Information Layout

In the bookmarks to the left you will find the information divided into different color coded segments:

**Primary Information**

This is the core information for this vehicle. Use this segment as your major point of reference and information.

**Supplementary Information** (if available)

These segments are updates and additions to the core information. They are added as needed when certain changes are made to the model. Be sure to check these for additional information that may be lacking from the core information section.
SYMBOLS

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

**TIP**

The following symbols are not relevant to every vehicle.

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

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EAS0130
IDENTIFICATION

EAS0140
VEHICLE IDENTIFICATION NUMBER
The vehicle identification number “1” is stamped into the front left side of the frame.

EAS0150
MODEL LABEL
The model label “1” is affixed to the location shown in the illustration. 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 with 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.

1. ECU (engine control unit) 9. Fuel injector
2. Lean angle sensor 10. Fuel pump
3. Fuel injection system relay 11. Speed sensor
4. Engine trouble warning light 12. Crankshaft position sensor
5. ISC (idle speed control) unit 13. Coolant temperature sensor
6. Intake air pressure sensor 14. Spark plug
7. TPS (throttle position sensor) 15. Ignition coil
8. Intake air temperature sensor

12 3 4 6 7 8 9 1 0
5
11 12 13 14 15
169x144
1.1234678910
339x174
1112131415
263x417
5
74x144
1.1234678910
339x174
1112131415
263x417
5
74x144
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1.1234678910
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263x417
5
74x144
1.1234678910
339x174
1112131415
263x417
5

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 only 324 kPa (3.24 kgf/cm², 46.1 psi). 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.
FEATURES

OUTLINE OF THE EPS (ELECTRIC POWER STEERING) SYSTEM (YFM5FGP/YFM7FGP only)
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**NOTICE**

To prevent accidental damage to the EPS unit, it must not be disassembled.
EPS (ELECTRIC POWER STEERING) SYSTEM BLOCK DIAGRAM (YFM5FGP/YFM7FGP only)
1. EPS unit
2. Torque sensor
3. EPS motor
4. EPS control unit
5. Battery
6. Engine rpm signal
7. Coolant temperature sensor signal
8. Crankshaft position sensor signal
9. Speed sensor signal
10. ECU (engine control unit)
11. Intake air temperature sensor signal
12. Throttle position sensor signal
13. Intake air pressure sensor signal
14. Lean angle sensor signal
15. Ignition coil
16. Fuel pump
17. Fuel injector
18. Meter assembly
   • Multifunction display:
     Speedometer/Odometer/Tripmeter A/Tripmeter B/Clock/Fuel meter/Gear position
   • Indicator and warning lights: EPS warning/Engine trouble warning/Coolant temperature warning/Reverse indicator/Neutral indicator/Park indicator/High-range indicator/Low-range indicator/Differential lock
   • FI and EPS self-diagnostic fault codes
INSTRUMENT FUNCTIONS

Multifunction display

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

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

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

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

Clock mode
Pushing the “CLOCK” button switches the display between the clock mode “CLOCK” and the hour meter mode “HOUR” in the following order: CLOCK → HOUR → CLOCK
To set the clock:
1. Set the display to the clock mode.
2. Push the “SELECT” button and “RESET” button together for at least three seconds.
3. When the hour digits start flashing, push the “RESET” button to set the hours.
4. Push the “SELECT” button, and the minute digits will start flashing.
5. Push the “RESET” button to set the minutes.
6. Push the “SELECT” button and then release it to start the clock.

Fuel meter

1. Fuel level warning indicator
2. Fuel meter
3. “E” segment

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

TIP
This fuel meter is equipped with a self-diagnosis system. If the electrical circuit is defective, all the display segments and fuel level warning indicator will start flashing. If this occurs, check the electrical circuit.
Refer to “SIGNALING SYSTEM” on page 9-19.
Self-diagnosis device

1. Fault code display

This model is equipped with a self-diagnosis device for various electrical circuits. If any of those circuits are defective, the multifunction display will indicate a two-digit fault code. If the multifunction display indicates such a fault code, note the code number, and check the vehicle.

**NOTICE**

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

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

2. Use only the proper tools and cleaning equipment. Refer to “SPECIAL TOOLS” on page 1-14.

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

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

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

REPLACEMENT PARTS

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

GASKETS, OIL SEALS AND O-RINGS

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

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

LOCK WASHERS/PLATES AND COTTER PINS

After removal, replace all lock washers/plates “1” and cotter pins. After the bolt or nut has been tightened to specification, bend the lock tabs along a flat of the bolt or nut.
BEARINGS AND OIL SEALS
Install bearings “1” and oil seals “2” so that the manufacturer marks or numbers are visible.
When installing oil seals “2”, lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.

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

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

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

1. Disconnect:
   - Lead
   - Coupler
   - Connector

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

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

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

4. Connect:
   - Lead
   - Coupler
   - Connector

   TIP
   Make sure all connections are tight.

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

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country. When placing an order, refer to the list provided below to avoid any mistakes.

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

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</tr>
<tr>
<td>90890-04081</td>
<td>90890-04081</td>
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<tr>
<td>Pot spacer</td>
<td>YM-91044</td>
<td></td>
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<tr>
<td>YM-91044</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spacer</td>
<td><img src="image5" alt="Spacer" /></td>
<td>5-72</td>
</tr>
<tr>
<td>90890-01309</td>
<td>φ35</td>
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<tr>
<td>Pot spacer</td>
<td>YU-90059</td>
<td></td>
</tr>
<tr>
<td>Coupling gear/middle shaft tool</td>
<td><img src="image6" alt="Coupling gear/middle shaft tool" /></td>
<td>5-82, 5-85</td>
</tr>
<tr>
<td>90890-01229</td>
<td>25×22×1.6</td>
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</tr>
<tr>
<td>Gear holder</td>
<td>41.7×35×1.5</td>
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<tr>
<td>YM-01229</td>
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<tr>
<td>Tool name/Tool No.</td>
<td>Illustration</td>
<td>Reference pages</td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
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</tr>
<tr>
<td>Bearing retainer wrench</td>
<td><img src="image1" alt="Bearing retainer wrench" /></td>
<td>5-83, 5-84</td>
</tr>
<tr>
<td>90890-04128</td>
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<tr>
<td>Middle gear bearing retainer</td>
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<tr>
<td>YM-04128</td>
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<tr>
<td>Ring nut wrench</td>
<td><img src="image2" alt="Ring nut wrench" /></td>
<td>5-83, 5-84</td>
</tr>
<tr>
<td>90890-01430</td>
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<tr>
<td>YM-38404</td>
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<tr>
<td>Final gear backlash band</td>
<td><img src="image3" alt="Final gear backlash band" /></td>
<td>5-86, 8-29</td>
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<tr>
<td>90890-01511</td>
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<tr>
<td>Middle drive gear lash tool</td>
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<tr>
<td>YM-01230</td>
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<tr>
<td>Radiator cap tester</td>
<td><img src="image4" alt="Radiator cap tester" /></td>
<td>6-3</td>
</tr>
<tr>
<td>90890-01325</td>
<td><img src="image5" alt="Radiator cap tester illustration" /></td>
<td>6-3</td>
</tr>
<tr>
<td>Radiator pressure tester</td>
<td></td>
<td></td>
</tr>
<tr>
<td>YU-24460-01</td>
<td><img src="image6" alt="YU-24460-01" /></td>
<td>6-3</td>
</tr>
<tr>
<td>Radiator cap tester adapter</td>
<td><img src="image7" alt="Radiator cap tester adapter illustration" /></td>
<td>6-3</td>
</tr>
<tr>
<td>90890-01352</td>
<td><img src="image8" alt="90890-01352" /></td>
<td>6-3</td>
</tr>
<tr>
<td>Radiator pressure tester adapter</td>
<td><img src="image9" alt="Radiator pressure tester adapter" /></td>
<td>6-3</td>
</tr>
<tr>
<td>YU-33984</td>
<td><img src="image10" alt="YU-33984" /></td>
<td>6-3</td>
</tr>
<tr>
<td>Mechanical seal installer</td>
<td><img src="image11" alt="Mechanical seal installer" /></td>
<td>6-9</td>
</tr>
<tr>
<td>90890-04132</td>
<td><img src="image12" alt="90890-04132" /></td>
<td>6-9</td>
</tr>
<tr>
<td>Water pump seal installer</td>
<td><img src="image13" alt="Water pump seal installer" /></td>
<td>6-9</td>
</tr>
<tr>
<td>YM-33221-A</td>
<td><img src="image14" alt="YM-33221-A" /></td>
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</tr>
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</table>

Note: The tool images are placeholders and should be replaced with actual images from the source document.
<table>
<thead>
<tr>
<th>Tool name/Tool No.</th>
<th>Illustration</th>
<th>Reference pages</th>
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<tbody>
<tr>
<td>Middle driven shaft bearing driver</td>
<td></td>
<td>6-9</td>
</tr>
<tr>
<td>90890-04058</td>
<td></td>
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<tr>
<td>Bearing driver 40 mm</td>
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<tr>
<td>YM-04058</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure gauge</td>
<td></td>
<td>7-7</td>
</tr>
<tr>
<td>90890-03153</td>
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<td></td>
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<tr>
<td>YU-03153</td>
<td></td>
<td></td>
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<tr>
<td>Fuel pressure adapter</td>
<td></td>
<td>7-7</td>
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<tr>
<td>90890-03176</td>
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<tr>
<td>YM-03176</td>
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<td></td>
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<tr>
<td>Boots band installation tool</td>
<td></td>
<td>8-9, 8-11, 8-22,</td>
</tr>
<tr>
<td>90890-01526</td>
<td></td>
<td>8-24</td>
</tr>
<tr>
<td>YM-01526</td>
<td></td>
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<tr>
<td>Ring gear fix bolt (M10)</td>
<td></td>
<td>8-13</td>
</tr>
<tr>
<td>90890-01527</td>
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<td></td>
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<tr>
<td>YM-01527</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gear lash measurement tool</td>
<td></td>
<td>8-13</td>
</tr>
<tr>
<td>90890-01475</td>
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<tr>
<td>Middle drive gear lash tool</td>
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<tr>
<td>YM-01475</td>
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<tr>
<td>Ring gear fix bolt (M14)</td>
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<td>8-29</td>
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<tr>
<td>90890-01524</td>
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<tr>
<td>YM-01524</td>
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<tr>
<td>Ignition checker</td>
<td></td>
<td>9-91</td>
</tr>
<tr>
<td>90890-06754</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opama pet-4000 spark checker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>YM-34487</td>
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### GENERAL SPECIFICATIONS

#### Model
- **Model**: 28P1, 28P5 (YFM5FGY)
- **Model**: 34D1, 34D5, 34D8 (YFM5FGPY)
- **Model**: 5C0A, 5C0C (YFM7FGY)
- **Model**: 43P1, 43P5, 43P8, 43PA (YFM7FGPY)

#### Dimensions
- **Overall length**: 2065 mm (81.3 in)
- **Overall width**: 1180 mm (46.5 in)
- **Overall height**: 1240 mm (48.8 in)
- **Seat height**: 905 mm (35.6 in)
- **Wheelbase**: 1250 mm (49.2 in)
- **Ground clearance**: 275 mm (10.8 in)
- **Minimum turning radius**: 3200 mm (126 in)

#### Weight
- **With oil and fuel**: 294.0 kg (648 lb)
- **Maximum loading limit**: 220.0 kg (485 lb)
  
  *(Total weight of rider, cargo, accessories, and tongue)*
<table>
<thead>
<tr>
<th>Engine Specifications</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engine</strong></td>
<td></td>
</tr>
<tr>
<td>Engine type</td>
<td>Liquid cooled 4-stroke, SOHC</td>
</tr>
<tr>
<td>Displacement</td>
<td>558.0 cm³ (YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>686.0 cm³ (YFM7FGY/YFM7FGPY)</td>
</tr>
<tr>
<td>Cylinder arrangement</td>
<td>Forward-inclined single cylinder</td>
</tr>
<tr>
<td>Bore × stroke</td>
<td>92.0 × 84.0 mm (3.62 × 3.31 in) (YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>102.0 × 84.0 mm (4.02 × 3.31 in) (YFM7FGY/YFM7FGPY)</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>9.30 :1 (YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>9.20 :1 (YFM7FGY/YFM7FGPY)</td>
</tr>
<tr>
<td>Standard compression pressure (at sea level)</td>
<td>480 kPa (4.8 kgf/cm², 68.3 psi) (YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>450 kPa (4.5 kgf/cm², 64.0 psi) (YFM7FGY/YFM7FGPY)</td>
</tr>
<tr>
<td>Minimum–maximum</td>
<td>420–540 kPa (4.2–5.4 kgf/cm², 59.7–76.8 psi) (YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>390–500 kPa (3.9–5.0 kgf/cm², 55.5–71.1 psi) (YFM7FGY/YFM7FGPY)</td>
</tr>
<tr>
<td>Starting system</td>
<td>Electric starter</td>
</tr>
<tr>
<td><strong>Fuel</strong></td>
<td></td>
</tr>
<tr>
<td>Recommended fuel</td>
<td>Unleaded gasoline only</td>
</tr>
<tr>
<td>Fuel tank capacity</td>
<td>20.0 L (5.28 US gal, 4.40 Imp.gal)</td>
</tr>
<tr>
<td>Fuel reserve amount</td>
<td>4.5 L (1.19 US gal, 0.99 Imp.gal)</td>
</tr>
<tr>
<td><strong>Engine oil</strong></td>
<td></td>
</tr>
<tr>
<td>Lubrication system</td>
<td>Wet sump</td>
</tr>
<tr>
<td>Type</td>
<td>YAMALUBE 4 5W-30 or 10W-40 or 20W-50, SAE 5W-30 or SAE 10W-40 or SAE 20W-50</td>
</tr>
<tr>
<td>Recommended engine oil grade</td>
<td>API service SG type or higher, JASO standard MA</td>
</tr>
<tr>
<td>Engine oil quantity</td>
<td></td>
</tr>
<tr>
<td>Total amount</td>
<td>2.40 L (2.54 US qt, 2.11 Imp.qt)</td>
</tr>
<tr>
<td>Without oil filter cartridge replacement</td>
<td>2.00 L (2.11 US qt, 1.76 Imp.qt)</td>
</tr>
<tr>
<td>With oil filter cartridge replacement</td>
<td>2.10 L (2.22 US qt, 1.85 Imp.qt)</td>
</tr>
<tr>
<td>Oil pressure (hot)</td>
<td>50.0 kPa/1600 r/min (0.50 kgf/cm²/1600 r/min, 7.3 psi/1600 r/min)</td>
</tr>
<tr>
<td><strong>Final gear oil</strong></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>SAE 80 API GL-4 Hypoid gear oil</td>
</tr>
<tr>
<td>Total amount</td>
<td>0.25 L (0.26 US qt, 0.22 Imp.qt)</td>
</tr>
<tr>
<td>Periodic oil change</td>
<td>0.20 L (0.21 US qt, 0.18 Imp.qt)</td>
</tr>
<tr>
<td><strong>Differential gear oil</strong></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>SAE 80 API GL-4 Hypoid gear oil</td>
</tr>
<tr>
<td>Total amount</td>
<td>0.23 L (0.24 US qt, 0.20 Imp.qt)</td>
</tr>
<tr>
<td>Periodic oil change</td>
<td>0.22 L (0.23 US qt, 0.19 Imp.qt)</td>
</tr>
</tbody>
</table>
## ENGINE SPECIFICATIONS

### Oil filter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Oil filter type</td>
<td>Cartridge (paper)</td>
</tr>
</tbody>
</table>

### Oil pump

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil pump type</td>
<td>Trochoid</td>
</tr>
<tr>
<td>Inner-rotor-to-outer-rotor-tip clearance Limit</td>
<td>Less than 0.12 mm (0.0047 in)</td>
</tr>
<tr>
<td>Outer-rotor-to-oil-pump-housing clearance Limit</td>
<td>0.24 mm (0.0094 in)</td>
</tr>
<tr>
<td>Outer-rotor-to-oil-pump-housing clearance Limit</td>
<td>0.20 mm (0.0079 in)</td>
</tr>
<tr>
<td>Oil-pump-housing-to-inner-and-outer-rotor clearance Limit</td>
<td>0.090–0.170 mm (0.0035–0.0067 in)</td>
</tr>
<tr>
<td>Pressure check location</td>
<td>Cylinder head</td>
</tr>
</tbody>
</table>

### Cooling system

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiator capacity (including all routes)</td>
<td>1.99 L (2.10 US qt, 1.75 Imp.qt)</td>
</tr>
<tr>
<td>Coolant reservoir capacity (up to the maximum level mark)</td>
<td>0.24 L (0.25 US qt, 0.21 Imp.qt)</td>
</tr>
<tr>
<td>From low to full level</td>
<td>0.14 L (0.15 US qt, 0.12 Imp.qt)</td>
</tr>
<tr>
<td>Radiator cap opening pressure</td>
<td>93.3–122.7 kPa (0.95–1.25 kgf/cm², 13.5–17.8 psi)</td>
</tr>
<tr>
<td>Valve relief pressure</td>
<td>4.9 kPa (0.05 kgf/cm², 0.7 psi)</td>
</tr>
<tr>
<td>Thermostat</td>
<td>3B4/NIPPON THERMOSTAT</td>
</tr>
<tr>
<td>Valve opening temperature</td>
<td>50–54 °C (122–129 °F)</td>
</tr>
<tr>
<td>Valve full open temperature</td>
<td>70 °C (158 °F)</td>
</tr>
<tr>
<td>Valve lift (full open)</td>
<td>7.0 mm (0.28 in)</td>
</tr>
<tr>
<td>Radiator core</td>
<td>248.2 mm (9.77 in)</td>
</tr>
<tr>
<td>Water pump</td>
<td>Single suction centrifugal pump</td>
</tr>
<tr>
<td>Reduction ratio</td>
<td>32/31 (1.032)</td>
</tr>
<tr>
<td>Impeller shaft tilt limit</td>
<td>0.15 mm (0.006 in)</td>
</tr>
</tbody>
</table>

### Spark plug

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Manufacturer/model</td>
<td>NGK/LMAR6A-9</td>
</tr>
<tr>
<td>Spark plug gap</td>
<td>0.8–0.9 mm (0.031–0.035 in)</td>
</tr>
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</table>

### Cylinder head

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>51.40–54.40 cm³ (YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>56.70–60.30 cm³ (YFM7FGY/YFM7FGPY)</td>
</tr>
<tr>
<td>Warpage limit</td>
<td>0.03 mm (0.0012 in)</td>
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</tbody>
</table>

### Camshaft

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Drive system</td>
<td>Chain drive (left)</td>
</tr>
</tbody>
</table>
### Camshaft lobe dimensions

<table>
<thead>
<tr>
<th>Part</th>
<th>Dimension Range</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake A</td>
<td>43.488–43.588 mm</td>
<td>43.388 mm</td>
</tr>
<tr>
<td>Intake B</td>
<td>36.959–37.059 mm</td>
<td>36.859 mm</td>
</tr>
<tr>
<td>Exhaust A</td>
<td>43.129–43.229 mm</td>
<td>43.029 mm</td>
</tr>
<tr>
<td>Exhaust B</td>
<td>37.007–37.107 mm</td>
<td>36.907 mm</td>
</tr>
</tbody>
</table>

Camshaft runout limit: 0.015 mm (0.0006 in)

### Timing chain

- **Model/number of links**: 98XRH2010/126
- **Tensioning system**: Automatic

### Rocker arm/rocker arm shaft

<table>
<thead>
<tr>
<th>Part</th>
<th>Dimension Range</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rocker arm inside diameter</td>
<td>12.000–12.018 mm</td>
<td></td>
</tr>
<tr>
<td>Rocker arm shaft outside diameter</td>
<td>11.981–11.991 mm</td>
<td></td>
</tr>
<tr>
<td>Rocker-arm-to-rocker-arm-shaft clearance</td>
<td>0.009–0.037 mm</td>
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</table>

### Valve, valve seat, valve guide

#### Valve clearance (cold)

<table>
<thead>
<tr>
<th>Part</th>
<th>Clearance Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake</td>
<td>0.09–0.13 mm</td>
</tr>
<tr>
<td>Exhaust</td>
<td>0.16–0.20 mm</td>
</tr>
</tbody>
</table>

#### Valve dimensions

<table>
<thead>
<tr>
<th>Part</th>
<th>Dimension Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve head diameter A (intake)</td>
<td>32.90–33.10 mm</td>
</tr>
<tr>
<td>Valve head diameter A (exhaust)</td>
<td>27.90–28.10 mm</td>
</tr>
</tbody>
</table>

Valve face width B (intake): 2.26 mm (0.0890 in)
<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve face width B (exhaust)</td>
<td>2.26 mm (0.0890 in)</td>
</tr>
<tr>
<td>Valve seat width C (intake)</td>
<td>1.00–1.20 mm (0.0394–0.0472 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>1.60 mm (0.0630 in)</td>
</tr>
<tr>
<td>Valve seat width C (exhaust)</td>
<td>1.00–1.20 mm (0.0394–0.0472 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>1.60 mm (0.0630 in)</td>
</tr>
<tr>
<td>Valve margin thickness D (intake)</td>
<td>0.80–1.20 mm (0.0315–0.0472 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.4 mm (0.02 in)</td>
</tr>
<tr>
<td>Valve margin thickness D (exhaust)</td>
<td>0.80–1.20 mm (0.0315–0.0472 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.4 mm (0.02 in)</td>
</tr>
<tr>
<td>Valve stem diameter (intake)</td>
<td>5.975–5.990 mm (0.2352–0.2358 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>5.945 mm (0.2341 in)</td>
</tr>
<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>
</tbody>
</table>

**Valve spring**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<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>
</tbody>
</table>
### Spring Rate

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1 (intake)</td>
<td>34.18</td>
<td>N/mm</td>
</tr>
<tr>
<td></td>
<td>3.49</td>
<td>kgf</td>
</tr>
<tr>
<td></td>
<td>195.16</td>
<td>lbf</td>
</tr>
<tr>
<td>K2 (intake)</td>
<td>44.14</td>
<td>N/mm</td>
</tr>
<tr>
<td></td>
<td>4.50</td>
<td>kgf</td>
</tr>
<tr>
<td></td>
<td>252.04</td>
<td>lbf</td>
</tr>
<tr>
<td>K1 (exhaust)</td>
<td>34.18</td>
<td>N/mm</td>
</tr>
<tr>
<td></td>
<td>3.49</td>
<td>kgf</td>
</tr>
<tr>
<td></td>
<td>195.16</td>
<td>lbf</td>
</tr>
<tr>
<td>K2 (exhaust)</td>
<td>44.14</td>
<td>N/mm</td>
</tr>
<tr>
<td></td>
<td>4.50</td>
<td>kgf</td>
</tr>
<tr>
<td></td>
<td>252.04</td>
<td>lbf</td>
</tr>
</tbody>
</table>

### Installed Compression Spring Force

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(intake)</td>
<td>171.00–197.00</td>
<td>N (17.44–20.09 kgf, 38.44–44.29 lbf)</td>
</tr>
<tr>
<td>(exhaust)</td>
<td>171.00–197.00</td>
<td>N (17.44–20.09 kgf, 38.44–44.29 lbf)</td>
</tr>
</tbody>
</table>

### Spring Tilt

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(intake)</td>
<td>2.5°/1.80 mm</td>
</tr>
<tr>
<td>(exhaust)</td>
<td>2.5°/1.80 mm</td>
</tr>
</tbody>
</table>

### Winding Direction

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>(intake)</td>
<td>Clockwise</td>
</tr>
<tr>
<td>(exhaust)</td>
<td>Clockwise</td>
</tr>
</tbody>
</table>

### Cylinder

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bore</td>
<td>92.000–92.010 mm (3.6220–3.6224 in)</td>
</tr>
<tr>
<td></td>
<td>(YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>102.000–102.010 mm (4.0157–4.0161 in)</td>
</tr>
<tr>
<td></td>
<td>(YFM7FGY/YFM7FGPY)</td>
</tr>
<tr>
<td>Wear limit</td>
<td>92.080 mm (3.6252 in)</td>
</tr>
<tr>
<td></td>
<td>(YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>102.080 mm (4.0189 in)</td>
</tr>
<tr>
<td></td>
<td>(YFM7FGY/YFM7FGPY)</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>

