incline it more than 65 degrees.</td>
</tr>
<tr>
<td></td>
<td>• Upright</td>
<td>3.6–4.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Overturned</td>
<td>0.7–1.3</td>
<td></td>
</tr>
<tr>
<td>09</td>
<td>Fuel system voltage (battery voltage)</td>
<td>Approximately 12.0</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>21</td>
<td>Gear position switch</td>
<td>ON</td>
<td>Shift the transmission.</td>
</tr>
<tr>
<td></td>
<td>• Transmission is in neutral</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Transmission is in gear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>EEPROM fault code display</td>
<td>00</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>• No history</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• History exists</td>
<td>01 (Cylinder fault code)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>Malfunction history code display</td>
<td>00</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>• No history</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• History exists</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.)
### SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Display</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 62                  | Malfunction history code erasure  
  - No history  
  - History exists | 00  
  - 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.) | Save the malfunction history to the computer, and then delete the fault codes. |
| 70                  | Control number | 0–254 [-] | — |

#### Diagnostic code: actuator operation table

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Actuation</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 30                  | Ignition coil | Actuates the ignition coil five times at one-second intervals.  
  The “CHECK” indicator and “ ● ” on the Yamaha diagnostic tool screen come on each time the ignition coil is actuated. | Check that a spark is generated five times.  
  - Connect an ignition checker. |
| 36                  | Injector | Actuates the 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. | Check that the injector is actuated five times by listening for the operating sound. |
| 48                  | Air induction system solenoid | Actuates the air induction system solenoid five times at one-second intervals.  
  The “CHECK” indicator and “ ● ” on the Yamaha diagnostic tool screen come on each time the air induction system solenoid is actuated. | Check that the air induction system solenoid is actuated five times by listening for the operating sound. |
<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Actuation</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>Fuel injection system relay</td>
<td>Actuates the fuel injection system relay five times at one-second intervals.</td>
<td>Check that the fuel injection system relay unit is actuated five times by listening for the operating sound.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The “CHECK” indicator and “олуч” on the Yamaha diagnostic tool screen come on each time the relay is actuated.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(When the relay is on, the “CHECK” indicator and “луч” on the Yamaha diagnostic tool screen go off. When the relay is off, the “CHECK” indicator and “луч” on the Yamaha diagnostic tool screen come on.)</td>
<td></td>
</tr>
<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 “луч” on the Yamaha diagnostic tool screen come on each time the relay is actuated.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(When the relay is on, the “CHECK” indicator and “луч” on the Yamaha diagnostic tool screen go off. When the relay is off, the “CHECK” indicator and “луч” on the Yamaha diagnostic tool screen come on.)</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>ISC valve</td>
<td>Actuates and fully closes the ISC valve, then opens it to the stand-by opening position when the engine is started. This operation takes approximately 3 seconds until it is completed. The “CHECK” indicator and “луч” 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

1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Load control relay
5. Frame ground
6. Main switch
7. Engine ground
8. Battery
9. Main fuse
10. EPS fuse
11. Fuel injection system fuse
12. Starter relay
13. Starter motor
14. Fuel injection system relay
15. Air induction system solenoid
16. Differential motor relay 1
17. Differential motor
18. Gear position switch
19. On-Command four-wheel-drive switch
20. Yamaha diagnostic tool coupler
21. ISC (idle speed control) unit
22. ECU (engine control unit)
23. Ignition coil
24. Spark plug
25. Fuel injector
26. Intake air temperature sensor
27. Coolant temperature sensor
28. Speed sensor
29. TPS (throttle position sensor)
30. Intake air pressure sensor
31. Lean angle sensor
32. Parking brake switch
33. Reverse switch
34. Joint coupler
35. EPS unit
36. EPS motor
37. EPS torque sensor
38. EPS self-diagnosis signal connector
39. EPS (electric power steering) control unit
40. Seat belt switch
41. Indicator light assembly
42. Helmet indicator light
43. Seat belt indicator light
44. Meter assembly
45. Multi-function meter
46. Engine trouble warning light
47. Coolant temperature warning light
48. Parking brake indicator light
49. Reverse indicator light
50. Neutral indicator light
51. High-range indicator light
52. Low-range indicator light
53. On-Command differential gear lock indicator light
54. EPS warning light
55. Fuel sender
56. Fuel pump
57. Differential motor relay 2
58. Light switch
59. Headlight relay
60. Headlight
61. Auxiliary DC jack
62. Brake light switch
63. Tail/brake light
64. Radiator fan motor fuse
65. Differential motor fuse
66. Ignition fuse
67. Backup fuse
68. Signaling system fuse
69. Headlight fuse
70. Auxiliary DC jack fuse
71. Radiator fan motor
72. Radiator fan motor circuit breaker
73. Radiator fan motor relay
74. Horn switch (for Europe and Oceania)
75. Horn (for Europe and Oceania)
76. Backup light
77. Backup light relay
A. Optional
B. Wire harness
C. Negative battery sub-wire harness
D. EPS (electric power steering) control unit

COLOR CODE

B  Black
Br  Brown
G  Green
Gy  Gray
L  Blue
Lg  Light green
O  Orange
P  Pink
R  Red
Sb  Sky blue
W  White
Y  Yellow
B/G  Black/Green
B/L  Black/Blue
B/R  Black/Red
B/W  Black/White
B/Y  Black/Yellow
Br/B  Brown/Black
Br/L  Brown/Blue
Br/R  Brown/Red
Br/W  Brown/White
Br/Y  Brown/Yellow
G/R  Green/Red
G/W  Green/White
G/Y  Green/Yellow
Gy/G  Gray/Green
L/B  Blue/Black
L/R  Blue/Red
L/W  Blue/White
L/Y  Blue/Yellow
O/B  Orange/Black
O/L  Orange/Blue
O/W  Orange/White
P/L  Pink/Blue
P/W  Pink/White
R/B  Red/Black
R/G  Red/Green
R/L  Red/Blue
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W/R  White/Red
Y/B  Yellow/Black
Y/G  Yellow/Green
Y/L  Yellow/Blue
Y/R  Yellow/Red
Y/W  Yellow/White