### Piston

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</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>Limit</td>
<td>0.10 mm (0.0039 in) (YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>0.13 mm (0.0051 in) (YFM7FGY/YFM7FGPY)</td>
</tr>
<tr>
<td>Diameter D</td>
<td>91.955–91.970 mm (3.6203–3.6209 in)</td>
</tr>
<tr>
<td></td>
<td>(YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>101.955–101.970 mm (4.0140–4.0146 in)</td>
</tr>
<tr>
<td></td>
<td>(YFM7FGY/YFM7FGPY)</td>
</tr>
<tr>
<td>Height H</td>
<td>10.0 mm (0.39 in)</td>
</tr>
<tr>
<td>Offset</td>
<td>0.50 mm (0.0197 in)</td>
</tr>
<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>
</tbody>
</table>
## ENGINE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Limit</th>
<th>22.971 mm (0.9044 in)</th>
</tr>
</thead>
</table>
| Piston-pin-to-piston-pin-bore clearance Limit | 0.004–0.024 mm (0.0002–0.0009 in) | 0.0740 mm (0.0029 in)

### Piston ring

**Top ring**
- **Ring type**: Barrel
- **Dimensions (B × T)**:
  - 1.20 × 3.50 mm (0.05 × 0.14 in) (YFM5FGY/YFM5FGPY)
  - 1.20 × 3.80 mm (0.05 × 0.15 in) (YFM7FGY/YFM7FGPY)

- **End 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**
- **Ring type**: Taper
- **Dimensions (B × T)**: 1.20 × 4.00 mm (0.05 × 0.16 in)

- **End gap (installed)**: 0.75–0.90 mm (0.03–0.04 in)
- **Limit**: 1.25 mm (0.049 in)
- **Ring side clearance**: 0.020–0.060 mm (0.0008–0.0024 in)
  - (YFM5FGY/YFM5FGPY)
  - 0.030–0.070 mm (0.0012–0.0028 in)
  - (YFM7FGY/YFM7FGPY)
  - **Limit**: 0.12 mm (0.0047 in) (YFM5FGY/YFM5FGPY)
  - 0.13 mm (0.0051 in) (YFM7FGY/YFM7FGPY)

**Oil ring**
- **Dimensions (B × T)**:
  - 2.00 × 2.80 mm (0.08 × 0.11 in) (YFM5FGY/YFM5FGPY)
  - 2.50 × 2.80 mm (0.10 × 0.11 in) (YFM7FGY/YFM7FGPY)

- **End gap (installed)**: 0.20–0.70 mm (0.01–0.03 in)
- **Ring side clearance**: 0.04–0.13 mm (0.0016–0.0051 in)
  - (YFM5FGY/YFM5FGPY)
  - 0.060–0.150 mm (0.0024–0.0059 in)
  - (YFM7FGY/YFM7FGPY)

**Crankshaft**
- **Width A**: 74.95–75.00 mm (2.951–2.953 in)
### ENGINE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runout limit C</td>
<td>0.030 mm (0.0012 in)</td>
</tr>
<tr>
<td>Big end side clearance D</td>
<td>0.350–0.650 mm (0.0138–0.0256 in)</td>
</tr>
</tbody>
</table>

#### Balancer

- **Balancer drive method**: Gear

#### Automatic centrifugal clutch

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clutch type</td>
<td>Wet, centrifugal automatic</td>
</tr>
<tr>
<td>Clutch shoe thickness</td>
<td>1.5 mm (0.06 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>1.0 mm (0.04 in)</td>
</tr>
<tr>
<td>Clutch-in revolution</td>
<td>2000–2100 r/min (YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td>Clutch-stall revolution</td>
<td>3500–3600 r/min (YFM5FGY/YFM5FGPY)</td>
</tr>
</tbody>
</table>

#### V-belt

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-belt width</td>
<td>33.3 mm (1.31 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>30.0 mm (1.18 in)</td>
</tr>
</tbody>
</table>

#### Transmission

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission type</td>
<td>V-belt automatic</td>
</tr>
<tr>
<td>Primary reduction system</td>
<td>V-belt</td>
</tr>
<tr>
<td>Secondary reduction system</td>
<td>Shaft drive</td>
</tr>
<tr>
<td>Secondary reduction ratio</td>
<td>$41/21 \times 24/18 \times 33/9$ (9.544)</td>
</tr>
<tr>
<td>Operation</td>
<td>Left hand operation</td>
</tr>
<tr>
<td>Single speed automatic</td>
<td>2.380–0.700 :1</td>
</tr>
<tr>
<td>Low range</td>
<td>31/16 (1.938)</td>
</tr>
<tr>
<td>High range</td>
<td>31/27 (1.148)</td>
</tr>
<tr>
<td>Reverse gear</td>
<td>$23/14 \times 28/23$ (2.000)</td>
</tr>
<tr>
<td>Drive axle runout limit</td>
<td>0.06 mm (0.0024 in)</td>
</tr>
</tbody>
</table>

#### Shifting mechanism

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift mechanism type</td>
<td>Shift drum and guide bar</td>
</tr>
<tr>
<td>Shift fork-R, -L thickness</td>
<td>5.76–5.89 mm (0.227–0.232 in)</td>
</tr>
</tbody>
</table>

#### Decompression device

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device type</td>
<td>Auto decomp</td>
</tr>
</tbody>
</table>

#### Air filter

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air filter element</td>
<td>Wet element</td>
</tr>
<tr>
<td>Air filter oil grade</td>
<td>Foam air filter oil</td>
</tr>
</tbody>
</table>
### Fuel pump

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump type</td>
<td>Electrical</td>
</tr>
<tr>
<td>Model/manufacturer</td>
<td>3B4/DENSO</td>
</tr>
</tbody>
</table>

### Throttle body

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type/quantity</td>
<td>40EIS/1</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>MIKUNI</td>
</tr>
<tr>
<td>ID mark</td>
<td>28P1 00 (YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>43P1 00 (YFM7FGY/YFM7FGPY)</td>
</tr>
<tr>
<td>Throttle valve size</td>
<td>#50</td>
</tr>
</tbody>
</table>

### Fuel injector

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model/quantity</td>
<td>297510–1010/1</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>DENSO</td>
</tr>
</tbody>
</table>

### Idling condition

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine idling speed</td>
<td>1550–1650 r/min</td>
</tr>
<tr>
<td>Intake vacuum</td>
<td>33.0 kPa (248 mmHg, 9.7 inHg) (YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>35.0 kPa (263 mmHg, 10.3 inHg) (YFM7FGY/YFM7FGPY)</td>
</tr>
<tr>
<td>Water temperature</td>
<td>85.0–95.0 °C (185.0–203.0 °F) (YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>75.0–85.0 °C (167.0–185.0 °F) (YFM7FGY/YFM7FGPY)</td>
</tr>
<tr>
<td>Oil temperature</td>
<td>80.0–90.0 °C (176.0–194.0 °F) (YFM5FGY/YFM5FGPY)</td>
</tr>
<tr>
<td></td>
<td>55.0–65.0 °C (131.00–149.0 °F) (YFM7FGY/YFM7FGPY)</td>
</tr>
<tr>
<td>Throttle lever free play</td>
<td>3.0–5.0 mm (0.12–0.20 in)</td>
</tr>
<tr>
<td>Speed limiter length</td>
<td>Less than 12 mm (0.47 in)</td>
</tr>
</tbody>
</table>

### Shaft drive

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle gear backlash</td>
<td>0.10–0.30 mm (0.004–0.012 in)</td>
</tr>
<tr>
<td>Final gear backlash</td>
<td>0.10–0.20 mm (0.004–0.008 in)</td>
</tr>
<tr>
<td>Differential gear backlash</td>
<td>0.05–0.25 mm (0.002–0.010 in)</td>
</tr>
</tbody>
</table>
## Chassis Specifications

<table>
<thead>
<tr>
<th>Chassis</th>
<th>Frame type</th>
<th>Steel tube frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caster angle</td>
<td>5.0°</td>
<td></td>
</tr>
<tr>
<td>Camber angle</td>
<td>0.0°</td>
<td></td>
</tr>
<tr>
<td>Kingpin angle</td>
<td>11.0°</td>
<td></td>
</tr>
<tr>
<td>Kingpin offset</td>
<td>0.0 mm (0.00 in)</td>
<td></td>
</tr>
<tr>
<td>Trail</td>
<td>26.0 mm (1.02 in)</td>
<td></td>
</tr>
<tr>
<td>Tread rear (STD)</td>
<td>915.0 mm (36.02 in)</td>
<td></td>
</tr>
<tr>
<td>Tread front (STD)</td>
<td>940.0 mm (37.01 in)</td>
<td></td>
</tr>
<tr>
<td>Toe-in (with tire touching the ground)</td>
<td>0.0–10.0 mm (0.00–0.39 in)</td>
<td></td>
</tr>
</tbody>
</table>

### Front Wheel

<table>
<thead>
<tr>
<th>Wheel type</th>
<th>Panel wheel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rim size</td>
<td>12 × 6.0 AT</td>
</tr>
<tr>
<td>Rim material</td>
<td>Steel (for models equipped with steel wheels)</td>
</tr>
<tr>
<td></td>
<td>Aluminum (for models equipped with aluminum wheels)</td>
</tr>
<tr>
<td>Wheel travel</td>
<td>180 mm (7.1 in)</td>
</tr>
<tr>
<td>Radial wheel runout limit</td>
<td>2.0 mm (0.08 in)</td>
</tr>
<tr>
<td>Lateral wheel runout limit</td>
<td>2.0 mm (0.08 in)</td>
</tr>
</tbody>
</table>

### Rear Wheel

<table>
<thead>
<tr>
<th>Wheel type</th>
<th>Panel wheel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rim size</td>
<td>12 × 7.5 AT</td>
</tr>
<tr>
<td>Rim material</td>
<td>Steel (for models equipped with steel wheels)</td>
</tr>
<tr>
<td></td>
<td>Aluminum (for models equipped with aluminum wheels)</td>
</tr>
<tr>
<td>Wheel travel</td>
<td>230 mm (9.1 in)</td>
</tr>
<tr>
<td>Radial wheel runout limit</td>
<td>2.0 mm (0.08 in)</td>
</tr>
<tr>
<td>Lateral wheel runout limit</td>
<td>2.0 mm (0.08 in)</td>
</tr>
</tbody>
</table>

### Front Tire

<table>
<thead>
<tr>
<th>Type</th>
<th>Tubeless</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>AT25 × 8–12</td>
</tr>
<tr>
<td>Manufacturer/model</td>
<td>DUNLOP/KT421</td>
</tr>
<tr>
<td>Wear limit (front)</td>
<td>3 mm (0.12 in)</td>
</tr>
</tbody>
</table>

### Rear Tire

<table>
<thead>
<tr>
<th>Type</th>
<th>Tubeless</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>AT25 × 10–12</td>
</tr>
<tr>
<td>Manufacturer/model</td>
<td>DUNLOP/KT425</td>
</tr>
<tr>
<td>Wear limit (rear)</td>
<td>3 mm (0.12 in)</td>
</tr>
</tbody>
</table>

### Tire Air Pressure (measured on cold tires)

<table>
<thead>
<tr>
<th>Type</th>
<th>Recommended</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td>35 kPa (0.35 kgf/cm², 5.0 psi)</td>
<td>32 kPa (0.32 kgf/cm², 4.6 psi)</td>
</tr>
<tr>
<td>Rear</td>
<td>30 kPa (0.30 kgf/cm², 4.4 psi)</td>
<td>27 kPa (0.27 kgf/cm², 4.0 psi)</td>
</tr>
</tbody>
</table>
# CHASSIS SPECIFICATIONS

## Front brake
- **Type**: Dual disc brake
- **Operation**: Right hand operation
- **Front brake lever free play (lever end)**: 0 mm (0 in)
- **Front disc brake**
  - **Disc outside diameter × thickness**: 220.0 × 3.5 mm (8.66 × 0.14 in)
  - **Brake disc thickness limit**: 3.0 mm (0.12 in)
  - **Brake disc deflection limit**: 0.1 mm (0.004 in)
  - **Brake pad lining thickness (inner)**: 4.4 mm (0.17 in)
    - **Limit**: 1.0 mm (0.04 in)
  - **Brake pad lining thickness (outer)**: 4.4 mm (0.17 in)
    - **Limit**: 1.0 mm (0.04 in)
  - **Master cylinder inside diameter**: 12.70 mm (0.50 in)
  - **Caliper cylinder inside diameter**: 33.96 mm (1.34 in)
  - **Recommended fluid**: DOT 4

## Rear brake
- **Type**: Dual disc brake
- **Operation**: Left hand and right foot operation
- **Rear brake lever free play (lever end)**: 0 mm (0 in)
- **Brake pedal free play**: 0.0–5.0 mm (0.00–0.20 in)
- **Rear disc brake**
  - **Disc outside diameter × thickness**: 205.0 × 3.5 mm (8.07 × 0.14 in)
  - **Brake disc thickness limit**: 3.0 mm (0.12 in)
  - **Brake disc deflection limit**: 0.1 mm (0.004 in)
  - **Brake pad lining thickness (inner)**: 5.8 mm (0.23 in)
    - **Limit**: 1.0 mm (0.04 in)
  - **Brake pad lining thickness (outer)**: 5.8 mm (0.23 in)
    - **Limit**: 1.0 mm (0.04 in)
  - **Master cylinder inside diameter**: 12.70 mm (0.50 in)
  - **Caliper cylinder inside diameter**: 33.96 mm (1.34 in)
  - **Recommended fluid**: DOT 4

## Steering
- **Steering bearing type**: Ball and race bearing
- **Steering tension**: 50 N (5.0 kgf) (YFM5FGPY/YFM7FGPY)

## Front suspension
- **Type**: Double wishbone
- **Spring/shock absorber type**: Coil spring/oil damper
- **Wheel travel**: 180 mm (7.1 in)
- **Shock absorber travel**: 90.2 mm (3.55 in) (YFM5FGY/YFM5FGPY)
  - 90.7 mm (3.57 in) (YFM7FGY/YFM7FGPY)
- **Spring free length**: 292.0 mm (11.50 in)
- **Installed length**: 233.1 mm (9.18 in) (YFM5FGY/YFM5FGPY)
  - 233.5 mm (9.19 in) (YFM7FGY/YFM7FGPY)
- **Spring rate K1**: 23.00 N/mm (2.35 kgf/mm, 131.33 lb/in)
- **Spring stroke K1**: 0.0–90.2 mm (0.00–3.55 in)
  - (YFM5FGY/YFM5FGPY)
  - 0.0–90.7 mm (0.00–3.57 in)
    - (YFM7FGY/YFM7FGPY)
- **Optional spring available**: No
### CHASSIS SPECIFICATIONS

<table>
<thead>
<tr>
<th>Spring preload adjusting positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Standard</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
</tbody>
</table>

### Rear suspension

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Double wishbone</td>
</tr>
<tr>
<td><strong>Spring/shock absorber type</strong></td>
<td>Coil spring/oil damper</td>
</tr>
<tr>
<td><strong>Wheel travel</strong></td>
<td>230 mm (9.1 in)</td>
</tr>
<tr>
<td><strong>Rear shock absorber assembly travel</strong></td>
<td>109.2 mm (4.30 in)</td>
</tr>
<tr>
<td><strong>Spring free length</strong></td>
<td></td>
</tr>
<tr>
<td>(YFM5FGY/YFM5FGPY)</td>
<td>318.1 mm (12.52 in)</td>
</tr>
<tr>
<td>(YFM7FGY/YFM7FGPY)</td>
<td>314.5 mm (12.38 in)</td>
</tr>
<tr>
<td><strong>Installed length</strong></td>
<td></td>
</tr>
<tr>
<td>(YFM5FGY/YFM5FGPY)</td>
<td>270.6 mm (10.65 in)</td>
</tr>
<tr>
<td>(YFM7FGY/YFM7FGPY)</td>
<td>267.5 mm (10.53 in)</td>
</tr>
<tr>
<td><strong>Spring rate K1</strong></td>
<td></td>
</tr>
<tr>
<td>(YFM5FGY/YFM5FGPY)</td>
<td>31.00 N/mm (3.16 kgf/mm, 177.01 lb/in)</td>
</tr>
<tr>
<td>(YFM7FGY/YFM7FGPY)</td>
<td>33.50 N/mm (3.42 kgf/mm, 191.29 lb/in)</td>
</tr>
<tr>
<td><strong>Spring rate K2</strong></td>
<td></td>
</tr>
<tr>
<td>(YFM7FGY/YFM7FGPY)</td>
<td>36.00 N/mm (3.67 kgf/mm, 205.56 lb/in)</td>
</tr>
<tr>
<td><strong>Spring stroke K1</strong></td>
<td></td>
</tr>
<tr>
<td>(YFM5FGY/YFM5FGPY)</td>
<td>0.0–109.2 mm (0.00–4.30 in)</td>
</tr>
<tr>
<td>(YFM7FGY/YFM7FGPY)</td>
<td>0.0–43.0 mm (0.00–1.69 in)</td>
</tr>
<tr>
<td><strong>Spring stroke K2</strong></td>
<td></td>
</tr>
<tr>
<td>(YFM7FGY/YFM7FGPY)</td>
<td>43.0–109.2 mm (1.69–4.30 in)</td>
</tr>
</tbody>
</table>

**Optional spring available**

- No
## ELECTRICAL SPECIFICATIONS

### Voltage

| System voltage | 12 V |

### Ignition system

<table>
<thead>
<tr>
<th>Ignition system</th>
<th>TCI (digital)</th>
</tr>
</thead>
<tbody>
<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>
</tbody>
</table>

### Engine control unit

<table>
<thead>
<tr>
<th>Model/manufacturer</th>
<th>F8T83872/MITSUBISHI (YFM5FGY/YFM5FGPY)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F8T83874/MITSUBISHI (YFM7FGY/YFM7FGPY)</td>
</tr>
</tbody>
</table>

### Fuel injection sensor

<table>
<thead>
<tr>
<th>Crankshaft position sensor resistance</th>
<th>459–561 Ω at 20 °C (68 °F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake air pressure sensor output voltage</td>
<td>3.75–4.25 V</td>
</tr>
<tr>
<td>Intake air temperature sensor resistance</td>
<td>290–390 Ω at 80 °C (176 °F)</td>
</tr>
<tr>
<td>Coolant temperature sensor resistance</td>
<td>2.45 kΩ at 20 °C (68 °F)</td>
</tr>
<tr>
<td></td>
<td>290–354 Ω at 80 °C (176 °F)</td>
</tr>
</tbody>
</table>

### Ignition coil

<table>
<thead>
<tr>
<th>Model/manufacturer</th>
<th>2JN/YAMAHA</th>
</tr>
</thead>
<tbody>
<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 at 20 °C (68 °F)</td>
</tr>
<tr>
<td>Secondary coil resistance</td>
<td>8.64–12.96 kΩ at 20 °C (68 °F)</td>
</tr>
</tbody>
</table>

### Spark plug cap

<table>
<thead>
<tr>
<th>Material</th>
<th>Resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance</td>
<td>10.0 kΩ</td>
</tr>
</tbody>
</table>

### AC magneto

<table>
<thead>
<tr>
<th>Model/manufacturer</th>
<th>F4T39373/MITSUBISHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard output</td>
<td>14.0 V 34.0 A at 5,000 r/min</td>
</tr>
<tr>
<td>Stator coil resistance</td>
<td>0.108–0.132 Ω at 20 °C (68 °F)</td>
</tr>
</tbody>
</table>

### Rectifier/regulator

<table>
<thead>
<tr>
<th>Regulator type</th>
<th>Semi conductor-short circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model/manufacturer</td>
<td>FH012AA/SHINDENGEN</td>
</tr>
<tr>
<td>Regulated voltage (DC)</td>
<td>14.2–14.8 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>
</tbody>
</table>

### Battery

<table>
<thead>
<tr>
<th>Model</th>
<th>YTX20L-BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage, capacity</td>
<td>12 V, 18.0 Ah</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>GS YUASA</td>
</tr>
<tr>
<td>Ten hour rate amperage</td>
<td>1.8 A</td>
</tr>
</tbody>
</table>
### Headlight
- **Bulb type**: Halogen bulb

### Bulb voltage, wattage × quantity
- **Headlight**: 12 V, 35.0/35.0 W × 2
- **Tail/brake light**: 12 V, 5.0/21.0 W × 1
- **Meter lighting**: EL

### Indicator and warning lights
- **Neutral indicator light**: LED
- **Reverse indicator light**: LED
- **Coolant temperature warning light**: LED
- **Park indicator light**: LED
- **On-Command four-wheel-drive/differential gear lock indicator**: LCD
- **Engine trouble warning light**: LED
- **High-range indicator light**: LED
- **Low-range indicator light**: LED
- **Differential gear lock indicator light**: LED
- **EPS warning light**: LED (YFM5FGPY/YFM7FGPY)

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

### Starter motor
- **Model/manufacturer**: SM-17/MITSUBA
- **Power output**: 0.80 kW
- **Armature coil resistance**: 0.0050–0.0150 Ω at 20 °C (68 °F)
- **Brush overall length**: 12.0 mm (0.47 in)
- **Limit**: 6.50 mm (0.26 in)
- **Brush spring force**: 6.02–6.51 N (614–664 gf, 21.69–23.45 oz)
- **Mica undercut (depth)**: 0.70 mm (0.03 in)

### Starter relay
- **Model/manufacturer**: 2768113-A/JIDECO
- **Amperage**: 180.0 A
- **Coil resistance**: 4.18–4.62 Ω at 20 °C (68 °F)

### Fuel sender unit
- **Sender unit resistance (full)**: 19.00–21.00 Ω
- **Sender unit resistance (empty)**: 139.00–141.00 Ω

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

### Fan motor relay
- **Model/manufacturer**: ACM33211/MATSUSHITA
- **Coil resistance**: 86.4–105.6 Ω

### Fuel injection system relay
- **Model/manufacturer**: ACM33211/MATSUSHITA
- **Coil resistance**: 86.4–105.6 Ω
### Headlight relay
- **Model/manufacturer**: G8HN-1C4T-DJ/OMRON
- **Coil resistance**: 94.5–115.5 Ω

### Four-wheel-drive motor relay 3
- **Model/manufacturer**: ACM33211/MATSUSHITA
- **Coil resistance**: 86.4–105.6 Ω

### Four-wheel-drive motor relay 1, 2
- **Model/manufacturer**: G8HN-1C4T-DJ/OMRON
- **Coil resistance**: 94.5–115.5 Ω

### Circuit breaker
- **Circuit breaker type**: Fuse

### Fuses
- **Main fuse**: 40.0 A
- **Headlight fuse**: 15.0 A
- **Signaling system fuse**: 5.0 A
- **Ignition fuse**: 15.0 A
- **Radiator fan motor fuse**: 20.0 A
- **Auxiliary DC jack fuse**: 15.0 A
- **Fuel injection system fuse**: 15.0 A
- **Four-wheel-drive motor fuse**: 15.0 A
- **EPS fuse**: 40.0 A (YFM5FGPY/YFM7FGPY)
- **Spare fuse**: 40.0 A
- **Spare fuse**: 20.0 A
- **Spare fuse**: 15.0 A
- **Spare fuse**: 5.0 A
GENERAL TIGHTENING TORQUE SPECIFICATIONS

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

<table>
<thead>
<tr>
<th>A (nut)</th>
<th>B (bolt)</th>
<th>General tightening torques</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nm</td>
</tr>
<tr>
<td>10 mm</td>
<td>6 mm</td>
<td>6</td>
</tr>
<tr>
<td>12 mm</td>
<td>8 mm</td>
<td>15</td>
</tr>
<tr>
<td>14 mm</td>
<td>10 mm</td>
<td>30</td>
</tr>
<tr>
<td>17 mm</td>
<td>12 mm</td>
<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>

A. Distance between flats
B. Outside thread diameter
### 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>4</td>
<td>14 Nm (1.4 m·kg, 10 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Muffler bolt</td>
<td>M8</td>
<td>1</td>
<td>20 Nm (2.0 m·kg, 14 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Muffler and muffler bracket bolt</td>
<td>M8</td>
<td>2</td>
<td>20 Nm (2.0 m·kg, 14 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Spark arrester bolt</td>
<td>M6</td>
<td>3</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Purging bolt</td>
<td>M10</td>
<td>1</td>
<td>27 Nm (2.7 m·kg, 19 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Exhaust pipe protector bolt</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Crankshaft end accessing screw</td>
<td>M36</td>
<td>1</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Timing mark accessing screw</td>
<td>M14</td>
<td>1</td>
<td>6 Nm (0.6 m·kg, 4.3 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>AC magneto cover bolt</td>
<td>M6</td>
<td>11</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>AC magneto rotor nut</td>
<td>M16</td>
<td>1</td>
<td>60 Nm (6.0 m·kg, 43 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>AC magneto/crankshaft position sensor lead holder bolt</td>
<td>M5</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Starter clutch bolt</td>
<td>M8</td>
<td>3</td>
<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
<td>Left-hand thread Stake.</td>
</tr>
<tr>
<td>Drive belt cover bolt</td>
<td>M6</td>
<td>12</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Drive belt case bolt</td>
<td>M6</td>
<td>8</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Bearing housing bolt (primary sheave assembly)</td>
<td>M6</td>
<td>4</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Bearing retainer bolt (bearing housing)</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Primary sheave assembly nut</td>
<td>M16</td>
<td>1</td>
<td>140 Nm (14.0 m·kg, 100 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Secondary sheave assembly nut</td>
<td>M16</td>
<td>1</td>
<td>100 Nm (10.0 m·kg, 72 ft·lb)</td>
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</tr>
<tr>
<td>Secondary sheave spring retaining nut</td>
<td>M36</td>
<td>1</td>
<td>90 Nm (9.0 m·kg, 65 ft·lb)</td>
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</tr>
<tr>
<td>Clutch housing assembly bolt</td>
<td>M6</td>
<td>9</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Clutch carrier assembly nut</td>
<td>M22</td>
<td>1</td>
<td>190 Nm (19.0 m·kg, 140 ft·lb)</td>
<td>Left-hand thread Stake.</td>
</tr>
<tr>
<td>Cylinder bolt</td>
<td>M10</td>
<td>4</td>
<td>50 Nm (5.0 m·kg, 36 ft·lb)</td>
<td>See TIP.</td>
</tr>
<tr>
<td>Cylinder bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Cylinder head stud bolt (exhaust pipe)</td>
<td>M8</td>
<td>4</td>
<td>15 Nm (1.5 m·kg, 11 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Cylinder head bolt</td>
<td>M9</td>
<td>4</td>
<td>35 Nm (3.5 m·kg, 25 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Cylinder head bolt</td>
<td>M9</td>
<td>2</td>
<td>38 Nm (3.8 m·kg, 27 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Cylinder head bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Tappet cover bolt</td>
<td>M6</td>
<td>8</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Camshaft sprocket cover bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Thermostat cover bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Thread size</td>
<td>Q’ty</td>
<td>Tightening torque</td>
<td>Remarks</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------</td>
<td>------</td>
<td>-------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Oil check bolt</td>
<td>M8</td>
<td>1</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Cylinder head air bleed bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Camshaft sprocket bolt</td>
<td>M7</td>
<td>2</td>
<td>20 Nm (2.0 m·kg, 14 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Decompression assembly bolt</td>
<td>M7</td>
<td>2</td>
<td>20 Nm (2.0 m·kg, 14 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Valve adjusting screw locknut</td>
<td>M6</td>
<td>4</td>
<td>14 Nm (1.4 m·kg, 10 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Bearing retainer bolt (camshaft)</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Timing chain guide bolt (intake side)</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Timing chain tensioner cap bolt</td>
<td>M16</td>
<td>1</td>
<td>20 Nm (2.0 m·kg, 14 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Timing chain tensioner bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Oil delivery pipe 1 union bolt</td>
<td>M8</td>
<td>2</td>
<td>18 Nm (1.8 m·kg, 13 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Oil delivery pipe 2 union bolt</td>
<td>M14</td>
<td>2</td>
<td>35 Nm (3.5 m·kg, 25 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Oil delivery pipe 2 union bolt</td>
<td>M10</td>
<td>1</td>
<td>20 Nm (2.0 m·kg, 14 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Oil delivery pipe 2 bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Crankcase bolt</td>
<td>M8</td>
<td>3</td>
<td>26 Nm (2.6 m·kg, 19 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Crankcase bolt</td>
<td>M6</td>
<td>4</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Crankcase bolt</td>
<td>M6</td>
<td>9</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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<tr>
<td>Dipstick guide bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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</tr>
<tr>
<td>Engine oil drain bolt</td>
<td>M14</td>
<td>1</td>
<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
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</tr>
<tr>
<td>Oil filter cartridge</td>
<td>M20</td>
<td>1</td>
<td>17 Nm (1.7 m·kg, 12 ft·lb)</td>
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<tr>
<td>Oil filter cartridge union bolt</td>
<td>M20</td>
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<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
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<tr>
<td>Timing chain guide bolt (lower)</td>
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<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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<tr>
<td>Bearing retainer bolt (crankcase)</td>
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<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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<tr>
<td>Oil pump bolt</td>
<td>M6</td>
<td>3</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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<tr>
<td>Oil pump housing cover screw</td>
<td>M5</td>
<td>1</td>
<td>5 Nm (0.5 m·kg, 3.6 ft·lb)</td>
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</tr>
<tr>
<td>Oil pump driven gear nut</td>
<td>M10</td>
<td>1</td>
<td>22 Nm (2.2 m·kg, 16 ft·lb)</td>
<td>Use a lock washer.</td>
</tr>
<tr>
<td>Balancer driven gear nut</td>
<td>M18</td>
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<td>80 Nm (8.0 m·kg, 58 ft·lb)</td>
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<tr>
<td>Water pump housing bolt</td>
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<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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<tr>
<td>Coolant drain bolt</td>
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<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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<tr>
<td>Water pump air bleed bolt</td>
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<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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<td>Water pump outlet pipe bolt</td>
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<td>Water jacket joint bolt</td>
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<tr>
<td>Shift lever cover bolt</td>
<td>M6</td>
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<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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<tr>
<td>Shift lever 2 assembly bolt</td>
<td>M6</td>
<td>1</td>
<td>14 Nm (1.4 m·kg, 10 ft·lb)</td>
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</tr>
<tr>
<td>Shift drum stopper bolt</td>
<td>M14</td>
<td>1</td>
<td>18 Nm (1.8 m·kg, 13 ft·lb)</td>
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</tr>
<tr>
<td>Stopper lever stopper bolt</td>
<td>M14</td>
<td>1</td>
<td>18 Nm (1.8 m·kg, 13 ft·lb)</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>Middle drive pinion gear nut</td>
<td>M22</td>
<td>1</td>
<td>190 Nm (19.0 m·kg, 140 ft·lb)</td>
<td>Stake.</td>
</tr>
<tr>
<td>Middle drive shaft bearing housing bolt</td>
<td>M8</td>
<td>4</td>
<td>32 Nm (3.2 m·kg, 23 ft·lb)</td>
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<tr>
<td>Middle drive shaft bearing retainer bolt</td>
<td>M8</td>
<td>4</td>
<td>29 Nm (2.9 m·kg, 21 ft·lb)</td>
<td>Stake.</td>
</tr>
<tr>
<td>Front drive shaft yoke nut (middle gear side)</td>
<td>M16</td>
<td>1</td>
<td>115 Nm (11.5 m·kg, 85 ft·lb)</td>
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<tr>
<td>Middle driven shaft bearing retainer</td>
<td>M55</td>
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<td>80 Nm (8.0 m·kg, 58 ft·lb)</td>
<td>Left-hand thread</td>
</tr>
<tr>
<td>Middle driven pinion gear bearing housing bolt</td>
<td>M8</td>
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<td>25 Nm (2.5 m·kg, 18 ft·lb)</td>
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<tr>
<td>Middle driven pinion gear bearing retainer</td>
<td>M60</td>
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<td>130 Nm (13.0 m·kg, 94 ft·lb)</td>
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<tr>
<td>Rear drive shaft yoke nut (middle gear side)</td>
<td>M16</td>
<td>1</td>
<td>150 Nm (15.0 m·kg, 110 ft·lb)</td>
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<tr>
<td>Starter motor bolt</td>
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<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
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<tr>
<td>Starter motor lead nut</td>
<td>M6</td>
<td>1</td>
<td>11 Nm (1.1 m·kg, 8.0 ft·lb)</td>
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<tr>
<td>Spark plug</td>
<td>M10</td>
<td>1</td>
<td>13 Nm (1.3 m·kg, 9.4 ft·lb)</td>
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<tr>
<td>Stator coil assembly bolt</td>
<td>M6</td>
<td>3</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
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<tr>
<td>Crankshaft position sensor bolt</td>
<td>M5</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Coolant temperature sensor</td>
<td>M12</td>
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<td>18 Nm (1.8 m·kg, 13 ft·lb)</td>
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<tr>
<td>Gear position switch bolt</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Reverse switch</td>
<td>M10</td>
<td>1</td>
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<tr>
<td>Speed sensor bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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</tbody>
</table>

### Tip
Temporarily tighten the cylinder bolts to 15 Nm (1.5 m·kg, 11 ft·lb) and then tighten them to 50 Nm (5.0 m·kg, 36 ft·lb).

### Cylinder Head Tightening Sequence:

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Thread size</th>
<th>Q’ty</th>
<th>Tightening torque</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine mounting bolt (front lower side)</td>
<td>M10</td>
<td>2</td>
<td>42 Nm (4.2 m-kg, 30 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Engine mounting bolt (front upper side)</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Engine mounting bolt (rear lower side)</td>
<td>M10</td>
<td>2</td>
<td>42 Nm (4.2 m-kg, 30 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Engine mounting bolt (rear upper side)</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m-kg, 7.2 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Rubber damper nut (front side)</td>
<td>M10</td>
<td>2</td>
<td>42 Nm (4.2 m-kg, 30 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Rubber damper nut (rear side)</td>
<td>M10</td>
<td>2</td>
<td>42 Nm (4.2 m-kg, 30 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Trailer hitch bolt</td>
<td>M10</td>
<td>2</td>
<td>55 Nm (5.5 m-kg, 40 ft-lb)</td>
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</tr>
<tr>
<td>Drive select lever unit bolt</td>
<td>M6</td>
<td>3</td>
<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
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<tr>
<td>Drive select lever guide bolt</td>
<td>M6</td>
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<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
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<tr>
<td>Shift arm bolt</td>
<td>M6</td>
<td>1</td>
<td>14 Nm (1.4 m-kg, 10 ft-lb)</td>
<td></td>
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<tr>
<td>Shift control cable nut</td>
<td>M14</td>
<td>1</td>
<td>17 Nm (1.7 m-kg, 12 ft-lb)</td>
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<tr>
<td>Drive select lever shift rod locknut (select lever unit side)</td>
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<td>1</td>
<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
<td>Left-hand thread</td>
</tr>
<tr>
<td>Drive select lever shift rod locknut (shift arm side)</td>
<td>M6</td>
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<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
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<tr>
<td>Brake pedal free play adjusting nut</td>
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<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
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<tr>
<td>Radiator bolt</td>
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<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
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<tr>
<td>Radiator bracket bolt</td>
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<td>Coolant reservoir bolt</td>
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<tr>
<td>Fuel tank bolt</td>
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<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
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<tr>
<td>Fuel pump nut</td>
<td>M6</td>
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<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
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<tr>
<td>Fuel tank side cover bolt</td>
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<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
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<tr>
<td>Fuel tank breather hose joint bolt</td>
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<tr>
<td>Throttle body joint clamp screw</td>
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<td>3 Nm (0.3 m-kg, 2.2 ft-lb)</td>
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<tr>
<td>Engine skid plate bolt</td>
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<tr>
<td>Footrest bracket bolt</td>
<td>M10</td>
<td>8</td>
<td>53 Nm (5.3 m-kg, 38 ft-lb)</td>
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<tr>
<td>Footrest board bolt</td>
<td>M6</td>
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<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
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<tr>
<td>Footrest bolt</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
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<tr>
<td>Front carrier bolt</td>
<td>M8</td>
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<td>26 Nm (2.6 m-kg, 19 ft-lb)</td>
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<tr>
<td>Front carrier bolt</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Front carrier bracket bolt</td>
<td>M8</td>
<td>2</td>
<td>34 Nm (3.4 m-kg, 24 ft-lb)</td>
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</tr>
<tr>
<td>Front guard bolt</td>
<td>M8</td>
<td>4</td>
<td>26 Nm (2.6 m-kg, 19 ft-lb)</td>
<td></td>
</tr>
<tr>
<td>Front grill bolt</td>
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<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
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<tr>
<td>Front grill bracket bolt</td>
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<td>7 Nm (0.7 m-kg, 5.1 ft-lb)</td>
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</tr>
<tr>
<td>Item</td>
<td>Thread size</td>
<td>Q’ty</td>
<td>Tightening torque</td>
<td>Remarks</td>
</tr>
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<td>-------------</td>
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<tr>
<td>Front fender bolt</td>
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<tr>
<td>Rear carrier bolt</td>
<td>M8</td>
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<td>34 Nm (3.4 m·kg, 24 ft·lb)</td>
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<tr>
<td>Rear carrier bolt</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Rear carrier bracket bolt</td>
<td>M10</td>
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<td>53 Nm (5.3 m·kg, 38 ft·lb)</td>
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</tr>
<tr>
<td>Rear fender bolt</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Front wheel nut</td>
<td>M10</td>
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<td>55 Nm (5.5 m·kg, 40 ft·lb)</td>
<td>Stake.</td>
</tr>
<tr>
<td>Front wheel axle nut</td>
<td>M20</td>
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<td>260 Nm (26.0 m·kg, 190 ft·lb)</td>
<td>Stake.</td>
</tr>
<tr>
<td>Rear wheel nut</td>
<td>M10</td>
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<td>55 Nm (5.5 m·kg, 40 ft·lb)</td>
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<tr>
<td>Rear wheel axle nut</td>
<td>M20</td>
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<td>260 Nm (26.0 m·kg, 190 ft·lb)</td>
<td>Stake.</td>
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<tr>
<td>Front brake caliper bolt</td>
<td>M8</td>
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<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
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</tr>
<tr>
<td>Front brake disc bolt</td>
<td>M8</td>
<td>8</td>
<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Rear brake caliper bolt</td>
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<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
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<td>Rear brake disc bolt</td>
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<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
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<tr>
<td>Brake hose union bolt</td>
<td>M10</td>
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<td>27 Nm (2.7 m·kg, 19 ft·lb)</td>
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<td>Brake pad holding bolt</td>
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<tr>
<td>Brake caliper bleed screw</td>
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<td>5 Nm (0.5 m·kg, 3.6 ft·lb)</td>
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<tr>
<td>Steering knuckle and front upper arm nut</td>
<td>M10</td>
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<td>25 Nm (2.5 m·kg, 18 ft·lb)</td>
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</tr>
<tr>
<td>Steering knuckle and front lower arm nut</td>
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</tr>
<tr>
<td>Steering knuckle and tie-rod nut</td>
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<tr>
<td>Front upper arm nut</td>
<td>M10</td>
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<tr>
<td>Front lower arm nut</td>
<td>M10</td>
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</tr>
<tr>
<td>Front shock absorber nut</td>
<td>M10</td>
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<td>45 Nm (4.5 m·kg, 32 ft·lb)</td>
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</tr>
<tr>
<td>Front brake disc guard bolt</td>
<td>M6</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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</tr>
<tr>
<td>Front brake hose holder bolt</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
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<tr>
<td>Front arm protector nut</td>
<td>M6</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
</tr>
<tr>
<td>Rear arm protector holder nut</td>
<td>M6</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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</tr>
<tr>
<td>Rear knuckle nut</td>
<td>M10</td>
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<td>45 Nm (4.5 m·kg, 32 ft·lb)</td>
<td></td>
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<tr>
<td>Rear upper arm nut</td>
<td>M10</td>
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<td>45 Nm (4.5 m·kg, 32 ft·lb)</td>
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<tr>
<td>Rear lower arm nut</td>
<td>M10</td>
<td>4</td>
<td>45 Nm (4.5 m·kg, 32 ft·lb)</td>
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<tr>
<td>Rear shock absorber nut</td>
<td>M10</td>
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<td>45 Nm (4.5 m·kg, 32 ft·lb)</td>
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<tr>
<td>Rear brake disc guard bolt</td>
<td>M6</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Rear brake hose guide bolt</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
<td></td>
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<tr>
<td>Rear arm protector nut</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Rear arm protector holder nut</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Rear brake hose protector bolt</td>
<td>M6</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Stabilizer joint nut</td>
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<td>51 Nm (5.1 m·kg, 37 ft·lb)</td>
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</tr>
<tr>
<td>Item</td>
<td>Thread size</td>
<td>Q’ty</td>
<td>Toughening torque</td>
<td>Remarks</td>
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<td>-----------------------------------------</td>
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<tr>
<td>Stabilizer holder bolt</td>
<td>M8</td>
<td>4</td>
<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
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<tr>
<td>Handlebar holder bolt</td>
<td>M8</td>
<td>4</td>
<td>20 Nm (2.0 m·kg, 14 ft·lb)</td>
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<tr>
<td>Front brake master cylinder holder bolt</td>
<td>M6</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Rear brake master cylinder holder bolt</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Front brake lever pivot bolt</td>
<td>M6</td>
<td>1</td>
<td>6 Nm (0.6 m·kg, 4.3 ft·lb)</td>
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<tr>
<td>Front brake lever pivot nut</td>
<td>M6</td>
<td>1</td>
<td>6 Nm (0.6 m·kg, 4.3 ft·lb)</td>
<td>Left-hand thread</td>
</tr>
<tr>
<td>Rear brake lever pivot bolt</td>
<td>M6</td>
<td>1</td>
<td>6 Nm (0.6 m·kg, 4.3 ft·lb)</td>
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<tr>
<td>Rear brake lever pivot nut</td>
<td>M6</td>
<td>1</td>
<td>6 Nm (0.6 m·kg, 4.3 ft·lb)</td>
<td>Left-hand thread</td>
</tr>
<tr>
<td>Front brake hose joint bolt</td>
<td>M6</td>
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<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
<td></td>
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<tr>
<td>Rear brake hose joint bolt</td>
<td>M6</td>
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<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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<tr>
<td>Brake pipe locknut</td>
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<td>3</td>
<td>19 Nm (1.9 m·kg, 13 ft·lb)</td>
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<tr>
<td>Steering stem bushing bolt</td>
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<td>23 Nm (2.3 m·kg, 17 ft·lb)</td>
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</tr>
<tr>
<td>Steering stem bracket bolt</td>
<td>M10</td>
<td>2</td>
<td>51 Nm (5.1 m·kg, 37 ft·lb)</td>
<td>Left-hand thread</td>
</tr>
<tr>
<td>Steering stem support bolt (for YFM5FG/YFM7FG)</td>
<td>M8</td>
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<td>30 Nm (3.0 m·kg, 22 ft·lb)</td>
<td>Left-hand thread</td>
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<tr>
<td>Pitman arm nut (for YFM5FG/YFM7FG)</td>
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<td>190 Nm (19.0 m·kg, 140 ft·lb)</td>
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<tr>
<td>Steering stem bearing bolt (for YFM5FG/YFM7FG)</td>
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<td>51 Nm (5.1 m·kg, 37 ft·lb)</td>
<td>Left-hand thread</td>
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<tr>
<td>Steering stem bearing nut (for YFM5FG/YFM7FG)</td>
<td>M22</td>
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<tr>
<td>Steering stem joint bolt (for YFM5FG/YFM7FG)</td>
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<tr>
<td>EPS unit bolt (for YFM5FG/YFM7FG)</td>
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<td>Pitman arm nut (for YFM5FG/YFM7FG)</td>
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<tr>
<td>EPS motor cover bolt (for YFM5FG/YFM7FG)</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>Pitman arm and tie-rod nut</td>
<td>M10</td>
<td>2</td>
<td>25 Nm (2.5 m·kg, 18 ft·lb)</td>
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<tr>
<td>Tie-rod end locknut (pitman arm side)</td>
<td>M10</td>
<td>2</td>
<td>15 Nm (1.5 m·kg, 11 ft·lb)</td>
<td>Left-hand thread</td>
</tr>
<tr>
<td>Tie-rod end locknut (front wheel side)</td>
<td>M10</td>
<td>2</td>
<td>15 Nm (1.5 m·kg, 11 ft·lb)</td>
<td>Left-hand thread</td>
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<tr>
<td>Differential assembly nut</td>
<td>M10</td>
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<td>55 Nm (5.5 m·kg, 40 ft·lb)</td>
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<tr>
<td>Differential assembly bolt</td>
<td>M10</td>
<td>2</td>
<td>55 Nm (5.5 m·kg, 40 ft·lb)</td>
<td>Left-hand thread</td>
</tr>
<tr>
<td>Differential gear oil filler bolt</td>
<td>M14</td>
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<td>23 Nm (2.3 m·kg, 17 ft·lb)</td>
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<tr>
<td>Item</td>
<td>Thread size</td>
<td>Q’ty</td>
<td>Tightening torque</td>
<td>Remarks</td>
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<tr>
<td>---------------------------------------------------</td>
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<tr>
<td>Differential gear oil drain bolt</td>
<td>M10</td>
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<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
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<tr>
<td>Differential case cover bolt</td>
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<tr>
<td>Differential motor bolt</td>
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<td>11 Nm (1.1 m·kg, 8.0 ft·lb)</td>
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<td>Front drive shaft yoke nut (differential case side)</td>
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<td>Final gear oil drain bolt</td>
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<td>Final gear oil level check bolt</td>
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<td>Final drive case cover bolt</td>
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<tr>
<td>Final drive pinion gear bearing housing bolt</td>
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<tr>
<td>Electrical components tray bolt</td>
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<tr>
<td>Battery holding bracket fitting screw</td>
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<td>Battery holding bracket nut</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>ECU (engine control unit) bolt</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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<tr>
<td>ECU bracket bolt</td>
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<tr>
<td>Rectifier/regulator bolt</td>
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<tr>
<td>Ignition coil bolt</td>
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<tr>
<td>Frame ground bolt</td>
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<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
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## LUBRICATION POINTS AND LUBRICANT TYPES

### ENGINE

<table>
<thead>
<tr>
<th>Lubrication point</th>
<th>Lubricant</th>
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<tr>
<td>Oil seal lips</td>
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<tr>
<td>Bearings</td>
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<tr>
<td>O-rings</td>
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<tr>
<td>Cylinder head bolts</td>
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<td>Crankshaft pin</td>
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<td>Connecting rod big end thrust surface</td>
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<td>Crankshaft sprocket</td>
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<td>Inner race (crankshaft)</td>
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<tr>
<td>Buffer boss (crankshaft)</td>
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<td>Crankshaft seal</td>
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<td>Piston pin</td>
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<td>Piston rings and ring grooves</td>
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<td>Valve stems (intake and exhaust)</td>
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<tr>
<td>Valve stem seal (intake and exhaust)</td>
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<td>Rocker arm shafts</td>
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<td>Camshaft lobes</td>
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<td>Decompressor lever pin</td>
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<td>Decompressor lever</td>
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<td>Rocker arms (intake and exhaust)</td>
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<td>Oil pump shaft</td>
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<td>O-ring (oil filter cartridge)</td>
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<td>Water pump impeller shaft</td>
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<td>Dipstick mating surface</td>
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<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>Clutch carrier assembly</td>
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<td>One-way clutch bearing</td>
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<td>Clutch dog and middle drive gear</td>
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<tr>
<td>Reverse idle gear shaft</td>
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<tr>
<td>Middle driven shaft splines</td>
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<td>Lubrication point</td>
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<td>Shift drum</td>
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<td>Shift forks and shift fork guide bar</td>
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<td>Ball (shift drum stopper)</td>
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<td>Stopper lever and stopper lever shaft</td>
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<td>Shift lever 2 inner surface</td>
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<td>Shift lever 1</td>
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<td>Shift lever 1 gear teeth and shift lever 2 gear teeth</td>
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<tr>
<td>Stopper lever stopper</td>
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<td>Bearing (final drive pinion gear)</td>
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<tr>
<td>Bearing (final drive case)</td>
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<tr>
<td>AC magneto lead grommet</td>
<td>Yamaha bond No.1215 (Three bond No.1215®)</td>
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<tr>
<td>Crankcase mating surface</td>
<td>Yamaha bond No.1215 (Three bond No.1215®)</td>
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</table>
1. Oil delivery pipe 1
2. Oil delivery pipe 2
3. Oil filter cartridge
4. Oil strainer
5. Drive axle
6. Relief valve assembly
7. Reverse idle gear shaft
1. Camshaft
2. Crankshaft
3. Oil strainer
4. Oil pump rotor
5. Oil pump driven gear
1. Coolant reservoir hose
2. Radiator inlet hose
3. Coolant reservoir
4. Water pump
5. Water pump outlet pipe
6. Water pump outlet hose
7. Radiator outlet hose
8. Radiator
1. Front brake light switch lead
2. On-command four-wheel-drive motor switch and differential gear lock switch lead
3. Front brake hose
4. Throttle cable
5. Rear brake cable
6. Shift control cable
7. Rear brake hose
8. Left handlebar switch lead
9. Rear brake light switch lead
10. Differential case breather hose
11. Radiator fan motor breather hose
12. EPS motor breather hose (YFM5FGP/YFM7FGP only)
13. Radiator fan motor lead
14. Meter assembly lead
15. EPS control unit lead (YFM5FGP/YFM7FGP only)
16. Final drive case breather hose

A. Pass the front brake hose and throttle cable through the guide on the handlebar cover.
B. Pass the rear brake cable, shift control cable, and rear brake hose through the guide on the handlebar cover.
C. Route the rear brake cable, shift control cable, and rear brake hose in front of the left handlebar switch lead and rear brake light switch lead.
D. Pass the rear brake hose and throttle cable through the guide, making sure to route the cable behind the hose.
E. Pass the rear brake cable and shift control cable through the guide.
F. Pass the front brake hose through the guide.
G. Route the throttle cable behind the rear brake cable and shift control cable.
H. Route the front brake light switch lead, on-command four-wheel-drive motor switch and differential gear lock switch lead, left handlebar switch lead, and rear brake light switch lead over the throttle cable, rear brake cable, and shift control cable, then to the front of where the cables cross.
I. Fasten the left handlebar switch lead and rear brake light switch lead with the plastic bands at the bends in the handlebar, making sure to route the leads under the handlebar and to face the ends of the bands forward.
J. Pass the differential case breather hose through the guide on the meter bracket.
K. Pass the radiator fan motor breather hose through the guide on the meter bracket.
L. Pass the EPS motor breather hose through the guide on the meter bracket. (YFM5FGP/YFM7FGP only)
M. Route the radiator fan motor breather hose and differential case breather hose in front of the frame.
N. Fasten the differential case breather hose to the frame with the plastic band, making sure to face the end of the band inward.
O. Route the differential case breather hose to the inside of the frame.
P. To differential assembly
Q. Fasten the meter assembly lead and EPS control unit lead (YFM5FGP/YFM7FGP only) with a plastic locking tie. Be sure to fasten the plastic locking tie around the protective sleeves of the leads, not the leads themselves.

R. Pass the final drive case breather hose through the guide on the meter bracket.
S. Fasten the front brake light switch lead, on-command four-wheel-drive motor switch and differential gear lock switch lead, left handlebar switch lead, and rear brake light switch lead with a plastic locking tie. Be sure to fasten the plastic locking tie above the couplers and fasten it around the protective sleeves of the leads, not the leads themselves.

T. 20–50 mm (0.79–1.97 in)
U. Fasten the front brake light switch lead and on-command four-wheel-drive motor switch and differential gear lock switch lead with the plastic bands at the bends in the handlebar, making sure to route the leads under the handlebar and to face the ends of the bands forward.
1. Coolant reservoir hose
2. Radiator fan motor breather hose
3. Differential case breather hose
4. EPS motor breather hose (YFM5FGP/YFM7FGP only)
5. Ground lead
6. Coolant reservoir breather hose
7. Throttle cable
8. Fuel injector lead
9. Fuel tank drain hose
10. Final drive case breather hose
11. Speed sensor lead
12. AC magneto/crankshaft position sensor lead
13. Radiator outlet hose
14. Differential motor lead
15. EPS torque sensor lead (YFM5FGP/YFM7FGP only)
16. Gear position switch lead
17. Reverse switch lead
18. Shift control cable
19. Starter motor lead

A. Face the end of the coolant reservoir breather hose downward.
B. Route the fuel injector lead to the inside of the fuel tank drain hose.
C. Pass the AC magneto/crankshaft position sensor lead through the holder.
D. Fasten the radiator outlet hose to the frame with the plastic band, making sure to face the end of the band inward.
E. Route the EPS motor breather hose under the coolant reservoir hose. (YFM5FGP/YFM7FGP only)
F. Place the EPS torque sensor lead (YFM5FGP/YFM7FGP only) and differential motor lead in the holder, and then insert the ends of the holder into the hole in the stay on the frame.
G. Route the differential case breather hose to the inside of the frame.
H. Fasten the differential case breather hose to the frame with the plastic band, making sure to face the end of the band inward.
I. Attach the ground lead terminal to the frame using the bolt.
J. Route the radiator fan motor breather hose and differential case breather hose to the inside of the radiator outlet hose.
K. Route the final drive case breather hose above the reverse switch lead and ground leads.
L. Route the final drive case breather hose above the reverse switch lead and ground leads.
M. Route the speed sensor lead, AC magneto/crankshaft position sensor lead, and final drive case breather hose through the guide in the order listed.
N. Route the speed sensor lead, AC magneto/crankshaft position sensor lead, and final drive case breather hose to the right of the reverse switch.
O. Route the final drive case breather hose above the reverse switch lead and ground leads.
P. Route the shift control cable under the gear position switch lead, speed sensor lead, and AC magneto/crankshaft position sensor lead.
Q. YFM5FGP/YFM7FGP
1. Wire harness
2. Fuel hose
3. Intake air temperature sensor lead
4. Final drive case breather hose
5. Ground lead
6. Starter motor lead
7. Air filter case breather hose
8. Coolant temperature sensor lead
9. Throttle body breather hose
10. Main switch lead
11. Auxiliary DC jack lead
12. EPS motor lead (YFM5FGP/YFM7FGP only)
13. Differential motor lead
14. EPS torque sensor lead (YFM5FGP/YFM7FGP only)
15. Radiator fan motor lead
16. Radiator inlet hose
17. EPS motor breather hose (YFM5FGP/YFM7FGP only)
18. Spark plug lead
19. Rear brake cable
20. Shift control cable
21. Fuel tank drain hose
22. Gear position switch lead
23. Speed sensor lead
24. AC magneto/crankshaft position sensor lead
25. Fuel injector lead
26. Radiator fan motor breather hose
27. EPS torque sensor coupler (YFM5FGP/YFM7FGP only)

A. Route the fuel hose between the wire harness and the fuel tank drain hose.
B. Route the air filter case breather hose to the outside of the leads, and then fasten the hose with the holder on V-belt cooling intake duct joint.
C. Route the throttle body breather hose under the coolant temperature sensor lead.
D. Route the EPS motor breather hose (YFM5FGP/YFM7FGP only) and radiator fan motor breather hose above the V-belt cooling intake duct.
E. Route the final drive case breather hose above the V-belt cooling intake duct.
F. Route the radiator fan motor lead between the electrical components tray and the radiator inlet hose.
G. Fasten the radiator fan motor lead and radiator fan motor breather hose to the frame with the plastic band, making sure to face the end of the band inward.
H. Route the spark plug lead to the outside of the rear brake cable and shift control cable.
I. Route the fuel tank drain hose to the inside of the leads and fuel hose, making sure to position the end of the drain hose as shown in the illustration.
J. Fasten the final drive case breather hose, ground lead, starter motor lead, fuel injector lead, coolant temperature sensor lead, AC magneto/crankshaft position sensor lead, and wire harness with the plastic band, making sure to position the band near the split in the wire harness.
K. Route the fuel injector lead and coolant temperature sensor lead to the inside of the ground lead, starter motor lead, final drive case breather hose, and wire harness.
1. Tail/brake light lead
2. Rectifier/regulator lead
3. AC magneto lead
4. Speed sensor lead
5. Final drive case breather hose
6. Fuel hose
7. Fuel pump lead
8. Wire harness
   A. To tail/brake light
   B. Fasten the tail/brake light lead to the frame with plastic locking ties, making sure to face the end of each tie downward.
   C. Install the plastic band near the split in the wire harness.
   D. Route the tail/brake light lead to the outside of the frame.
   E. Face the end of the plastic band downward.
   F. Pass the final drive case breather hose through the guide.
### CABLE ROUTING

1. Left headlight lead
2. Four-wheel-drive motor relay 1
3. Four-wheel-drive motor relay 2
4. Headlight relay
5. Battery
6. ECU (engine control unit)
7. Negative battery lead
8. Right headlight lead
9. EPS (electric power steering) control unit (YFM5FGP/YFM7FGP only)
10. Radiator fan motor lead
11. EPS control unit lead (YFM5FGP/YFM7FGP only)
12. Auxiliary DC jack lead
13. Main switch lead
14. Radiator fan motor relay
15. Fuel injection system relay
16. Four-wheel-drive motor relay 3
17. Final drive case breather hose
18. Starter motor lead
19. Differential motor lead
20. Meter assembly lead
21. Lean angle sensor lead
22. Coolant reservoir breather hose
23. Fuse box
24. Spare fuse
25. Main fuse
26. EPS fuse (YFM5FGP/YFM7FGP only)
27. Starter relay
28. Positive battery lead
29. Ground lead
30. Coolant reservoir hose
31. EPS motor breather hose (YFM5FGP/YFM7FGP only)
32. Differential case breather hose
33. Radiator fan motor breather hose
34. Wire harness

<table>
<thead>
<tr>
<th>A.</th>
<th>To left headlight</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.</td>
<td>Connect the headlight coupler, and then fasten the coupler with the holder on the electrical components tray.</td>
</tr>
<tr>
<td>C.</td>
<td>To right headlight</td>
</tr>
<tr>
<td>D.</td>
<td>Route the negative battery lead along the guide on the electrical components tray.</td>
</tr>
<tr>
<td>E.</td>
<td>Place the couplers on the inside of the electrical components tray.</td>
</tr>
<tr>
<td>F.</td>
<td>To main switch and auxiliary DC jack</td>
</tr>
<tr>
<td>G.</td>
<td>Route the starter motor lead above the leads in the electrical components tray.</td>
</tr>
<tr>
<td>H.</td>
<td>Fasten the EPS control unit lead with the holder. (YFM5FGP/YFM7FGP only)</td>
</tr>
<tr>
<td>I.</td>
<td>Fasten the meter assembly lead and EPS control unit lead (YFM5FGP/YFM7FGP only) with the twist tie.</td>
</tr>
<tr>
<td>J.</td>
<td>Fasten the left handlebar switch lead, on-command four-wheel-drive motor switch and differential gear lock switch lead, front brake light switch lead, and rear brake light switch lead with the holder.</td>
</tr>
<tr>
<td>K.</td>
<td>Fasten the joint coupler lead with the holder.</td>
</tr>
</tbody>
</table>

L. Pass the coolant reservoir breather hose through the guides on the plastic cover and electrical components tray and route it under the positive battery lead and starter motor lead.

M. Route the hoses under the positive battery lead, and then route them upward, to the inside of the coolant reservoir breather hose.

N. Fasten the coolant reservoir breather hose with the holder on the electrical components tray.

O. Fasten the coolant reservoir hose with the holder on the electrical components tray.

P. Pass the hoses and ground lead through the opening in the electrical components tray.

Q. Route the coolant reservoir breather hose above the other hoses.

R. Route the hoses to the inside of the screw.
1. Throttle cable  
2. Rear brake hose  
3. Rear brake cable  
4. Front brake hose  
5. Negative battery lead  
6. Final drive case breather hose  
7. Starter motor lead  
8. Throttle body breather hose  
9. Intake air pressure sensor lead  
10. TPS lead  
11. Intake air temperature sensor lead  
12. Fuel injector lead  
13. Coolant temperature sensor lead  
14. Wire harness  
15. AC magneto lead  
16. Rectifier/regulator lead  
17. Fuel hose  
18. Tail/brake light lead  
19. Fuel pump lead  
20. ISC unit lead  

A. Route the throttle cable under the plastic cover.  
B. Route the final drive case breather hose on top of the leads.  
C. Fasten the radiator fan motor breather hose and throttle body breather hose with the holder.  
D. Route the intake air pressure sensor lead to the front of the throttle body breather hose and above the ISC unit lead.  
E. Fasten the ISC unit lead with the holder.  
F. To engine  
G. To air filter case  
H. Route the fuel injector lead and coolant temperature sensor lead to the outside of the frame.  
I. Pass the tail/brake light lead through the hole in the rear fender.  
J. Fasten the tail/brake light lead with the holder, making sure that the coupler is positioned to the rear of the holder.  
K. Pass the throttle cable through the guide on the plastic cover.  
L. Insert the projection on the wire harness holder into the hole in the plastic cover.
1. Front brake pipe
2. Rear brake pipe
3. Front brake hose
4. Rear brake hose
   A. Pass the front brake hose through the holder.
   B. Fasten the front brake hose with the holder.
   C. Pass the rear brake pipe through the holder.
   D. Fasten the rear brake pipe with the holder.
   E. Pass the rear brake hose through the holder.
   F. Fasten the rear brake hose with the holder.
PERIODIC CHECKS AND ADJUSTMENTS

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

PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

TIP
• For ATVs not equipped with an odometer or an hour meter, follow the month maintenance intervals.
• For ATVs equipped with an odometer or an hour meter, follow the km (mi) or hours maintenance intervals. However, keep in mind that if the ATV 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.

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>Whichever comes first</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>month 1 3 6 6 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>km (mi) 320 (200) 1300 (800) 2500 (1600) 2500 (1600) 5000 (3200)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>hours 20 80 160 160 320</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake hoses</td>
<td>• Check for cracks or other damage, and replace if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear brake hose protectors</td>
<td>• Check for wear, cracks or other damage, and replace if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Wheels</td>
<td>• Check runout and for damage, and replace if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>7</td>
<td>Tires</td>
<td>• Check tread depth and for damage, and replace if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check air pressure and balance, and correct if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>8</td>
<td>Wheel hub bearings</td>
<td>• Check for looseness or damage, and replace if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>9</td>
<td>V-belt</td>
<td>• Check for wear, cracks or other damage, and replace if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>10</td>
<td>Chassis fasteners</td>
<td>• Make sure that all nuts, bolts, and screws are properly tightened.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>11</td>
<td>Shock absorber assemblies</td>
<td>• Check operation and correct if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check for oil leakage and replace if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>12</td>
<td>Stabilizer bushes</td>
<td>• Check for cracks or other damage, and replace if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>13</td>
<td>Rear knuckle pivots</td>
<td>• Lubricate with lithium-soap-based grease.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>14</td>
<td>Steering shaft</td>
<td>• Lubricate with lithium-soap-based grease.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>15</td>
<td>Steering system</td>
<td>• Check operation and repair or replace if damaged.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check toe-in and adjust if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>16</td>
<td>Engine mount</td>
<td>• Check for cracks or other damage, and replace if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>17</td>
<td>Axle boots</td>
<td>• Check for cracks or other damage, and replace if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>18</td>
<td>Engine oil</td>
<td>• Change.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check ATV for oil leakage, and correct if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>19</td>
<td>Engine oil filter cartridge</td>
<td>• Replace.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>20</td>
<td>Differential gear oil</td>
<td>• Change.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check ATV for oil leakage, and correct if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>21</td>
<td>Final gear oil</td>
<td>• Change.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check ATV for oil leakage, and correct if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>22</td>
<td>Cooling system</td>
<td>• Check coolant level and ATV for coolant leakage, and correct if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace coolant.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Every 2 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Moving parts and cables</td>
<td>• Lubricate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Drive select lever safety system cable</td>
<td>• Check operation and adjust or replace if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>25</td>
<td>Throttle lever housing and cable</td>
<td>• Check operation and correct if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check throttle cable free play and adjust if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lubricate throttle lever housing and cable.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Front and rear brake switches</td>
<td>• Check operation and correct if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>27</td>
<td>Lights and switches</td>
<td>• Check operation and correct if necessary.</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adjust headlight beams.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PERIODIC MAINTENANCE

TIP

- The air filter needs more frequent service if you are riding in unusually wet or dusty areas.
- Hydraulic brake service
  - Regularly check and, if necessary, correct the brake fluid level.
  - Every two years replace the internal components of the brake master cylinders and calipers, and change the brake fluid.
  - Replace the brake hoses every four years and if cracked or damaged.
ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

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

1. Remove:
   - Left side panel
   - Right side panel
   - Front fender
   - Footrest board
   - Air filter case
   Refer to "GENERAL CHASSIS" on page 4-1.

2. Remove:
   - Intake tappet cover “1”
   - Exhaust tappet cover
   - Camshaft sprocket cover “2”

3. Disconnect:
   - Spark plug cap “1”

4. Remove:
   - Spark plug “2”

5. Remove:
   - Timing mark accessing screw “1”
   - Crankshaft end accessing screw “2”

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

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

**TIP**
- Turn the crankshaft counterclockwise.
- 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.

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.

- Measure the valve clearance with a thickness gauge “1”.

---

---
Out of specification → Adjust.

**Thickness gauge**
90890-03079
Narrow gauge set
YM-34483

7. Adjust:
- Valve clearance

- Loosen the locknut “1”.
- Insert a thickness gauge “2” between the end of the adjusting screw and the valve tip.
- Turn the adjusting screw “3” in direction “a” or “b” with the tappet adjusting tool “4” until the specified valve clearance is obtained.

**Valve adjusting screw locknut**
14 Nm (1.4 m·kg, 10 ft·lb)

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

8. Install:
- Timing mark accessing screw
- Crankshaft end accessing screw

**Timing mark accessing screw**
6 Nm (0.6 m·kg, 4.3 ft·lb)
**Crankshaft end accessing screw**
10 Nm (1.0 m·kg, 7.2 ft·lb)

9. Install:
- Spark plug

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

10. Connect:
- Spark plug cap

11. Install:
- O-rings “1” New
- Camshaft sprocket cover
- Intake tappet cover
- Exhaust tappet cover

**Camshaft sprocket cover bolt**
10 Nm (1.0 m·kg, 7.2 ft·lb)
**Tappet cover bolt**
10 Nm (1.0 m·kg, 7.2 ft·lb)

12. Install:
- Air filter case
- Footrest board
- Front fender
- Right side panel
- Left side panel

Refer to “GENERAL CHASSIS” on page 4-1.
ADJUSTING THE THROTTLE LEVER FREE PLAY

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

   Throttle lever free play
   3.0–5.0 mm (0.12–0.20 in)

2. Remove:
   • Left side panel
     Refer to “GENERAL CHASSIS” on page 4-1.

3. Adjust:
   • Throttle lever free play

   Throttle body side
   a. Slide back the rubber cover “1”.
   b. Loosen the locknut “2” on the throttle body side.
   c. Turn the adjusting nut “3” in direction “a” or “b” until the correct free play is obtained.

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

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

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

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

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

4. Install:
   • Left side panel
     Refer to “GENERAL CHASSIS” on page 4-1.

TIP
If the free play cannot be adjusted here, adjust it at the handlebar side of the cable.

ADJUSTING THE SPEED LIMITER

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

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

   Speed limiter length
   Less than 12 mm (0.47 in)
2. Adjust:
   - Speed limiter length “a”

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

   Direction “b”
   Speed limiter length is decreased.
   Direction “c”
   Speed limiter length is increased.

   c. Tighten the locknut.

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

---

**Manufacturer/model**
NGK/LMAR6A-9

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

---

**CHECKING THE SPARK PLUG**

1. Remove:
   - Right side panel
     Refer to “GENERAL CHASSIS” on page 4-1.

2. Disconnect:
   - Spark plug cap

3. Remove:
   - Spark plug

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

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

5. Clean:
   - Spark plug
     (with a spark plug cleaner or wire brush)

6. 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)

7. Install:
   - Spark plug
     **Spark plug**
     13 Nm (1.3 m·kg, 9.4 ft·lb)

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

8. Connect:
   - Spark plug cap
10. Install:
   • Right side panel
   Refer to “GENERAL CHASSIS” on page 4-1.

EAS02700
CHECKING THE IGNITION TIMING
TIP
Prior to checking the ignition timing, check the wiring connections of the entire ignition system. Make sure all connections are tight and free of corrosion.

1. Remove:
   • Left side panel
   • Right side panel
   • Footrest board
   Refer to “GENERAL CHASSIS” on page 4-1.

2. Connect:
   • Timing light
     (onto the spark plug lead)
   • Digital tachometer
     (onto the spark plug lead)

3. Check:
   • Ignition timing

a. Start the engine, warm it up for several minutes, and then let it run at the specified engine idling speed.

b. Remove the timing mark accessing screw “1”.

c. Visually check the stationary pointer “a” to verify it is within the required firing range “b” indicated on the AC magneto rotor.

Incorrect firing range → Check the ignition system.

TIP
When checking the ignition timing, make sure that the timing light cord does not come in contact with the exhaust muffler.

4. Detach:
   • Timing light
   • Tachometer

5. Install:
   • Footrest board
   • Right side panel
   • Left side panel
   Refer to “GENERAL CHASSIS” on page 4-1.

EAS02710
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 3-4.

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

3. Remove:
   • Right side panel
   Refer to “GENERAL CHASSIS” on page 4-1.

4. Disconnect:
   • Spark plug cap

5. Remove:
   • Spark plug
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:
   - Extension "1"
   - Compression gauge “2”

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

8. Install:
   - Spark plug

9. Connect:
   - Spark plug cap

10. Install:

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

---

**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 checking the oil level, be sure to warm up the engine sufficiently, and then wait at least 10 minutes until the oil settles for an accurate reading.

3. Remove:
   - Dipstick accessing panel
     Refer to “GENERAL CHASSIS” on page 4-1.

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.
ENGINE

NOTICE
Do not allow foreign materials to enter the crankcase.

TIP
To obtain an accurate oil level reading, the dipstick must be inserted completely into the oil filter hole.

5. Check the engine oil level again.

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

6. Install:
- Dipstick accessing panel
  Refer to “GENERAL CHASSIS” on page 4-1.

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

Type
YAMALUBE 4 5W-30 or 10W-40 or 20W-50, SAE 5W-30 or SAE 10W-40 or SAE 20W-50
Recommended engine oil grade
API service SG type or higher, JASO standard MA

NOTICE
- Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives or use engine oils with a grade of CD “c” or higher and do not use oils labeled “ENERGY CONSERVING II” “d”.
- Do not allow foreign materials to enter the crankcase.
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 an oil filter wrench “2”.

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

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

   Oil filter wrench
   90890-01426
   YU-38411

   ENGINE oil drain bolt
   30 Nm (3.0 m·kg, 22 ft·lb)

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

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

   Engine oil quantity
   Total amount
   2.40 L (2.54 US qt, 2.11 Imp.qt)
   Without oil filter cartridge replacement
   2.00 L (2.11 US qt, 1.76 Imp.qt)
   With oil filter cartridge replacement
   2.10 L (2.22 US qt, 1.85 Imp.qt)

11. Install:
    • Dipstick
12. Start the engine, warm it up for several minutes, and then turn it off.
13. Check:
    • Engine
      (for engine oil leaks)
14. Check:
    • Engine oil level
      Refer to “CHECKING THE ENGINE OIL LEVEL” on page 3-9.
15. Check:
    • Engine oil pressure

   a. Slightly loosen the oil check bolt “1”.

   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 5-68.

   d. Start the engine after solving any problems and check the engine oil pressure again.

   e. Tighten the oil check bolt to specification.
CLEANING THE AIR FILTER ELEMENT

1. Remove:
   • Fuel tank cover
   • Left side panel
   • Right side panel
   Refer to “GENERAL CHASSIS” on page 4-1.

TIP
There are two check hoses “1” at the bottom of the air filter case. If dust and/or water collects in them, clean the air filter element, air filter mesh and air filter case.

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

3. Remove:
   • Air filter element “1”
   • Air filter element frame “2”

4. Check:
   • Air filter element
   • Air filter element frame
   Damage → Replace.

5. Clean:
   • Air filter element
     (with solvent)

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

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

TIP
After cleaning, carefully pat the air filter element on a clean cloth to remove the excess solvent.

ECA28P1011
The engine should never be run without the air filter; excessive piston and/or cylinder wear may result.
6. Apply the recommended oil to the entire surface of the air filter element and then carefully pat the air filter element on a clean cloth to remove the excess oil. The air filter element should be wet but not dripping.

7. Install:
   - Air filter element frame
   - Air filter element
   - Air filter case cover (along with the gasket)

TIP
Make sure the air filter element and air filter element frame are properly installed in the air filter case.

8. Install:
   - Right side panel
   - Left side panel
   - Fuel tank cover
   Refer to “GENERAL CHASSIS” on page 4-1.

CHECKING THE V-BELT
1. Remove:
   - Drive belt cover
   Refer to “PRIMARY AND SECONDARY SHEAVES” on page 5-47.

2. Check:
   - V-belt “1”
     Cranks/damage/wear → Replace.
     Grease/oil → Clean the primary and secondary sheaves.
   Refer to “REPLACING THE V-BELT” on page 3-13.

3. Measure:
   - V-belt width “a”
     Out of specification → Replace.
   Refer to “REPLACING THE V-BELT” on page 3-13.

REPLACING THE V-BELT
1. Replace:
   - V-belt

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

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

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

**TIP**

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

d. Remove the bolts.

EAS21030

**CHECKING THE THROTTLE BODY JOINT**

1. Remove:
   - Left side panel
   Refer to “GENERAL CHASSIS” on page 4-1.

2. Check:
   - Throttle body joint “1”
   Cracks/damage → Replace.

3. Install:
   - Left side panel
   Refer to “GENERAL CHASSIS” on page 4-1.

EAS21040

**CHECKING THE FUEL LINE**

1. Remove:
   - Seat
   - Right side panel

2. Check:
   - Fuel hose “1”
   Cracks/damage → Replace.
   Loose connection → Connect properly.

3. Install:
   - V-belt cooling exhaust duct
   Refer to “ENGINE REMOVAL” on page 5-1.
   - Rear fender
   - Right side panel
   - Seat
   Refer to “GENERAL CHASSIS” on page 4-1.

EAS21050

**CHECKING THE BREATHER HOSES**

1. Remove:
   - Left side panel
   - Air filter case
   Refer to “GENERAL CHASSIS” on page 4-1.

2. Check:
   - Cylinder head breather hose “1”
   - Throttle body breather hose “2”
   Cracks/damage → Replace.
   Loose connection → Connect properly.

**NOTICE**

Make sure the cylinder head breather hose is routed correctly.
• Left side panel  
  Refer to “GENERAL CHASSIS” on page 4-1.

EAS1080
CHECKING THE EXHAUST SYSTEM
1. Check:
• Exhaust pipe “1”
• Muffler “2”
• Exhaust pipe protector “3”
• Muffler bracket “4”
• Springs “5”
  Cracks/damage → Replace.
• Gaskets “6”
  Exhaust gas leaks → Replace.
2. Check:
• Tightening torque

EAS28970
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.
• Make sure that the transmission is in neutral.

a. Remove the bolts “1”.
b. Remove the tailpipe “2” by pulling it out of the muffler and the gasket.

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 the gasket, and then insert the tailpipe into the muffler and align the bolt holes.
e. Insert the bolts “1” and tighten them.
f. Remove the purging bolt “3”.

Exhaust pipe nut “7”  
14 Nm (1.4 m·kg, 10 ft·lb)
Muffler and muffler bracket bolt “8”  
20 Nm (2.0 m·kg, 14 ft·lb)
Muffler bolt “9”  
20 Nm (2.0 m·kg, 14 ft·lb)
Exhaust pipe protector bolt “10”  
7 Nm (0.7 m·kg, 5.1 ft·lb)

Spark arrester bolt  
10 Nm (1.0 m·kg, 7.2 ft·lb)
g. Start the engine and rev it up approximately twenty times while momentarily creating exhaust system back pressure by blocking the end of the muffler with a shop towel.

h. Stop the engine and allow the exhaust pipe to cool.

i. Install the purging bolt and tighten it.

---

### Purging bolt

27 Nm (2.7 m·kg, 19 ft·lb)

---

**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 minimum level mark “a” and maximum 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.

---

**CHECKING THE COOLING SYSTEM**

1. Remove:
   - Front fenders
   - Left footrest board

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

2. Check:
   - Radiator “1”
   - Radiator inlet hose “2”
   - Coolant reservoir “3”
   - Coolant reservoir hose “4”
   - Radiator outlet hose “5”
   - Water jacket joint “6”
   - Water pump outlet hose “7”
   - Water pump outlet pipe “8”
   - Water pump housing “9”

   Cracks/damage → Replace. Refer to “RADIATOR” on page 6-1 and “WATER PUMP” on page 6-7.
### Changing the Coolant

1. **Remove:**
   - Right side panel
   - Left side panel
   - Front carrier
   - Upper panel
   - Refer to “GENERAL CHASSIS” on page 4-1.

2. **Remove:**
   - Coolant reservoir cap “1”

3. **Disconnect:**
   - Coolant reservoir hose “2”

4. **Drain:**
   - Coolant (from the coolant reservoir)

5. **Connect:**
   - Coolant reservoir hose

6. **Remove:**
   - Radiator cap “1”

**WARNING**

A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:

Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, press down on the radiator cap and turn it counterclockwise to remove.

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

**TIP**

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

---

**8**

**9**

---

**3-17**
8. Drain:
   • Coolant
     (from the engine and radiator)

9. Check:
   • Coolant drain bolt “1”
     Damage → Replace.

10. Install:
    • Copper washer “2” New
    • Coolant drain bolt

<table>
<thead>
<tr>
<th>Coolant drain bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Nm (1.0 m·kg, 7.2 ft·lb)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Recommended antifreeze</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines</td>
</tr>
<tr>
<td>Mixing ratio</td>
</tr>
<tr>
<td>1:1 (antifreeze:water)</td>
</tr>
<tr>
<td>Radiator capacity (including all routes)</td>
</tr>
<tr>
<td>1.99 L (2.10 US qt, 1.75 Imp.qt)</td>
</tr>
<tr>
<td>Coolant reservoir capacity (up to the maximum level mark)</td>
</tr>
<tr>
<td>0.24 L (0.25 US qt, 0.21 Imp.qt)</td>
</tr>
</tbody>
</table>

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

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

13. Install:
    • Coolant reservoir cap “1”

14. Bleed:
    • Coolant system

⚠️ 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.

---

T.R.

Coolant drain bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

New

2

New

1

New

a

Remove the V-belt cooling exhaust duct “1.”
b. Loosen the water pump air bleed bolt “2”, without removing it, to allow all of the air to escape from the air bleed bolt hole.

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

\[
\text{Water pump air bleed bolt} \\
10 \text{Nm (1.0 m-kg, 7.2 ft-lb)}
\]

d. Loosen the cylinder head air bleed bolt “3”, without removing it, to allow all of the air to escape from the air bleed bolt hole.

e. When coolant begins to flow out of the bolt hole, tighten the cylinder head air bleed bolt to specification.

\[
\text{Cylinder head air bleed bolt} \\
10 \text{Nm (1.0 m-kg, 7.2 ft-lb)}
\]

f. Install the V-belt cooling exhaust duct.

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

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

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

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

- Coolant level
  Refer to “CHECKING THE COOLANT LEVEL” on page 3-16.

19. Install:
- Upper panel
- Front carrier
- Left side panel
- Right side panel
  Refer to “GENERAL CHASSIS” on page 4-1.
ADJUSTING THE FRONT DISC BRAKE

1. Check:
   • Front brake lever free play “a”
     Out of specification → Bleed the front brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

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

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

<table>
<thead>
<tr>
<th>Brake pedal free play</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0–5.0 mm (0.00–0.20 in)</td>
</tr>
</tbody>
</table>

3. Adjust:
   • Brake pedal free play

   a. Remove the front fender inner panel.
     Refer to “GENERAL CHASSIS” on page 4-1.
   b. Loosen the adjusting nut “1” and locknut “2”.
   c. Turn the adjusting nut “1” in direction “a” until
      the rear brake cable “3” is taut.
   d. Turn the adjusting nut “1” one turn in direction
      “b”, and then tighten the locknut “2”.
   e. While holding the locknut “2”, tighten the adjusting nut “1”.

<table>
<thead>
<tr>
<th>Brake pedal free play adjusting nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
</tr>
</tbody>
</table>

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

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

TIP

When checking the brake pedal free play, make sure that the brake lever bracket “6” does not move.
h. Adjust the drive select lever control cable. Refer to "ADJUSTING THE DRIVE SELECT LEVER CONTROL CABLE AND SHIFT ROD" on page 3-24.

**WARNING**

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

i. Install the front fender inner panel. Refer to "GENERAL CHASSIS" on page 4-1.

**CHECKING THE BRAKE FLUID LEVEL**

1. Place the vehicle on a level surface.

**TIP**

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

2. Check:
   - Brake fluid level
     Below the minimum level mark "a" → Add the recommended brake fluid to the proper level.

**Recommended fluid**

DOT 4

**WARNING**

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

**NOTICE**

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

**TIP**

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

**CHECKING THE FRONT BRAKE PADS**

The following procedure applies to all of the brake pads.
1. Remove:
   • Front wheels
   Refer to “FRONT WHEELS” on page 4-14.
2. Operate the brake.
3. Check:
   • Front brake pads
     A wear indicator groove “a” has almost disappeared → Replace the brake pads and brake pad spring as a set.
     Refer to “FRONT BRAKE” on page 4-21.
4. Install:
   • Front wheels
   Refer to “FRONT WHEELS” on page 4-14.

CHECKING THE REAR BRAKE PADS
The following procedure applies to all of the brake pads.
1. Remove:
   • Rear wheels
   Refer to “REAR WHEELS” on page 4-18.
2. Operate the brake.
3. Check:
   • Rear brake pads
     A wear indicator groove “a” has almost disappeared → Replace the brake pads and brake pad spring as a set.
     Refer to “REAR BRAKE” on page 4-32.
4. Install:
   • Rear wheels
   Refer to “REAR WHEELS” on page 4-18.

CHECKING THE FRONT BRAKE HOSES
The following procedure applies to all of the brake hoses and brake hose clamps.
1. Check:
   • Front brake hoses “1”
     Cracks/damage/wear → Replace.

CHECKING THE REAR BRAKE HOSES
The following procedure applies to all of the brake hoses and brake hose clamps.
1. Check:
   • Rear brake hoses “1”
     Cracks/damage/wear → Replace.
2. Check:
   • Brake hose holders
     Loose → Tighten the clamp bolt.
3. Apply the brake several times.
4. Check:
   • Brake hoses
     Brake fluid leakage → Replace any damaged hose.
     Refer to “REAR BRAKE” on page 4-32.

CHECKING THE REAR BRAKE HOSE PROTECTORS
The following procedure applies to both of the rear brake hose protectors.
1. Remove:
   • Rear wheels
     Refer to “REAR WHEELS” on page 4-18.
2. Check:
   • Rear brake hose protector “1”
     Wear indicator “a” becomes visible → Replace the rear brake hose protector.
     Refer to “REAR KNUCKLES AND STABILIZER” on page 4-64.

TIP
Stones and mud thrown up by the wheels will wear down the tops of the rear brake hose protectors.

A. Protector is normal.
B. Protector is worn.

3. Install:
   • Rear wheels
     Refer to “REAR WHEELS” on page 4-18.

BLEEDING THE HYDRAULIC BRAKE SYSTEM

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

TIP
Be careful not to spill any brake fluid or allow the brake master cylinder reservoir or brake fluid reservoir to overflow.
• When bleeding the hydraulic brake system, make sure there is always enough brake fluid before applying the brake. Ignoring this precaution could allow air to enter the hydraulic brake system, considerably lengthening the bleeding procedure.
• If bleeding is difficult, it may be necessary to let the brake fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the hose have disappeared.

1. Remove:
   • Rear wheels
     Refer to “REAR WHEELS” on page 4-18.
2. Bleed:
   • Hydraulic brake system

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

A. Protector is normal.
B. Protector is worn.
d. Place the other end of the hose into a container.
e. Slowly apply the brake several times.
f. Fully pull the brake lever or fully press down 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 lever to touch the throttle grip or the brake pedal to fully extend.
h. Tighten the bleed screw and then release the brake lever or 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·kg, 3.6 ft·lb)

k. Fill the brake fluid reservoir to the proper level with the recommended brake fluid. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.

**WARNING**
After bleeding the hydraulic brake system, check the brake operation.
Drive select lever shift control cable:

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

b. Squeeze the brake lever 20 mm (0.79 in) “a”, loosen the locknut “1”, and then adjust the shift control cable “2” with the adjuster “3” so that the drive select lever can be shifted to “R” (reverse) from “N” (neutral), and to “P” (park) from “R” (reverse).

c. Release the brake lever so that “a” is 0 mm (0 in), and then verify that the drive select lever cannot be shifted to “R” (reverse) from “N” (neutral), or to “P” (park) from “R” (reverse).

d. Tighten the locknuts.

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

TIP

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

f. Adjust the shift control cable again if necessary.

Drive select lever shift rod:

a. Make sure the drive select lever and transmission are in “N” (neutral).

b. Loosen both locknuts “1”.

c. Adjust the length “a” of the shift rod to 413 mm (16.3 in).

d. Tighten the locknuts.

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

TIP

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

f. Adjust the shift control cable again if necessary.

CHECKING THE FINAL GEAR OIL LEVEL

1. Place the vehicle on a level surface.

2. Remove:
   • Final gear oil level check bolt “1”

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.

Type
SAE 80 API GL-4 Hypoid gear oil

NOTICE

Take care not to allow foreign material to enter the final drive case.
4. Install:
   • Final gear oil level check bolt

   **Final gear oil level check bolt**
   10 Nm (1.0 m·kg, 7.2 ft·lb)

4. Remove:
   • Final gear oil level check bolt
   • Final gear oil drain bolt “1”

   Completely drain the final drive case of its oil.

5. Check:
   • Final gear oil drain bolt gasket
     Damage → Replace.

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

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

   **Total amount**
   0.25 L (0.26 US qt, 0.22 Imp.qt)
   Periodic oil change
   0.20 L (0.21 US qt, 0.18 Imp.qt)
   **Type**
   SAE 80 API GL-4 Hypoid gear oil

8. Check:
   • Oil level
     Refer to “CHECKING THE FINAL GEAR OIL LEVEL” on page 3-25.

9. Install:
   • Final gear oil level check bolt
   • Final gear oil filler bolt

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

**CHECKING THE DIFFERENTIAL GEAR OIL LEVEL**

1. Place the vehicle on a level surface.
2. Remove:
   • Differential gear oil filler bolt “1”
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

**NOTICE**
Take care not to allow foreign material to enter the differential case.
4. Install:
  • Differential gear oil filler bolt

**Differential gear oil filler bolt**
23 Nm (2.3 m-kg, 17 ft-lb)

---

**CHANGING THE DIFFERENTIAL GEAR OIL**

1. Place the vehicle on a level surface.
2. Place a receptacle under the differential case.
3. Remove:
  • Differential gear oil filler bolt
  • Differential gear oil drain bolt “1”
Completely drain the differential case of its oil.

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

5. Install:
  • Differential gear oil drain bolt

**Differential gear oil drain bolt**
10 Nm (1.0 m-kg, 7.2 ft-lb)

---

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

**NOTICE**

Take care not to allow foreign material to enter the differential case.

---

**TIP**

If gear oil is filled to the brim of the oil filler hole, oil may start leaking from the differential case breather hose. Therefore, check the quantity of the oil, not its level.

7. Check:
  • Oil level
  Refer to “CHECKING THE DIFFERENTIAL GEAR OIL LEVEL” on page 3-26

8. Install:
  • Differential gear oil filler bolt

**Differential gear oil filler bolt**
23 Nm (2.3 m-kg, 17 ft-lb)

---

**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 8-15.
CHECKING THE STEERING SYSTEM

1. Place the vehicle on a level surface.

2. Check:
   - Steering assembly bushings
     Move the handlebar up and down, and back
     and forth.
     Excessive play → Replace the steering stem
     bushings.

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

4. Raise the front end of the vehicle so that
   there is no weight on the front wheels.

5. Check:
   - Ball joints and wheel bearings
     Move the wheels laterally back and forth.
     Excessive free play → Replace the front
     arms (upper and lower) and/or wheel bear-
     ings.

6. Measure: (YFM5FGP/YFM7FGP only)
   - Steering tension
     Above specification → Adjust.

<table>
<thead>
<tr>
<th>Steering tension</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 N (5.0 kgf)</td>
</tr>
<tr>
<td>(YFM5FGPY/YFM7FGPY)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Belt tension gauge</th>
</tr>
</thead>
<tbody>
<tr>
<td>90890-03170</td>
</tr>
<tr>
<td>Rear drive belt tension gauge</td>
</tr>
<tr>
<td>YM-03170</td>
</tr>
</tbody>
</table>
7. Adjust: (YFM5FGP/YFM7FGP only)
   • Steering tension

   a. Remove the electrical components tray. Refer to “GENERAL CHASSIS” on page 4-1.
   b. Loosen the steering stem bracket bolts “1”, steering stem bearing bolts “2”, and steering stem joint bolts “3” completely.

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

c. Tighten the steering stem bearing bolts to specification.

d. Tighten the steering stem bracket bolts to specification.

![Steering stem bracket bolt]
51 Nm (5.1 m·kg, 37 ft·lb)
LOCTITE®

e. Tighten the steering stem joint bolts to specification.

![Steering stem joint bolt]
35 Nm (3.5 m·kg, 25 ft·lb)
LOCTITE®

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

![Steering tension]
50 N (5.0 kgf)
(YFM5FGPY/YFM7FGPY)

h. Install the electrical components tray. Refer to “GENERAL CHASSIS” on page 4-1.

---

**ADJUSTING THE TOE-IN**

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

![Toe-in (with tire touching the ground)]
0.0–10.0 mm (0.00–0.39 in)

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

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

![Toe-in = “B” - “A”]

*g. If the toe-in is incorrect, adjust it.*
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 handlebar is positioned 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 handlebar and check that the handlebar responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.

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

   ![Diagram of tie-rods]

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

   **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 surface.
   2. Check:
      • Damper rod
        Bends/damage → Replace the front shock absorber assembly.
        Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” on page 4-59.
      • Oil leakage
        Excessive oil leakage → Replace the front shock absorber assembly.
        Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” on page 4-59.
      • Spring
        Fatigue → Replace the front shock absorber assembly.
Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” on page 4-59.

3. Check:
   • Operation
     Pump the front shock absorber assembly up and down several times.
     Rough operation → Replace front shock absorber assembly.
     Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” on page 4-59.

EAS29310
ADJUSTING THE FRONT SHOCK ABSORBER ASSEMBLIES
The following procedure applies to both of the front shock absorber assemblies.

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

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

Ring nut wrench
90890-01268
Spanner wrench
YU-01268

Direction “a”
Spring preload is increased (suspension is harder).

Direction “b”
Spring preload is decreased (suspension is softer).

Spring preload adjusting positions
Minimum
1
Standard
3
Maximum
5

EAS29320
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 surface.

2. Check:
   • Damper rod
     Bends/damage → Replace the rear shock absorber assembly.
     Refer to “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” on page 4-67.
   • Oil leakage
     Excessive oil leakage → Replace the rear shock absorber assembly.
     Refer to “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” on page 4-67.
   • Spring
     Fatigue → Replace the rear shock absorber assembly.
     Refer to “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” on page 4-67.

3. Check:
   • Operation
     Pump the rear shock absorber assembly up and down several times.
     Rough operation → Replace rear shock absorber assembly.
     Refer to “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” on page 4-67.
ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLIES
The following procedure applies to both of the rear shock absorber assemblies.

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

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

   **Ring nut wrench**
   90890-01268
   **Spanner wrench**
   YU-01268

   **Direction “a”**
   Spring preload is increased (suspension is harder).

   **Direction “b”**
   Spring preload is decreased (suspension is softer).

   **Spring preload adjusting positions**
   Minimum 1
   Standard 3
   Maximum 5

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

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

**Tire characteristics**

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

**Front tire**
- **Type**
  Tubeless
- **Size**
  AT25 × 8–12
- **Manufacturer/model**
  DUNLOP/KT421

**Rear tire**
- **Type**
  Tubeless
- **Size**
  AT25 × 10–12
- **Manufacturer/model**
  DUNLOP/KT425

**Tire pressure**

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

Front
250 kPa (2.5 kgf/cm², 36 psi)
Rear
250 kPa (2.5 kgf/cm², 36 psi)

Higher pressures and fast inflation may cause a tire to burst. Inflate the tires very slowly and carefully.

<table>
<thead>
<tr>
<th>Tire air pressure (measured on cold tires)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommended</strong></td>
</tr>
<tr>
<td>Front</td>
</tr>
<tr>
<td>35 kPa (0.35 kgf/cm², 5.0 psi)</td>
</tr>
<tr>
<td>Rear</td>
</tr>
<tr>
<td>30 kPa (0.30 kgf/cm², 4.4 psi)</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
</tr>
<tr>
<td>Front</td>
</tr>
<tr>
<td>32 kPa (0.32 kgf/cm², 4.6 psi)</td>
</tr>
<tr>
<td>Rear</td>
</tr>
<tr>
<td>27 kPa (0.27 kgf/cm², 4.0 psi)</td>
</tr>
</tbody>
</table>

**Maximum loading limit**

EWA14970

**WARNING**

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

<table>
<thead>
<tr>
<th>Maximum loading limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>220.0 kg (485 lb)</td>
</tr>
<tr>
<td>(Total weight of rider, cargo, accessories, and tongue)</td>
</tr>
<tr>
<td>Front carrier</td>
</tr>
<tr>
<td>45.0 kg (99 lb)</td>
</tr>
<tr>
<td>Rear carrier</td>
</tr>
<tr>
<td>85.0 kg (187 lb)</td>
</tr>
<tr>
<td>Front storage compartment</td>
</tr>
<tr>
<td>0.5 kg (1 lb)</td>
</tr>
<tr>
<td>Rear storage compartment</td>
</tr>
<tr>
<td>2.0 kg (4 lb)</td>
</tr>
<tr>
<td>Trailer hitch</td>
</tr>
<tr>
<td>Pulling load (total weight of trailer and cargo)</td>
</tr>
<tr>
<td>5880 N (600 kgf, 1322 lbf)</td>
</tr>
<tr>
<td>Tongue weight (vertical weight on trailer hitch point)</td>
</tr>
<tr>
<td>147 N (15 kgf, 33 lbf)</td>
</tr>
</tbody>
</table>

1. Measure:
   • Tire pressure
     Out of specification → Adjust.

**TIP**

- The low-pressure tire gauge “1” is included as standard equipment.
- In order to ensure an accurate reading, make sure that the gauge is clean before use.

**WARNING**

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

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

**WARNING**

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

   TIP
   Always balance the wheel when a tire or wheel has been changed or replaced.

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 cable)

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

   Recommended lubricant
   Silicone grease

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

   Recommended lubricant
   Lithium-soap-based grease
ELECTRICAL SYSTEM

CHECKING AND CHARGING THE BATTERY
Refer to “ELECTRICAL COMPONENTS” on page 9-75.

CHECKING THE FUSES
Refer to “ELECTRICAL COMPONENTS” on page 9-75.

REPLACING THE HEADLIGHT BULBS
The following procedure applies to both of the headlight bulbs.
1. Remove:
   • Cover at the rear of the headlight “1”

2. Remove:
   • Headlight bulb cover “1”

3. Disconnect:
   • Headlight coupler “1”

4. Remove:
   • Headlight bulb holder “1”

   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.

   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.

5. Install:
   • Headlight bulb

6. Install:
   • Headlight bulb holder

7. Connect:
   • Headlight coupler

8. Install:
   • Headlight bulb cover
   • Cover at the rear of the headlight

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”.

   NEW
   • Headlight bulb “2”
Direction “a”
Headlight beam is raised.
Direction “b”
Headlight beam is lowered.
CHASSIS

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Removing the engine 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 engine skid plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Center engine skid plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear engine skid plate</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>

7 Nm (0.7 m · kg, 5.1 ft · lb)
Removing the seat and side panels

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seat</td>
<td>1</td>
<td><strong>TIP</strong> Pull up the seat lock lever, then pull up on the rear of the seat.</td>
</tr>
<tr>
<td>2</td>
<td>Battery cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fuel tank cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Left side panel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Right side panel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dipstick accessing panel</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
Removing the front carrier and front guard

Order | Job/Parts to remove | Q'ty | Remarks |
---|---|---|---|
1 | Front engine skid plate | | Refer to “Removing the engine skid plates”. |
2 | Front carrier | 1 | |
3 | Front carrier bracket | 2 | |
4 | Battery holding bracket | 1 | Disconnect.
5 | Battery lead | 2 | **NOTICE** First disconnect the negative battery lead, then disconnect the positive lead.
6 | Battery | 1 | |
7 | Upper panel | 1 | |
8 | Front guard | 1 | |
9 | Front guard cover | 2 | For installation, reverse the removal procedure.

**NOTICE**

ECA38P0103

First disconnect the negative battery lead, then disconnect the positive lead.
Removing the front fenders and front grill

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seat/Side panels</td>
<td>Refer to &quot;Removing the seat and side panels&quot;.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front carrier/Front guard</td>
<td>Refer to &quot;Removing the front carrier and front guard&quot;.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Front fender inner panel</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Auxiliary DC jack coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Main switch coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Front fender</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Headlight coupler</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Front grill</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

7 Nm (0.7 m·kg, 5.1 ft·lb)
Removing the rear carrier and rear fender

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rear carrier</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rear carrier bracket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Storage compartment</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Tail/brake light cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Tail/brake light connector</td>
<td>3</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Rear fender</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

Refer to “Removing the seat and side panels”.

** torques:**
- 7 Nm (0.7 m·kg, 5.1 ft·lb)
- 34 Nm (3.4 m·kg, 24 ft·lb)
- 53 Nm (5.3 m·kg, 38 ft·lb)
INSTALLING THE REAR FENDER

1. Install:
   - Rear fender

---

Rear fender bolt
7 Nm (0.7 m·kg, 5.1 ft·lb)

---

TIP

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

---

Diagram showing the rear fender bolt locations with numbers 1 and 2.
## Removing the electrical components tray 1/2

**Order** | **Job/Parts to remove** | **Q'ty** | **Remarks**
--- | --- | --- | ---
1 | Front fender/Front grill | 1 | Refer to “Removing the front fenders and front grill”.
2 | Battery holding bracket | 1 | Disconnect.
2 | Battery lead | 2 | **NOTICE**
| | | | First disconnect the negative battery lead, then disconnect the positive lead.
3 | Battery | 1 | 
4 | Lean angle sensor coupler | 1 | Disconnect.
5 | Lean angle sensor | 1 | 
6 | Four-wheel-drive motor relay 1 | 1 | 
7 | Four-wheel-drive motor relay 2 | 1 | 
8 | Headlight relay | 1 | 
9 | EPS control unit coupler | 5 | Disconnect. YFM5FGP/YFM7FGP only
10 | EPS (electric power steering) control unit | 1 | YFM5FGP/YFM7FGP only
11 | ECU coupler | 2 | Disconnect.
12 | ECU (engine control unit) | 1 | 

*NOTICE*  
10 Nm (0.7 m·kg, 5.1 ft·lb)
Removing the electrical components tray 1/2

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>ECU bracket</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>14</td>
<td>Radiator fan motor coupler</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
### Removing the electrical components tray 2/2

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Starter relay coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Starter relay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fuse box</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>EPS fuse</td>
<td>1</td>
<td>YFM5FGP/YFM7FGP only</td>
</tr>
<tr>
<td>5</td>
<td>Main fuse</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Spare fuse</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Radiator fan motor relay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Fuel injection system relay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Four-wheel-drive motor relay 3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Left handlebar switch coupler</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>11</td>
<td>On-command four-wheel-drive motor switch and differential gear lock switch coupler</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>12</td>
<td>Front brake light switch connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>13</td>
<td>Rear brake light switch connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>14</td>
<td>Meter assembly coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>15</td>
<td>Meter assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Frame ground terminal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Ignition coil connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
</tbody>
</table>
Removing the electrical components tray 2/2

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Differential motor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>19</td>
<td>Wire harness</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Electrical components tray</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
Removing the footrest boards

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seat/Side panels</td>
<td></td>
<td>Refer to “Removing the seat and side panels”.</td>
</tr>
<tr>
<td>1</td>
<td>Footrest</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Footrest board</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Footrest bracket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
INSTALLING THE FOOTREST BOARDS
The following procedure applies to both of the footrest boards.

1. Install:
   - Footrest board

<table>
<thead>
<tr>
<th>Footrest board bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
</tr>
</tbody>
</table>

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

2. Install:
   - Footrest

<table>
<thead>
<tr>
<th>Footrest bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
</tr>
</tbody>
</table>

   **TIP**
   Install the footrest with the oval hole “a” facing inward.
## Removing the air filter case

**Diagram:**
- Air filter case cover (1)
- Air filter element (2)
- Air filter element frame (3)
- Intake air temperature sensor coupler (4)
- Air filter case joint clamp screw (5)
- Cylinder head breather hose (6)
- Air filter case (7)
- Intake air temperature sensor (8)

### 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>Air filter case cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Air filter element</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Air filter element frame</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Intake air temperature sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Air filter case joint clamp screw</td>
<td>1</td>
<td>Loosen.</td>
</tr>
<tr>
<td>6</td>
<td>Cylinder head breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Air filter case</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Intake air temperature sensor</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

### Notes:
- **Seat/Side panels:** Refer to “Removing the seat and side panels”.
- **7 Nm (0.7 m·kg, 5.1 ft·lb):** Used for tightening.

---

**New Parts:**
- Air filter case cover
- Air filter element
- Air filter element frame
- Intake air temperature sensor coupler
- Air filter case joint clamp screw
- Cylinder head breather hose
- Air filter case
- Intake air temperature sensor
Removing the front wheels and brake discs

The following procedure applies to both of the front wheels.

Place the vehicle on a level surface.

1. Front wheel
2. Wheel cap
3. Front wheel axle nut
4. Front brake caliper assembly
5. Front wheel hub
6. Front brake disc

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>Front wheel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Wheel cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Front wheel axle nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Front brake caliper assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Front wheel hub</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Front brake disc</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**TIP**
Do not squeeze the front brake lever when the brake caliper is off of the brake disc as the brake pads will be forced shut.
FRONT WHEELS

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

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

3. Remove:
   • Front brake calipers

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

CHECKING THE FRONT WHEELS
The following procedure applies to both of the front wheels.
1. Check:
   • Tire
   • Wheel

   Refer to “CHECKING THE TIRES” on page 3-32 and “CHECKING THE WHEELS” on page 3-34.

2. Measure:
   • Radial wheel runout “1”
   • Lateral wheel runout “2”

   Over the specified limit → Replace the wheel or check the wheel bearing play.

   Refer to “CHECKING THE STEERING KNUCKLES AND FRONT WHEEL BEARINGS” on page 4-56.

<table>
<thead>
<tr>
<th>Radial wheel runout limit</th>
<th>2.0 mm (0.08 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lateral wheel runout limit</td>
<td>2.0 mm (0.08 in)</td>
</tr>
</tbody>
</table>

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.

CHECKING THE FRONT WHEEL HUBS
The following procedure applies to both of the front wheel hubs.
1. Check:
   • Wheel hub “1”
   Cracks/damage → Replace.
   • Splines (wheel hub) “2”
   Wear/damage → Replace the wheel hub.
INSTALLING THE FRONT BRAKE DISCS
The following procedure applies to both of the front brake discs.

1. Install:
   • Brake disc

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

   **Brake disc bolt**
   30 Nm (3.0 m·kg, 22 ft·lb)
   LOCTITE®

2. Check:
   • Brake disc
   Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-26

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

1. Install:
   • Wheel axle nut

   **TIP**
   The arrow mark “1” on the tire must point in the direction of wheel rotation.

   **Wheel axle nut**
   260 Nm (26.0 m·kg, 190 ft·lb)

2. Tighten:
   • Wheel nuts “1”

   **Wheel nut**
   55 Nm (5.5 m·kg, 40 ft·lb)

   **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 rear wheels and brake discs

**The following procedure applies to both of the rear wheels.**

**Place the vehicle on a level surface.**

**New**

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rear wheel</td>
<td>1</td>
<td><strong>TIP</strong> Do not squeeze the rear brake lever and brake pedal when the brake caliper is off of the brake disc as the brake pads will be forced shut.</td>
</tr>
<tr>
<td>2</td>
<td>Wheel cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear wheel axle nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rear brake caliper assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear wheel hub</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>6</td>
<td>Rear brake disc</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**30 Nm (3.0 m·kg, 22 ft·lb)**

**55 Nm (5.5 m·kg, 40 ft·lb)**

**260 Nm (26.0 m·kg, 190 ft·lb)**
REAR WHEELS

REMOVING THE REAR WHEELS
1. Place the vehicle on a level surface.
2. Elevate:
   • Rear wheels
TIP
Place the vehicle on a suitable stand so that the rear wheels are elevated.
3. Remove:
   • Rear brake calipers
TIP
Do not apply the brake lever and depress the brake pedal when removing the brake calipers.

CHECKING THE REAR WHEELS
The following procedure applies to both of the rear wheels.
1. Check:
   • Tire
   • Wheel
     Refer to “CHECKING THE TIRES” on page 3-32 and “CHECKING THE WHEELS” on page 3-34.
2. Measure:
   • Radial wheel runout
   • Lateral wheel runout
     Refer to “CHECKING THE FRONT WHEELS” on page 4-15.
     Over the specified limit → Replace the wheel or check the wheel bearing play.
     Refer to “CHECKING THE REAR KNUCKLES AND REAR WHEEL BEARINGS” on page 4-66.

   Radial wheel runout limit
   2.0 mm (0.08 in)
   Lateral wheel runout limit
   2.0 mm (0.08 in)

3. Check:
   • Wheel balance
     Refer to “CHECKING THE FRONT WHEELS” on page 4-15.

CHECKING THE REAR WHEEL HUBS
The following procedure applies to both of the rear wheel hubs.
1. Check:
   • Wheel hub “1”
     Cracks/damage → Replace.
   • Splines (wheel hub) “2”
     Wear/damage → Replace.

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

   Brake disc bolt
   30 Nm (3.0 m·kg, 22 ft·lb)
   LOCTITE®

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

INSTALLING THE REAR WHEEL HUBS
The following procedure applies to both of the rear wheel hubs.
1. Install:
   • Wheel axle nut

   Wheel axle nut
   260 Nm (26.0 m·kg, 190 ft·lb)

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.
2. Check:
   • Brake disc
     Refer to “CHECKING THE REAR BRAKE DISCS” on page 4-38.

INSTALLING THE REAR WHEELS
The following procedure applies to both of the rear wheels.
1. Install:
   • Wheel

**TIP**
The arrow mark “1” on the tire must point in the direction of wheel rotation.

2. Tighten:
   • Wheel nuts “1”

| Wheel nut | 55 Nm (5.5 m·kg, 40 ft·lb) |

**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

- Front brake caliper bolt
- Brake pad holding bolt plug
- Brake pad holding bolt
- Front brake pad
- Brake pad spring

**Order** | **Job/Parts to remove** | **Q’ty** | **Remarks**
--- | --- | --- | ---
Front wheel | Refer to “FRONT WHEELS” on page 4-14.
1 | Front brake caliper bolt | 2 | The following procedure applies to both of the front brake calipers.
2 | Brake pad holding bolt plug | 1 | For installation, reverse the removal procedure.
3 | Brake pad holding bolt | 1 | 
4 | Front brake pad | 2 | 
5 | Brake pad spring | 1 | 

- 30 Nm (3.0 m·kg, 22 ft·lb)
- 17 Nm (1.7 m·kg, 12 ft·lb)
- 5 Nm (0.5 m·kg, 3.6 ft·lb)
Removing the front brake master cylinder

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Brake fluid</td>
<td></td>
<td>Drain. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.</td>
</tr>
<tr>
<td></td>
<td>On-command four-wheel-drive motor switch and differential gear lock switch</td>
<td></td>
<td>Refer to “HANDLEBAR” on page 4-44.</td>
</tr>
<tr>
<td>1</td>
<td>Brake fluid reservoir cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake fluid reservoir diaphragm holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake fluid reservoir diaphragm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Front brake lever cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake lever</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Copper washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Front brake hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>9</td>
<td>Front brake light switch connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>10</td>
<td>Front brake light switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Front brake master cylinder holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Front brake master cylinder</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

**Torque Specifications**

- **6 Nm (0.6 m·kg, 4.3 ft·lb)**
- **7 Nm (0.7 m·kg, 5.1 ft·lb)**
- **27 Nm (2.7 m·kg, 19 ft·lb)**

**FWD TechSparkStudio.com**
Disassembling the front brake master cylinder

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake master cylinder kit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake master cylinder body</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>
Removing the front brake calipers

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

**Brake fluid**
Drain. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

**Front wheel**
Refer to “FRONT WHEELS” on page 4-14.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Copper washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Front brake hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Brake pad holding bolt plug</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake pad holding bolt</td>
<td>1</td>
<td>Loosen.</td>
</tr>
<tr>
<td>6</td>
<td>Front brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Front brake caliper assembly</td>
<td>1</td>
<td>For installation, reverse the removal proced-ure.</td>
</tr>
</tbody>
</table>
Disassembling the front brake calipers

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brake pad holding bolt</td>
<td>1</td>
<td>The following procedure applies to both of 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 piston</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake caliper dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Brake caliper piston seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bleed screw</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>

\[
\text{FWD} \quad 5 \text{Nm (0.5 m \cdot kg, 3.6 ft \cdot lb)}
\]

\[
\text{17 Nm (1.7 m \cdot kg, 12 ft \cdot lb)}
\]
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 split brake fluid immediately.
- Avoid brake fluid coming into contact with the eyes as it can cause serious injury.
- FIRST AID FOR BRAKE FLUID ENTERING THE EYES:
  - Flush with water for 15 minutes and get immediate medical attention.

CHECKING THE FRONT BRAKE DISCS

The following procedure applies to both brake discs.

1. Remove:
   - Front wheel
     Refer to “FRONT WHEELS” on page 4-14.

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.

Front brake disc bolt
30 Nm (3.0 m·kg, 22 ft·lb)
LOCTITE®

TIP
Install the brake disc so that the recessed portion of the bolt hole faces away from the hub.
d. Measure the brake disc deflection.
e. If out of specification, repeat the adjustment steps until the brake disc deflection is within specification.
f. If the brake disc deflection cannot be brought within specification, replace the brake disc.

6. Install:
   • Front wheels
   Refer to “FRONT WHEELS” on page 4-14.

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

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

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

   Brake pad lining thickness (inner)
   4.4 mm (0.17 in)
   Limit
   1.0 mm (0.04 in)
   Brake pad lining thickness (outer)
   4.4 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 a new 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 piston into the brake caliper with your finger.
   c. Tighten the bleed screw.

   **Bleed screw**
   5 Nm (0.5 m·kg, 3.6 ft·lb)

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

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

   **Brake pad holding bolt**
   17 Nm (1.7 m·kg, 12 ft·lb)
   **Brake caliper bolt**
   30 Nm (3.0 m·kg, 22 ft·lb)

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

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

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

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

! 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.

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

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

   a. Blow compressed air into the brake hose joint opening “a” to force out the piston 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 dust seal and brake caliper piston seal.

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

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

! WARNING
- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- Never use solvents on internal brake components as they will cause the piston seals to swell and distort.

Recommended brake component replacement schedule

<table>
<thead>
<tr>
<th>Component</th>
<th>Replacement Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake pads</td>
<td>If necessary</td>
</tr>
<tr>
<td>Piston seals, dust seals</td>
<td>Every two years</td>
</tr>
<tr>
<td>Brake hoses</td>
<td>Every four years</td>
</tr>
<tr>
<td>Brake fluid</td>
<td>Every two years and whenever the brake is disassembled</td>
</tr>
</tbody>
</table>

Techsparkstudio.com
Whenever a brake caliper is disassembled, replace the brake caliper piston seal and dust seal.

Recommended fluid
DOT 4

EWA22440
INSTALLING THE FRONT BRAKE CALIPERS
The following procedure applies to both of the brake calipers.
1. Install:
   • Brake caliper assembly
   • Brake caliper bolts “1”
   • Brake hose “2”
   • Copper washers “3” New
e   • Brake hose union bolt “4”

Brake caliper bolt
30 Nm (3.0 m·kg, 22 ft·lb)
Brake hose union bolt
27 Nm (2.7 m·kg, 19 ft·lb)

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

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

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

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

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

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

CHECKING THE FRONT BRAKE MASTER CYLINDER
1. Check:
   • Brake master cylinder
     Damage/scratches/wear → Replace.
   • Brake fluid delivery passages
     (brake master cylinder body)
     Obstruction → Blow out with compressed air.

2. Check:
   • Brake master cylinder kit
     Damage/scratches/wear → Replace.

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

**WARNING**
• Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
• Never use solvents on internal brake components.
• Whenever a master cylinder is disassembled, replace the brake master cylinder kit.

**Recommended fluid**
DOT 4

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

**TIP**
• Align the end of the brake master cylinder holder with the punch mark “a” on the handlebar.
• Install the brake master cylinder holder with the “UP” mark “b” facing up.
• Install the brake master cylinder holder so that the gaps between the brake master cylinder and the brake master cylinder holder are equal.

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

**Brake master cylinder holder bolt**
7 Nm (0.7 m·kg, 5.1 ft·lb)

**TIP**
• While holding the brake hose, tighten the union bolt as shown.
• Turn the handlebar to the left and right to make sure the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.

3. Install:
• Front brake lever cover “1”

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

**TIP**
• Do not fit the hole “b” in the front brake lever cover over the nut at this time.
• The hole “a” in the front brake lever cover is smaller than the bolt head; therefore, the hole will expand as it fits over the bolt head.
c. Fit the hole “b” in the front brake lever cover over the nut.

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

<table>
<thead>
<tr>
<th>Recommended fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOT 4</td>
</tr>
</tbody>
</table>

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>The following procedure applies to both of the rear brake calipers.</td>
</tr>
<tr>
<td>Rear wheel</td>
<td></td>
<td></td>
<td>Refer to “REAR WHEELS” on page 4-18.</td>
</tr>
<tr>
<td>1</td>
<td>Rear brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake pad holding bolt plug</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake pad holding bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rear brake pad</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake pad spring</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

\[5 \text{Nm} (0.5 \text{m} \cdot \text{kg}, 3.6 \text{ft} \cdot \text{lb})\]

\[17 \text{Nm} (1.7 \text{m} \cdot \text{kg}, 12 \text{ft} \cdot \text{lb})\]

\[30 \text{Nm} (3.0 \text{m} \cdot \text{kg}, 22 \text{ft} \cdot \text{lb})\]
Removing the rear brake master cylinder

### 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>Brake fluid</td>
<td>Drain. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Brake fluid reservoir cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake fluid reservoir diaphragm holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake fluid reservoir diaphragm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rear brake lever cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Shift control cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Rear brake cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Brake lever</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Brake lever bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Copper washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Rear brake hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>12</td>
<td>Rear brake light switch connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>13</td>
<td>Rear brake light switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Rear brake master cylinder holder</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the rear brake master cylinder

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Rear brake master cylinder</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>
Disassembling the rear brake master cylinder

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake master cylinder kit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake master cylinder body</td>
<td>1</td>
<td>For assembly, reverse the disassembly pro-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cedure.</td>
</tr>
</tbody>
</table>
Removing the rear brake calipers

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

- Brake fluid: Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
- Rear wheel: Refer to "REAR WHEELS" on page 4-18.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Copper washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear brake hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Brake pad holding bolt plug</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake pad holding bolt</td>
<td>1</td>
<td>Loosen.</td>
</tr>
<tr>
<td>6</td>
<td>Rear brake caliper bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rear brake caliper assembly</td>
<td>1</td>
<td>For installation, reverse the removal 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 holding bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake pad</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake pad spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake caliper bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake caliper piston</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake caliper dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Brake caliper piston seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bleed screw</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.
Disc brake components rarely require disassembly. Therefore, always follow these preventive measures:

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

CHECKING THE REAR BRAKE DISCS
The following procedure applies to both brake discs.

1. Remove:
   - Rear wheel
     Refer to “REAR WHEELS” on page 4-18.

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

3. Measure:
   - Brake disc deflection
     Out of specification → Correct the brake disc deflection or replace the brake disc.
     Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-26.

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

5. Adjust:
   - Brake disc deflection
     Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-26.

6. Install:
   - Rear wheels
     Refer to “REAR WHEELS” on page 4-18.

REPLACING THE REAR BRAKE PADS
TIP
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

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

2. Install:
   - Brake pad spring
   - Brake pads
Always install new brake pads and a brake pad spring as a set.

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

Loosen the bleed screw and push the brake caliper piston into the brake caliper with your finger.

Tighten the bleed screw.

<table>
<thead>
<tr>
<th>Bleed screw</th>
<th>5 Nm (0.5 m-km, 3.6 ft-lb)</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th>Brake pad holding bolt</th>
<th>17 Nm (1.7 m-km, 12 ft-lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake caliper bolt</td>
<td>30 Nm (3.0 m-km, 22 ft-lb)</td>
</tr>
</tbody>
</table>

Check:
- Brake fluid level
  Below the minimum level mark → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.
- Brake lever and pedal operation
  Soft or spongy feeling → Bleed the brake system. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

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.

The brake lever pivot bolt and nut have left-handed threads. To loosen the pivot bolt and nut, turn them clockwise.

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

1. Remove:
- Brake caliper piston “1”
- Brake caliper dust seal “2”
- Brake caliper piston seal “3”
b. Remove the brake caliper dust seal and brake caliper piston seal.

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

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

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>Recommended fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOT 4</td>
</tr>
</tbody>
</table>

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

Recommended fluid
DOT 4

Brake caliper bolt
30 Nm (3.0 m·kg, 22 ft·lb)

Brake hose union bolt
27 Nm (2.7 m·kg, 19 ft·lb)
When installing the brake hose onto the brake caliper, make sure the brake pipe touches the projection “a” on the brake caliper.

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

   ![Recommended 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 fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

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

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

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

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

**CHECKING THE REAR BRAKE MASTER CYLINDER**

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

2. Check:
   • Brake master cylinder kit
     Damage/scratches/wear → Replace.

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

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

**ASSEMBLING THE REAR BRAKE MASTER CYLINDER**

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

   **WARNING**
   • Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
   • Never use solvents on internal brake components.
   • Whenever a master cylinder is disassembled, replace the brake master cylinder kit.

![Recommended fluid DOT 4](image)

**INSTALLING THE REAR BRAKE MASTER CYLINDER**

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

   **WARNING**
   • Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
   • Never use solvents on internal brake components.
   • Whenever a master cylinder is disassembled, replace the brake master cylinder kit.

   **Brake master cylinder holder bolt 7 Nm (0.7 m·kg, 5.1 ft·lb)**
TIP

- Align the end of the brake master cylinder holder with the punch mark “a” on the handlebar.
- Install the brake master cylinder holder with the “UP” mark “b” facing up.
- Install the brake master cylinder holder so that the gaps between the brake master cylinder and the brake master cylinder holder are equal.

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

Brake hose union bolt
27 Nm (2.7 m-kg, 19 ft-lb)

TIP

- While holding the brake hose, tighten the union bolt as shown.
- Turn the handlebar to the left and right to make sure the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.

3. Install:
- Brake lever bracket

Brake lever pivot bolt
6 Nm (0.6 m-kg, 4.3 ft-lb)
Brake lever pivot nut
6 Nm (0.6 m-kg, 4.3 ft-lb)

NOTICE

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

4. Install:
- Rear brake lever cover “1”

TIP

Fit the holes in the rear brake lever cover over the bolt head “a” and nut “b”.

5. Fill:
- Brake master cylinder reservoir

Recommended fluid
DOT 4

WARNING

Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.

Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.

When refilling, be careful that water does not enter the brake master cylinder reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

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

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

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

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Handlebar cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Plastic band</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>On-command four-wheel-drive motor switch and differential gear lock switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Throttle lever assembly holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Throttle lever assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Front brake light switch connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Front brake master cylinder holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Front brake master cylinder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Rear brake light switch connector</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>10</td>
<td>Rear brake master cylinder holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Rear brake master cylinder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Left handlebar switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Handlebar grip</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Handlebar holder</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
Removing the handlebar

![Diagram of handlebar removal]

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Handlebar</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
REMOVING THE HANDLEBAR
1. Place the vehicle on a level surface.
2. Remove:
   • Handlebar grip “1”

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

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

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

INSTALLING THE HANDLEBAR
1. Place the vehicle on a level surface.
2. Install:
   • Handlebar
   • Handlebar holders
   • Handlebar holder bolt
     20 Nm (2.0 m·kg, 14 ft·lb)

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

WARNING
Do not touch the handlebar grip until the rubber adhesive has fully dried.
4. Install:
- Left handlebar switch
- Rear brake master cylinder “1”
- Rear brake master cylinder holder “2”

**TIP**
- Align the end of the brake master cylinder holder with the punch mark “a” on the handlebar.
- The “UP” mark “b” on the brake master cylinder holder should face up.
- Install the brake master cylinder holder so that the gaps between the brake master cylinder and the brake master cylinder holder are equal.

```
Rear brake master cylinder holder bolt
7 Nm (0.7 m·kg, 5.1 ft·lb)
```

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

**TIP**
- Align the end of the brake master cylinder holder with the punch mark “a” on the handlebar.
- The “UP” mark “b” on the brake master cylinder holder should face up.

```
Front brake master cylinder holder bolt
7 Nm (0.7 m·kg, 5.1 ft·lb)
```

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

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

```
Rear brake master cylinder holder bolt
7 Nm (0.7 m·kg, 5.1 ft·lb)
```

```
Front brake master cylinder holder bolt
7 Nm (0.7 m·kg, 5.1 ft·lb)
```
Removing the steering stem (for YFM5FG/YFM7FG)

<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>Lock washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cable guide</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Steering stem bushing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Collar</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Oil seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Tie-rod end nut</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Tie-rod</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>Pitman arm nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Pitman arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Steering stem</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Steering stem support</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Order Job/Parts to remove**

- Front fender/Air filter case/Electrical components tray

  Refer to "GENERAL CHASSIS" on page 4-1

- Handlebar

  Refer to "HANDLEBAR" on page 4-44

**Q'ty**

- Lock washer: 1
- Cable guide: 1
- Steering stem bushing: 2
- Collar: 2
- Oil seal: 2
- Tie-rod end nut: 2
- Tie-rod: 2
- Pitman arm nut: 1
- Pitman arm: 1
- Steering stem: 1
- Steering stem support: 1
- Oil seal: 1
- Oil seal: 1

**Remarks**

- Newparts are marked with "New".
- Torque values are given in Nm (Newton meters) and lb-ft (pounds-feet).

- 23 Nm (2.3 m·kg, 17 ft·lb)
- 51 Nm (5.1 m·kg, 37 ft·lb)
- 30 Nm (3.0 m·kg, 22 ft·lb)
- 25 Nm (2.5 m·kg, 18 ft·lb)
- 190 Nm (19.0 m·kg, 140 ft·lb)
- 51 Nm (5.1 m·kg, 37 ft·lb)
Removing the steering stem (for YFM5FG/YFM7FG)

<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>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Steering stem bracket</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
Removing the steering stem (for YFM5FGP/YFM7FGP)

**Order** | Job/Parts to remove | Q'ty | Remarks
--- | --- | --- | ---
Front fender/ Air filter case/ Electrical components tray | Refer to “GENERAL CHASSIS” on page 4-1
Handlebar | Refer to “HANDLEBAR” on page 4-44
1 | Lock washer | 1 | 
2 | Cable guide | 1 | 
3 | Steering stem bushing | 2 | 
4 | Collar | 2 | 
5 | Oil seal | 2 | 
6 | Tie-rod end nut | 2 | 
7 | Tie-rod | 2 | Disconnect. 
8 | Pitman arm nut | 1 | 
9 | Pitman arm | 1 | 
10 | Steering stem joint bolt | 2 | 
11 | Steering stem | 1 | 
12 | Collar | 1 | 
13 | Bearing nut | 1 | 
14 | Collar | 1 | 
15 | Steering stem bearing | 1 | 

**T.R.**
51 Nm (5.1 m · kg, 37 ft · lb)

125 Nm (12.5 m · kg, 90 ft · lb)

7 Nm (0.7 m · kg, 5.1 ft · lb)

210 Nm (21.0 m · kg, 150 ft · lb)

23 Nm (2.3 m · kg, 17 ft · lb)

125 Nm (12.5 m · kg, 90 ft · lb)

30 Nm (3.0 m · kg, 22 ft · lb)

35 Nm (3.5 m · kg, 25 ft · lb)

7 Nm (0.7 m · kg, 5.1 ft · lb)

51 Nm (5.1 m · kg, 37 ft · lb)

25 Nm (2.5 m · kg, 18 ft · lb)

6

51 Nm (5.1 m · kg, 37 ft · lb)

25 Nm (2.5 m · kg, 18 ft · lb)

6

51 Nm (5.1 m · kg, 37 ft · lb)

6

51 Nm (5.1 m · kg, 37 ft · lb)

25 Nm (2.5 m · kg, 18 ft · lb)

6

7 Nm (0.7 m · kg, 5.1 ft · lb)

51 Nm (5.1 m · kg, 37 ft · lb)

25 Nm (2.5 m · kg, 18 ft · lb)
Removing the steering stem (for YFM5FGP/YFM7FGP)

**NOTICE**

ECA28P1008

The EPS unit should not be disassembled.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Steering stem joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>EPS motor breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>EPS motor cover</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
| 19    | EPS unit                  | 1    | **NOTICE**
The EPS unit should not be disassembled. |
| 20    | Steering stem bracket     | 1    | For installation, reverse the removal proce-|
|       |                           |      | dure.                                        |
CHECKING THE STEERING STEM
1. Check:
   • Steering stem
     Bends → Replace.

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

2. Check:
   • Oil seals
   • Steering stem bushings
     Wear/damage → Replace.

3. Check: (YFM5FGP/YFM7FGP only)
   • Steering stem joint
     Cracks/damage → Replace.

INSTALLING THE STEERING STEM (for YFM5FG/YFM7FG)
1. Install:
   • Cable guide
   • Lock washer New
   • Steering stem bolts

TIP
• Bend the lock washer tab "a" along a flat side of the bolt.
• Pass the cable and hoses through the cable guide. Refer to "CABLE ROUTING" on page 2-33.

1. Install:
   • EPS unit “1”
   • Washers
   • EPS unit bolts “2”

   EPS unit bolt
   30 Nm (3.0 m·kg, 22 ft·lb)

   LOCTITE®

2. Install:
   • Steering stem “3”
   • Steering stem bearing “4”
   • Collar “5”
   • Bearing nut “6”

   Bearing nut
   125 Nm (12.5 m·kg, 90 ft·lb)

TIP
Install the steering stem bearing with the “UP” mark facing up.

3. Install:
   • Oil seals “7” New
   • Collars “8”
   • Steering stem bushings “9”
   • Cable guide “10”
   • Lock washer “11” New
   • Steering stem bracket “12”
• Steering stem bolts “13”
  (temporarily tighten)

**TIP**

Apply lithium-soap-based grease to the oil seals and steering stem bushings.

4. Install:
   • Collar “14”
   • Steering stem joint “15”
   • Steering stem joint bolts “16”
     (temporarily tighten)

**TIP**

• Apply LOCTITE® to the steering stem joint bolts.
• Align the spline “a” on the steering stem with the groove “b” in the steering stem joint.
• Align the punch mark “c” on the EPS unit with the groove “d” in the steering stem joint.

5. Tighten:
   • Steering stem bracket bolts “17”
   • Steering stem bearing bolts “18”
   • Steering stem joint bolts “16”

### Steering stem bracket bolt
51 Nm (5.1 m·kg, 37 ft·lb)
LOCTITE®

### Steering stem bearing bolt
51 Nm (5.1 m·kg, 37 ft·lb)
LOCTITE®

### Steering stem joint bolt
35 Nm (3.5 m·kg, 25 ft·lb)

6. Tighten:
   • Steering stem bolts “13”

**TIP**

• Bend the lock washer tab “e” along a flat side of the bolt.

---

**Pass the cable and hoses through the cable guide. Refer to “CABLE ROUTING” on page 2-33.**

---

**INSTALLING THE PITMAN ARM (for YFM5FG/YFM7FG)**

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

---

**Pitman arm nut**
190 Nm (19.0 m·kg, 140 ft·lb)

**TIP**

Align the groove “a” in the pitman arm with the steering stem spline “b” that is indented.

---

**INSTALLING THE PITMAN ARM (for YFM5FGP/YFM7FGP)**

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

---

**Pitman arm nut**
210 Nm (21.0 m·kg, 150 ft·lb)
TIP

Align the punch mark “a” on the EPS unit with the groove “b” in the pitman arm.
Removing the tie-rods and steering knuckles

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

Front wheel hub Refer to “FRONT WHEELS” on page 4-14

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brake disc guard</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Front arm protector</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tie-rod</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Steering knuckle</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>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Rubber boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Ball joint</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>Wheel bearing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
TIE-RODS AND STEERING KNUCKLES

EAS29670

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

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

EAS29680

CHECKING THE TIE-RODS
The following procedure applies to both of the tie-rods.
1. Check:
   • Tie-rod free play and movement
     Free play → Replace the tie-rod end.
     Rough movement → Replace the tie-rod end.
2. Check:
   • Tie-rod
     Bends/damage → Replace.

EWA15040

Eye protection is recommended when using striking tools.

ECA16190

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

EAS28P1030

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.
     Free play → Replace the ball joint.
     Rough movement → Replace the ball joint.

EAS29690

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 bearing “1”
     Rough movement/excessive free play → Replace.

a. Clean the surface of the steering knuckle.
b. Remove the circlip “1”, clip “2” and rubber boot “3”.

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

NOTICE
Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.
c. Remove the ball joint “4”.

**TIP**
Use a ball joint remover “5” to separate the ball joint “4” from the steering knuckle “6”.

| Ball joint remover | 90890-01474 | YM-01474 |

| Ball joint remover attachment set | 90890-01480 |
| Ball joint adapter set | YM-01480 |
| Ball joint remover short shaft set | 90890-01514 | YM-01514 |

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

**Ball joint bore inside diameter**
32.45–32.50 mm (1.278–1.280 in)

e. Attach the ball joint remover/attachment set/short shaft set and new ball joint (with rubber boot and retaining ring) “7” to the steering knuckle “8”.

**TIP**
- Always use a new ball joint set.

f. Hold the base “12” in place while turning in the short bolt “14” to install the new ball joint “7” into the steering knuckle “8”.

g. Remove the ball joint remover/attachment set/short shaft set.

h. Apply lithium-soap-based grease to the new ball joint.
i. Install a new circlip.

---

**INSTALLING THE TIE-RODS**

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

1. Install:
   - Tie-rod

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

2. Adjust:
   - Toe-in
     - Refer to “ADJUSTING THE TOE-IN” on page 3-29.

---

**INSTALLING THE FRONT ARM PROTECTORS**

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

1. Install:
   - Front arm protector “1”

   **a.** Fit the holders “a” on the front arm protector onto the lower arm.

   **b.** Tighten the nut “b”.

---
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.

<table>
<thead>
<tr>
<th>Number</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front wheel hub</td>
<td>Refer to “FRONT WHEELS” on page 4-14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front brake caliper assembly</td>
<td>Refer to “FRONT BRAKE” on page 4-21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Brake disc guard</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Front arm protector</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Front brake hose holder</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Nut/bolt</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Front shock absorber assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Nut/bolt</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Front upper arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Nut/bolt</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>
</tbody>
</table>
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>
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</thead>
<tbody>
<tr>
<td>13</td>
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</tr>
<tr>
<td>14</td>
<td>Circlip</td>
<td>1</td>
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</tr>
<tr>
<td>15</td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Rubber boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Ball joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</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.

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.
     Free play → Replace the ball joint.
     Rough movement → Replace the ball joint.

a. Clean the surface of the front upper arm.
b. Remove the circlip “1”, clip “2” and rubber boot “3”.

c. Attach the ball joint remover/attachment set to the ball joint (front upper arm) “4”.

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

   - Front shock absorber rod
     Bends/damage → Replace the front shock absorber assembly.

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

Ball joint remover
90890-01474
YM-01474

Ball joint remover attachment set
90890-01480

Ball joint adapter set
YM-01480
d. Hold the base “11” in place while turning in the long bolt “5” to remove the ball joint “4” from the front upper arm “12”.

e. Remove the ball joint remover/attachment set.

f. Attach the ball joint remover/attachment set and new ball joint (with rubber boot and retaining ring) “13” to the front upper arm “12”.

**TIP**

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

g. Hold the base “11” in place while turning in the long bolt “5” to install the new ball joint “13” into the front upper arm “12”.

h. Remove the ball joint remover/attachment set.

i. Apply lithium-soap-based grease to the new ball joint.

j. 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

**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”.

c. Install the steering knuckle, upper steering knuckle nut “8”, and lower steering knuckle nut “9”.
d. Install the new cotter pins.
e. Tighten the front upper and lower arm nuts “4” to specification.

---

## Upper steering knuckle nut
25 Nm (2.5 m·kg, 18 ft·lb)

## Lower steering knuckle nut
30 Nm (3.0 m·kg, 22 ft·lb)

---

### INSTALLING THE FRONT ARM PROTECTORS

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

1. Install:
   - Front arm protector “1”

---

## Front arm protector nut
7 Nm (0.7 m·kg, 5.1 ft·lb)

---

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

---

## Front arm nut
45 Nm (4.5 m·kg, 32 ft·lb)
### 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>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>The following procedure applies to both of the rear knuckles.</td>
</tr>
<tr>
<td>Rear wheel hub</td>
<td></td>
<td></td>
<td>Refer to “REAR WHEELS” on page 4-18</td>
</tr>
<tr>
<td>1</td>
<td>Brake disc guard</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear arm protector</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rear arm protector holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear brake hose protector</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Rear brake hose holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rear knuckle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Spacer cover</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Spacer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Wheel bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Stabilizer joint</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Stabilizer holder</td>
<td>2</td>
<td></td>
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</tbody>
</table>
Removing the rear knuckles and stabilizer

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>14</td>
<td>Bushing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>15</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 bearing “1”
     Rough movement/excessive free play → Replace.

a. Clean the surface of the rear knuckle.
b. Remove the circlip “2”.
c. Drive out the bearing.

WARNING
Eye protection is recommended when using striking tools.

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

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

f. Install the new circlip.

CHECKING THE STABILIZER

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

INSTALLING THE REAR ARM PROTECTORS

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

1. Install:
   • Rear arm protector “1”
   • Rear arm protector holder “2”
Removing 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.

<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 knuckle/Stabilizer</td>
<td></td>
<td>The following procedure applies to both of</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the rear upper arms, rear lower arms, and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>rear shock absorber assemblies.</td>
</tr>
<tr>
<td>1</td>
<td>Rear brake hose guide</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Nut/Washer/Bolt</td>
<td>2/1/2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear shock absorber assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Nut/Bolt</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear upper arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dust cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Nut/Bolt</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Rear lower arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Dust cover</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bushing</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
CHECKING THE REAR ARMS
The following procedure applies to both of the rear upper arms and rear lower arms.
1. Check:
   • Rear arm free play

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

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

   Bends/damage → Replace.

3. Check:
   • Bushings
     Wear/damage → Replace.

CHECKING THE REAR SHOCK ABSORBER ASSEMBLIES
The following procedure applies to both of the rear shock absorber assemblies.
1. Check:
   • Rear shock absorber assembly
     Oil leaks → Replace the rear shock absorber assembly.
   • Rear shock absorber rod
     Bends/damage → Replace the rear shock absorber assembly.
   • Spring
     Move the spring up and down.
     Fatigue → Replace the rear shock absorber assembly.

INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES
The following procedure applies to both of the rear upper arms, rear lower arms, and rear shock absorber assemblies.
1. Install:
   • Rear upper arm
   • Rear lower arm
   • Rear shock absorber assembly

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

   TIP
   • Lubricate the rear upper and lower arm bolts “3” with lithium-soap-based grease.
   • Be sure to position the rear upper and lower arm bolts “3” so that the bolt heads face outward.
   • 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
   45 Nm (4.5 m·kg, 32 ft·lb)

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

   ▶️ Rear knuckle nut
   45 Nm (4.5 m·kg, 32 ft·lb)

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

   ▶️ Rear arm nut
   45 Nm (4.5 m·kg, 32 ft·lb)
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Removing the V-belt cooling ducts, muffler and exhaust pipe

### Order

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<th>Job/Parts to remove</th>
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<th>Remarks</th>
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<tbody>
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<td>1</td>
<td>V-belt cooling exhaust duct</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>V-belt cooling exhaust duct joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>V-belt cooling intake duct joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>V-belt cooling intake duct</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Exhaust pipe protector</td>
<td>1</td>
<td></td>
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<tr>
<td>6</td>
<td>Spring</td>
<td>2</td>
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<td>7</td>
<td>Muffler</td>
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<td>8</td>
<td>Gasket</td>
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<td>9</td>
<td>Muffler bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Exhaust pipe</td>
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<td></td>
</tr>
<tr>
<td>11</td>
<td>Gasket</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

### Notes
- Front fender/Rear fender/Left footrest board/Air filter case/Meter assembly
- Refer to “GENERAL CHASSIS” on page 4-1.
- **Torque: 20 Nm (2.0 m·kg, 14 ft·lb)**
- **Torque: 7 Nm (0.7 m·kg, 5.1 ft·lb)**
- **Torque: 14 Nm (1.4 m·kg, 10 ft·lb)**
INSTALLING THE MUFFLER

1. Install:
   • Gaskets “1”
   • Exhaust pipe “2”
   • Exhaust pipe nuts “3”

   Exhaust pipe nut
   14 Nm (1.4 m·kg, 10 ft·lb)

2. Install:
   • Muffler bracket “4”
   • Muffler bracket bolts “5”

   Muffler bracket bolt
   20 Nm (2.0 m·kg, 14 ft·lb)

3. Install:
   • Gasket “6”
   • Muffler “7”
   • Washer “8”
   • Muffler bolt “9”

   TIP
   Do not fully tighten the muffler bolt.

4. Install:
   • Springs “10”

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

5. Tighten:
   • Muffler bolt “9”

   Muffler bolt
   20 Nm (2.0 m·kg, 14 ft·lb)

INSTALLING THE V-BELT COOLING DUCTS

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

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

   a. Position the V-belt cooling intake duct joint with its arrow mark “a” pointing toward the engine.
   b. Align the projection on the V-belt cooling intake duct joint with the rib on the crankcase in the area “b” shown in the illustration.
   c. Align the screw head with the seam on the V-belt cooling intake duct joint in the area “c” shown in the illustration.
   d. Align the projection on the V-belt cooling intake duct with the projection on the V-belt cooling intake duct joint in the area “d” shown in the illustration.
   e. Align the bend in the screw clamp with the projection on the V-belt cooling intake duct joint in the area “e” shown in the illustration.
2. Install:
   - V-belt cooling exhaust duct joint “1”
   - V-belt cooling exhaust duct “2”

a. Position the V-belt cooling exhaust duct joint with its arrow mark “a” pointing toward the engine.
b. Align the projection on the V-belt cooling exhaust duct joint with the projection on the drive belt case in the area “b” shown in the illustration.
c. Align the screw head with the arrow mark “a” on the V-belt cooling exhaust duct joint in the area “c” shown in the illustration.
d. Align the projection on the V-belt cooling exhaust duct with the projection on the V-belt cooling exhaust duct joint in the area “d” shown in the illustration.
e. Align the screw head with the rib on the V-belt cooling exhaust duct in the area “e” shown in the illustration.
Removing the drive select lever unit

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drive select lever shift rod</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Drive select lever unit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Shift arm</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

**Torque Specifications**
- 7 Nm (0.7 m·kg, 5.1 ft·lb)
- 14 Nm (1.4 m·kg, 10 ft·lb)
INSTALLING THE DRIVE SELECT LEVER UNIT

1. Install:
   - Shift arm “1”
   - Drive select lever unit “2”
   - Drive select lever shift rod “3”

<table>
<thead>
<tr>
<th>Component</th>
<th>Torque Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift arm bolt</td>
<td>14 Nm (1.4 m·kg, 10 ft·lb)</td>
</tr>
<tr>
<td>LOCTITE®</td>
<td></td>
</tr>
<tr>
<td>Drive select lever unit bolt</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
</tr>
<tr>
<td>Drive select lever shift rod lock-nut</td>
<td>7 Nm (0.7 m·kg, 5.1 ft·lb)</td>
</tr>
</tbody>
</table>

**TIP**

- Make sure that the drive select lever and transmission are in “N” (neutral).
- The installed length “a” of the shift rod is 413 mm (16.3 in).
### Disconnecting the leads, cables and hoses

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Footrest board/Air filter case</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td></td>
<td>Throttle body assembly</td>
<td></td>
<td>Refer to “THROTTLE BODY” on page 7-4.</td>
</tr>
<tr>
<td></td>
<td>Fuel tank/Fuel tank shield</td>
<td></td>
<td>Refer to “FUEL TANK” on page 7-1.</td>
</tr>
<tr>
<td></td>
<td>Coolant reservoir</td>
<td></td>
<td>Refer to “RADIATOR” on page 6-1.</td>
</tr>
<tr>
<td></td>
<td>Thermostat</td>
<td></td>
<td>Refer to “THERMOSTAT” on page 6-4.</td>
</tr>
<tr>
<td></td>
<td>Water pump assembly</td>
<td></td>
<td>Refer to “WATER PUMP” on page 6-7.</td>
</tr>
<tr>
<td></td>
<td>Oil delivery pipe 2</td>
<td></td>
<td>Refer to “CYLINDER HEAD” on page 5-10.</td>
</tr>
<tr>
<td></td>
<td>Oil delivery pipe 1</td>
<td></td>
<td>Refer to “AC MAGNETO AND STARTER CLUTCH” on page 5-34.</td>
</tr>
<tr>
<td></td>
<td>Differential assembly</td>
<td></td>
<td>Refer to “FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT” on page 8-3.</td>
</tr>
<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 8-15.</td>
</tr>
<tr>
<td></td>
<td>Starter motor</td>
<td></td>
<td>Refer to “ELECTRIC STARTER” on page 5-40.</td>
</tr>
</tbody>
</table>

\[ \begin{align*} \text{\textbf{Remarks}} & 17 \text{Nm (1.7 m \cdot kg, 12 ft \cdot lb)} \end{align*} \]
### Disconnecting the leads, cables and hoses

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive belt case</td>
<td>Refer to “PRIMARY AND SECONDARY SHEAVES” on page 5-47.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Cylinder head breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Coolant temperature sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Spark plug cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Shift control cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Reverse switch lead</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Speed sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Crankshaft position sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>8</td>
<td>AC magneto coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>9</td>
<td>Gear position switch coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
</tbody>
</table>

17 Nm (1.7 m · kg, 12 ft · lb)

For installation, reverse the removal procedure.
Removing the engine

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rubber damper nut (front side)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Engine mounting bolt (rear upper side)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Engine mounting bolt (rear lower side)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Engine</td>
<td>1</td>
<td><strong>NOTICE</strong>&lt;br&gt;Make sure that the engine does not strike the brake pipe when removing it.</td>
</tr>
<tr>
<td>5</td>
<td>Rubber damper nut (rear side)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Rubber damper (rear side)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Engine mounting bolt (front upper side)</td>
<td>2</td>
<td><strong>TIP</strong>&lt;br&gt;Remove the engine from the left side of the vehicle.</td>
</tr>
<tr>
<td>8</td>
<td>Engine mounting bolt (front lower side)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Rubber damper (front side)</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
INSTALLING THE ENGINE

1. Install:
   - Rubber dampers (front side) “1”
   - Engine mounting bolts (front lower side) “2”
   - Engine mounting bolts (front upper side) “3”
   - Rubber dampers (rear side) “4”
   - Rubber damper nuts (rear side) “5”
   - Engine “6”
   - Engine mounting bolts (rear lower side) “7”
   - Engine mounting bolts (rear upper side) “8”
   - Rubber damper nuts (front side) “9”

2. Tighten:
   - Engine mounting bolts (front lower side) “2”
   - Engine mounting bolts (front upper side) “3”
   - Engine mounting bolts (rear lower side) “7”
   - Engine mounting bolts (rear upper side) “8”
   - Rubber damper nuts (front side) “9”
   - Rubber damper nuts (rear side) “5”

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

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine mounting bolt (front lower side)</td>
<td>42 (4.2 · kg, 30 · lb)</td>
</tr>
<tr>
<td>Engine mounting bolt (front upper side)</td>
<td>10 (1.0 · kg, 7.2 · lb)</td>
</tr>
<tr>
<td>Rubber damper nut (front side)</td>
<td>42 (4.2 · kg, 30 · lb)</td>
</tr>
<tr>
<td>Rubber damper nut (rear side)</td>
<td>42 (4.2 · kg, 30 · lb)</td>
</tr>
</tbody>
</table>

LOCTITE®
Removing the cylinder head

Order | Job/Parts to remove | Q’ty | Remarks
--- | --- | --- | ---
1 | Spark plug cap | 1 | Disconnect.
2 | Spark plug | 1 |
3 | Cylinder head breather hose | 1 |
4 | Camshaft sprocket cover | 1 |
5 | Tappet cover | 2 |
6 | Oil delivery pipe 2 | 1 |
7 | Oil check bolt | 1 |
8 | Timing chain tensioner cap bolt | 1 |
9 | Timing chain tensioner | 1 |
10 | Gasket | 1 |
11 | Camshaft sprocket | 1 |
12 | Decompressor assembly | 1 |
13 | Cylinder head | 1 |

Throttle body assembly

Thermostat/Coolant temperature sensor

V-belt cooling ducts/Exhaust pipe

Refer to “THROTTLE BODY” on page 7-4.

Refer to “THERMOSTAT” on page 6-4.

Refer to “ENGINE REMOVAL” on page 5-1.
Removing the cylinder head

**Order** | **Job/Parts to remove** | **Q’ty** | **Remarks**
---|---|---|---
14 | Cylinder head gasket | 1 | 
15 | Dowel pin | 2 | For installation, reverse the removal procedure.
CYLINDER HEAD

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”

3. Loosen:
   • Timing chain tensioner cap bolt

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

5. Remove:
   • Cylinder head

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.

NOTICE

Do not use a sharp instrument; otherwise, the following may be damaged or scratched:
• Spark plug bore threads
• Valve seats
3. Measure:
   • Cylinder head warpage
     Out of specification → Resurface the cylinder head.

Warpage limit
0.03 mm (0.0012 in)

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

b. Measure the warpage.

c. If the limit is exceeded, resurface the cylinder head as follows.
d. Place a 400–600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

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

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.
INSTALLING THE CYLINDER HEAD

1. Install:
   • Cylinder head gasket
   • Dowel pins
2. Install:
   • Cylinder head
   • Cylinder head bolts

### Cylinder head bolts “1”
Length: 135 mm (5.31 in)

### Cylinder head bolts “2”
Length: 145 mm (5.71 in)

**TIP**

- Lubricate the cylinder head bolt “1” and “2” threads and mating surface with molybdenum disulfide grease.
- Lubricate the cylinder head bolts “3” threads and mating surface with engine oil.
- Tighten the cylinder head bolts in the proper tightening sequence as shown and torque them in two stages.

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

   **TIP**

When installing the camshaft sprocket, be sure to keep the timing chain as tight as possible on the exhaust side.

**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

   **TIP**

   a. Remove the timing chain tensioner cap bolt “1”, copper washer “2” and spring “3”.
   b. Release the timing chain tensioner one-way cam “4” and push the timing chain tensioner rod “5” all the way into the timing chain tensioner housing.
   c. Install the timing chain tensioner and gasket “6” onto the cylinder.

   **Timing chain tensioner bolt**
   10 Nm (1.0 m-kg, 7.2 ft-lb)
**TIP**

Install the gasket with its beaded side facing the timing chain tensioner end.

d. Install the spring, copper washer and timing chain tensioner cap bolt.

<table>
<thead>
<tr>
<th>Timing chain tensioner cap bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>20 Nm (2.0 m·kg, 14 ft·lb)</strong></td>
</tr>
</tbody>
</table>

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.

**NOTICE**

Be sure to tighten the camshaft sprocket bolts to the specified torque 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 3-4.
Removing the rocker arms and camshaft

### Order

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cylinder head</td>
<td></td>
<td>Refer to &quot;CYLINDER HEAD&quot; on page 5-10.</td>
</tr>
<tr>
<td>1</td>
<td>Bearing retainer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rocker arm shaft</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Intake rocker arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Exhaust rocker arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Locknut</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Valve adjusting screw</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
| 7     | Camshaft                  | 1    | **NOTICE**
For installation, reverse the removal procedure. |
| 8     | Decompressor lever        | 1    |                                              |
| 9     | Decompressor lever pin    | 1    |                                              |
| 10    | Bearing                   | 1    |                                              |

**NOTICE**

Do not disassemble the camshaft assembly.
REMOVING THE ROCKER ARMS AND CAMSHAFT

1. Loosen:
   - Locknuts
   - Valve clearance 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”.

<table>
<thead>
<tr>
<th>Slide hammer bolt</th>
<th>90890-01083</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slide hammer bolt 6 mm</td>
<td>YU-01083-1</td>
</tr>
<tr>
<td>Weight</td>
<td>90890-01084</td>
</tr>
<tr>
<td></td>
<td>YU-01083-3</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Camshaft lobe dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake A</td>
</tr>
<tr>
<td>43.488–43.588 mm (1.7121–1.7161 in)</td>
</tr>
<tr>
<td>Limit 43.388 mm (1.7082 in)</td>
</tr>
<tr>
<td>Intake B</td>
</tr>
<tr>
<td>36.959–37.059 mm (1.4551–1.4590 in)</td>
</tr>
<tr>
<td>Limit 36.859 mm (1.4511 in)</td>
</tr>
<tr>
<td>Exhaust A</td>
</tr>
<tr>
<td>43.129–43.229 mm (1.6980–1.7019 in)</td>
</tr>
<tr>
<td>Limit 43.029 mm (1.6941 in)</td>
</tr>
<tr>
<td>Exhaust B</td>
</tr>
<tr>
<td>37.007–37.107 mm (1.4570–1.4609 in)</td>
</tr>
<tr>
<td>Limit 36.907 mm (1.4530 in)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Camshaft runout limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.015 mm (0.0006 in)</td>
</tr>
</tbody>
</table>
CHECKING THE DECOMPRESSION SYSTEM
1. Check:
   • Decompression system

   a. Check the decompression system with the camshaft sprocket installed on the decompressor lever and pin 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.

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

   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” (onto the cylinder head)
ROCKER ARMS AND CAMSHAFT

TIP

- Apply engine oil to the bearing.
- Install the bearing so that the seal is facing “a” the camshaft.

TIP

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

Installed depth
0 mm (0 in)

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

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

TIP

Install the decompressor lever pin “1” and decompressor lever “2” in the camshaft “3” as shown in the illustration.

TIP

5. Lubricate:
   - Rocker arms
   - Rocker arm shafts

   Recommended lubricant
   - Camshaft
     Molybdenum disulfide oil
   - Camshaft bearing, decompressor lever pin, decompressor lever
     Molybdenum disulfide grease
   - Engine oil

4. Install:
   - Camshaft “1”

5. Lubricate:
   - 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.

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

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

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
Removing the valves and valve springs

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cylinder head</td>
<td></td>
<td>Refer to “CYLINDER HEAD” on page 5-10.</td>
</tr>
<tr>
<td></td>
<td>Rocker arms/Rocker arm shafts/Camshaft</td>
<td></td>
<td>Refer to “ROCKER ARMS AND CAM-SHAFT” on page 5-17.</td>
</tr>
<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.
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 5-24.

   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”

---

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

**Valve spring compressor attachment**
90890-01243

**Valve spring compressor adapter (26 mm)**
YM-01253-1
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.

```
Valve-stem-to-valve-guide clearance (intake) 0.010–0.037 mm (0.0004–0.0015 in)
Limit 0.080 mm (0.0031 in)
Valve-stem-to-valve-guide clearance (exhaust) 0.025–0.052 mm (0.0010–0.0020 in)
Limit 0.100 mm (0.0039 in)
```

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

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

```
Valve guide position 12.7–13.1 mm (0.50–0.52 in)
```

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

```
Valve guide remover (ø6) 90890-04064
Valve guide remover (6.0 mm) YM-04064-A
Valve guide installer (ø6) 90890-04065
Valve guide installer (6.0 mm) YM-04065-A
Valve guide reamer (ø6) 90890-04066
Valve guide reamer (6.0 mm) YM-04066
```

3. Eliminate:
• Carbon deposits
  (from the valve face and valve seat)
4. Check:
   • Valve face
     Pitting/wear → Grind the valve face.
   • Valve stem end
     Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
5. Measure:
   • Valve margin thickness “a”
     Out of specification → Replace the valve.

   | Valve margin thickness D (intake) | 0.80–1.20 mm (0.0315–0.0472 in) |
   | Limit                           | 0.4 mm (0.02 in)                |
   | Valve margin thickness D (exhaust) | 0.80–1.20 mm (0.0315–0.0472 in) |
   | Limit                           | 0.4 mm (0.02 in)                |

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

   | Valve stem runout | 0.040 mm (0.0016 in) |

**TIP**

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

**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 Mechanic’s blueing dye (Dykem) “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.
Where the valve seat and valve face contacted one another, the blueing will have been removed.

4. Lap:
   - Valve face
   - Valve seat

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

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

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

b. Apply molybdenum disulfide oil onto the valve stem.

c. Install the valve into the cylinder head.

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

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

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

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

g. Apply Mechanic’s blueing dye (Dykem) “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.
2. Measure:
  • Compressed valve spring force “a”
    Out of specification → Replace the valve spring.

3. Measure:
  • Valve spring tilt “a”
    Out of specification → Replace the valve spring.

### Installed compression spring force

- **(intake)**
  - Free length: 40.38 mm (1.59 in)
  - Limit: 38.36 mm (1.51 in)
  - Installed compression spring force: 171.00–197.00 N (17.44–20.09 kgf, 38.44–44.29 lbf)
- **(exhaust)**
  - Free length: 40.38 mm (1.59 in)
  - Limit: 38.36 mm (1.51 in)
  - Installed compression spring force: 171.00–197.00 N (17.44–20.09 kgf, 38.44–44.29 lbf)

### Installed length

- **(intake)**
  - Installed length: 35.00 mm (1.38 in)
- **(exhaust)**
  - Installed length: 35.00 mm (1.38 in)

### Recommended lubricant

- Molybdenum disulfide oil

### INSTALLING THE VALVES

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

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

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

---

<table>
<thead>
<tr>
<th><strong>Valve spring compressor</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>90890-04019</td>
</tr>
<tr>
<td>YM-04019</td>
</tr>
<tr>
<td><strong>Valve spring compressor attachment</strong></td>
</tr>
<tr>
<td>90890-01243</td>
</tr>
<tr>
<td><strong>Valve spring compressor adapter (26 mm)</strong></td>
</tr>
<tr>
<td>YM-01253-1</td>
</tr>
</tbody>
</table>
Removing the cylinder and piston

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Timing chain guide (exhaust side)</td>
<td>1</td>
<td>Refer to “CYLINDER HEAD” on page 5-10.</td>
</tr>
<tr>
<td>2</td>
<td>Cylinder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cylinder gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Piston pin clip</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Piston pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Piston</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Top ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>2nd ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Oil ring</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

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
When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.

TIP
Measure cylinder bore “C” by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.
b. If out of specification, replace the cylinder, and replace the piston and piston rings as a set.

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

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

e. Calculate the piston-to-cylinder clearance with the following formula.

\[ \text{Piston-to-cylinder clearance} = \text{Cylinder bore “C”} - \text{Piston skirt diameter “D”} \]

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

---

**CHECKING THE PISTON RINGS**

1. Measure:
   - Piston ring side clearance
     - Out of specification → Replace the piston and piston rings as a set.

**TIP**

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

---

**Diameter D**

- 91.955–91.970 mm (3.6203–3.6209 in) (YFM5FGY/YFM5FGPY)
- 101.955–101.970 mm (4.0140–4.0146 in) (YFM7FGY/YFM7FGPY)

---

**Bore**

- 92.000–92.010 mm (3.6220–3.6224 in) (YFM5FGY/YFM5FGPY)
- 102.000–102.010 mm (4.0157–4.0161 in) (YFM7FGY/YFM7FGPY)

**Wear limit**

- 92.080 mm (3.6252 in) (YFM5FGY/YFM5FGPY)
- 102.080 mm (4.0189 in) (YFM7FGY/YFM7FGPY)

**Taper limit**

- 0.05 mm (0.002 in)
- Out of round limit
  - 0.05 mm (0.002 in)

---

**Top ring**

- Ring side clearance
  - 0.030–0.070 mm (0.0012–0.0028 in) (YFM5FGY/YFM5FGPY)
  - 0.020–0.060 mm (0.0008–0.0024 in) (YFM7FGY/YFM7FGPY)
  - 0.030–0.070 mm (0.0012–0.0028 in) (YFM7FGY/YFM7FGPY)

**Limit**

- 0.12 mm (0.0047 in)
- 0.13 mm (0.0051 in) (YFM7FGY/YFM7FGPY)

---

**2nd ring**

- Ring side clearance
  - 0.030–0.070 mm (0.0012–0.0028 in) (YFM5FGY/YFM5FGPY)
  - 0.030–0.070 mm (0.0012–0.0028 in) (YFM7FGY/YFM7FGPY)

**Limit**

- 0.12 mm (0.0047 in)
- 0.13 mm (0.0051 in) (YFM7FGY/YFM7FGPY)

---

**Oil ring**

- Ring side clearance
  - 0.04–0.13 mm (0.0016–0.0051 in) (YFM5FGY/YFM5FGPY)
  - 0.060–0.150 mm (0.0024–0.0059 in) (YFM7FGY/YFM7FGPY)
2. Install:
  • Piston ring
    (into the cylinder)

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

3. Measure:
  • Piston ring end gap
    Out of specification → Replace the piston ring.

  The oil ring expander spacer end gap cannot be measured. If the oil ring rail gap is excessive, replace all three piston rings.

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”
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’s marks or numbers face up.

2. Install:
   • Piston “1”
   • Piston pin “2”
   • Piston pin clips “3” New

TIP
Apply engine oil to the piston pin.
Make sure the punch mark “a” on the piston points towards the exhaust side of the cylinder.
Before installing the piston pin clips, cover the crankcase opening with a clean rag to prevent the clips from falling into the crankcase.

3. Install:
   • Cylinder gasket New

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.
Pass the timing chain and timing chain guide (exhaust side) through the timing chain cavity.

7. Install:
   • Cylinder bolts “1”

TIP
Lubricate the cylinder bolt “1” threads and mating surface with engine oil.

Piston-pin-to-piston-pin-bore clearance
0.004–0.024 mm (0.0002–0.0009 in)
Limit
0.0740 mm (0.0029 in)

Recommended lubricant
Engine oil

<table>
<thead>
<tr>
<th>a. Top ring</th>
<th>b. Oil ring expander</th>
<th>c. Upper oil ring rail</th>
<th>d. Lower oil ring rail</th>
<th>e. 2nd ring</th>
</tr>
</thead>
</table>

A. Exhaust side
8. Tighten:
• Cylinder bolts “1”
• Cylinder bolts (timing chain side) “2”

| Cylinder bolt | 1st        | 15 Nm (1.5 m·kg, 11 ft·lb) |
|               | 2nd        | 50 Nm (5.0 m·kg, 36 ft·lb) |
| Cylinder bolt (timing chain side) | 10 Nm (1.0 m·kg, 7.2 ft·lb) |
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>Engine oil</td>
<td></td>
<td>Drain. Refer to “CHANGING THE ENGINE OIL” on page 3-10.</td>
<td></td>
</tr>
<tr>
<td>Coolant</td>
<td></td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-17.</td>
<td></td>
</tr>
<tr>
<td>Left footrest board</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
<td></td>
</tr>
<tr>
<td>Drive select lever unit</td>
<td></td>
<td>Refer to “ENGINE REMOVAL” on page 5-1.</td>
<td></td>
</tr>
<tr>
<td>Water pump</td>
<td></td>
<td>Refer to “WATER PUMP” on page 6-7.</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Oil delivery pipe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>AC magneto coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Crankshaft position sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Lead holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>AC magneto cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>AC magneto cover gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Lead holder</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the AC magneto and starter clutch

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Crankshaft position sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Stator coil</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Torque limiter</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Starter idle gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Starter idle gear shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>AC magneto rotor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Starter clutch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Woodruff key</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Starter wheel gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
REMOVING THE AC MAGNETO ROTOR

1. Remove:
   • Lead holder “1”
   • 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

NOTICE
To protect the end of the crankshaft, place an appropriate sized socket between the flywheel puller set center bolt and the crankshaft.

TIP
• Use the flywheel puller “2”.
• Install the flywheel puller bolts to the threaded holes of the starter clutch.
• Make sure the flywheel puller is centered over the AC magneto rotor.

REMMOVING 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.
CHECKING THE STATOR COIL AND CRANKSHAFT POSITION SENSOR
1. Check:
   • Stator coil “1”
   • Crankshaft position sensor “2”
     Damage → Replace the crankshaft position sensor/stator assembly.

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
• 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.

Starter clutch bolt
30 Nm (3.0 m·kg, 22 ft·lb)
LOCTITE®

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A
INSTALLING THE AC MAGNETO

1. Install:
   • Stator coil “1”

   **Stator coil bolt**
   7 Nm (0.7 m·kg, 5.1 ft·lb)
   **LOCTITE®**

   **TIP**
   Align the projection “a” on the stator coil with the slot “b” in the AC magneto cover.

2. Apply:
   • Sealant “1”
     (onto the crankshaft position sensor/stator assembly lead grommet)

   **Yamaha bond No. 1215**
   90890-85505
   (Three Bond No.1215®)

3. Install:
   • Woodruff key

4. Tighten:
   • AC magneto rotor nut “1”

   **AC magneto rotor nut**
   60 Nm (6.0 m·kg, 43 ft·lb)

   **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.

5. Install:
   • AC magneto cover
   • Lead holder “1”
   • AC magneto cover bolts

   **AC magneto cover bolt**
   10 Nm (1.0 m·kg, 7.2 ft·lb)

   **TIP**
   Tighten the AC magneto cover bolts in stages, using a crisscross pattern.
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>Starter motor lead</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>2</td>
<td>Ground 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>
<tr>
<td></td>
<td>Muffler</td>
<td></td>
<td>Refer to &quot;ENGINE REMOVAL&quot; on page 5-1.</td>
</tr>
</tbody>
</table>

10 Nm (1.0 m·kg, 7.2 ft·lb)

11 Nm (1.1 m·kg, 8.0 ft·lb)
Disassembling the starter motor

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Starter motor front cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Starter motor rear cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brush holder set</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Armature assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Starter motor yoke</td>
<td>1</td>
<td>For assembly, reverse the disassembly pro-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cedure.</td>
</tr>
</tbody>
</table>

New

11 Nm (1.1 m·kg, 8.0 ft·lb)

5 Nm (0.5 m·kg, 3.6 ft·lb)
CHECKING THE STARTER MOTOR

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

2. Measure:
   • Mica undercut “a”
     Out of specification → Cut the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

   ![Mica undercut (depth)]
   0.70 mm (0.03 in)

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

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

4. Measure:
   • Brush length “a”
     Out of specification → Replace the brushes as a set.

   ![Brush overall length]
   12.0 mm (0.47 in)
   Limit
   6.50 mm (0.26 in)

5. Measure:
   • Brush spring force
     Out of specification → Replace the brush springs as a set.

   ![Brush spring force]

6. Check:
   • Gear teeth
     Damage/wear → Replace the gear.
7. Check:
   • Bearing
   • Oil seal
     Damage/wear → Replace the defective part(s).

ASSEMBLING THE STARTER MOTOR
1. Install:
   • Starter motor yoke “1”
   • Starter motor front cover “2”
   • Starter motor rear cover “3”

TIP
Align the alignment marks “a” on the starter motor yoke with the match marks “b” on the front and starter motor rear covers.
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>1</td>
<td>Lock washer</td>
<td>1</td>
<td>Refer to “AC MAGNETO AND STARTER CLUTCH” on page 5-34.</td>
</tr>
<tr>
<td>2</td>
<td>Balancer driven gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oil pump drive gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Chain</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Straight key</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Lock washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oil pump driven gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Spring</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Pin</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Balancer drive gear</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

**Notes:**
- 80 Nm (8.0 m·kg, 58 ft·lb)
- 22 Nm (2.2 m·kg, 16 ft·lb)
REMOVING THE BALANCER DRIVEN GEAR AND OIL PUMP DRIVEN GEAR
1. Straighten the lock washer tabs.
2. Loosen:
   • Balancer driven gear nut “1”
   • Oil pump driven gear nut “2”

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

CHECKING THE OIL PUMP DRIVE
1. Check:
   • Oil pump drive gear
   • Oil pump driven gear
Cracks/wear/damage → Replace.

CHECKING THE BALANCER DRIVE
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 GEAR
1. Install:
   • Pin
   • Spring
   • Balancer drive gear
(onto the buffer boss)

TIP
Align the punch mark “a” on the balancer drive gear with the hole “b” to the buffer boss.

2. Install:
   • Balancer drive gear “1”
   • Balancer driven gear “2”
   • Oil pump driven gear “3”

TIP
• Align the punch mark “a” on the balancer drive gear with the punch mark “b” on the balancer driven gear.
• Install the oil pump driven gear with the “3B4” mark “c” facing out.

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

TIP
• Place an aluminum plate “3” between the teeth of the balancer drive gear “4” and balancer driven gear “5”, then tighten the nuts.
• Apply the engine oil to the thread of axles and nuts.
4. Bend the lock washer tabs along the balancer driven gear nut and oil pump driven gear nut.
Removing the primary and secondary sheaves

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drive belt cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rubber gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bearing housing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Primary sheave assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>V-belt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Primary fixed sheave</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Secondary sheave assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Drive belt case</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Rubber gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Rubber gasket</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

For installation, reverse the removal proce-
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>Collar</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>

* Apply Yamaha Grizzly grease.

\[3 \text{ Nm (0.3 m \cdot kg, 2.2 ft \cdot lb)}\]
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>Nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>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>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>For assembly, reverse the disassembly pro-</td>
</tr>
</tbody>
</table>

---

* Apply BEL-RAY assembly lube®.
REMOVING THE PRIMARY AND SECONDARY SHEAVES

1. Loosen:
   - Secondary sheave nut “1”
   - Primary sheave nut “2”

TIP

- Use the sheave holder “3” to hold the primary sheave.
- First, loosen the secondary sheave nut “2”, then loosen the primary sheave nut “1”.

DISASSEMBLING THE SECONDARY SHEAVE

1. Remove:
   - Nut “1”

   a. Attach the sheave fixed block “2”, locknut wrench “3” and sheave spring compressor “4” to the secondary sheave assembly.

   b. Place the sheave fixed block in a vise and secure it.

   c. Tighten the sheave spring compressor nut “5” and compress the spring.

   d. Loosen the nut “1” with the locknut wrench “3”.

   e. Remove the nut “1”.

   f. Remove the sheave spring compressor and locknut wrench.

CHECKING THE V-BELT

1. Check:
   - V-belt “1”
     Cracks/damage/wear → Replace.
     Grease/oil → Clean the primary and secondary sheave.

2. Measure:
   - V-belt width “a”
     Out of specification → Replace.

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheave holder</td>
<td>90890-01701</td>
</tr>
<tr>
<td>Primary clutch holder</td>
<td>YS-01880-A</td>
</tr>
<tr>
<td>Sheave fixed block</td>
<td>90890-04135</td>
</tr>
<tr>
<td>Sheave fixed bracket</td>
<td>YM-04135</td>
</tr>
<tr>
<td>Locknut wrench</td>
<td>90890-01348</td>
</tr>
<tr>
<td>YM-01348</td>
<td></td>
</tr>
<tr>
<td>Sheave spring compressor</td>
<td>90890-04134</td>
</tr>
<tr>
<td>YM-04134</td>
<td></td>
</tr>
<tr>
<td>V-belt width</td>
<td>33.3 mm (1.31 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>30.0 mm (1.18 in)</td>
</tr>
</tbody>
</table>
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 (1.16 in) Limit
   29.5 mm (1.16 in)

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.
ASSEMBLING THE PRIMARY SHEAVE

1. Clean:
   - Primary sliding sheave “1”
   - Primary fixed sheave “2”
   - Collar “3”
   - Primary sheave weights “4”
   - Primary sliding sheave cam face

TIP

Remove any excess grease.

ASSEMBLING THE SECONDARY SHEAVE

1. Install:
   - Oil seals “1” New

2. Install:
   - Oil seals “1” New

Installed depth “a”
0 mm (0 in)

2. Secondary sliding sheave

2. Lubricate:
   - Secondary sliding sheave “1”
• Secondary fixed sheave “2”
  (with the recommended lubricant)

TIP
Apply BEL-RAY assembly lube® (15 g) to the inner surface of the secondary fixed sheave.

3. Install:
  • Secondary sliding sheave
4. Install:
  • Guide pins “1”

5. Lubricate:
  • Guide pin grooves “1”
    (with the recommended lubricant)

TIP
Apply BEL-RAY assembly lube® (5.0 g) to the guide pin grooves.

6. Install:
  • Spring seat
  • Compression spring
  • Spring seat
  • Nut

a. Attach the sheave fixed block, locknut wrench and sheave spring compressor to the secondary sheave.

b. Place the sheave fixed block in a vise and secure it.
c. Tighten the sheave spring compressor nut “1” and compress the spring.
d. Install the nut “2” and tighten it to the specified torque using the locknut wrench.

e. Remove the sheave spring compressor, locknut wrench, and sheave fixed block.

Recommended lubricant
BEL-RAY assembly lube®
INSTALLING THE PRIMARY AND SECONDARY SHEAVES

1. Install:
   • Secondary sheave
   • V-belt
   • 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” 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).

3. Tighten:
   • Primary sheave nut “1”
   • Secondary sheave nut “2”

Primary sheave nut 140 Nm (14.0 m·kg, 100 ft·lb)
Secondary sheave nut 100 Nm (10.0 m·kg, 72 ft·lb)

TIP
   • Use the sheave holder “3” to hold the primary sheave.
   • First, tighten the primary sheave nut “1”, then tighten the secondary sheave nut “2”.

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

2. Check:
   • Primary sheave weights position
     Out of specification → Repeat step (1).
Removing the clutch

Order | Job/Parts to remove | Q'ty | Remarks
--- | --- | --- | ---
1 | Clutch housing assembly | 1 | Refer to "PRIMARY AND SECONDARY SHEAVES" on page 5-47.
2 | Gasket | 1 | 
3 | Dowel pin | 2 | 
4 | One-way clutch bearing | 1 | 
5 | Nut | 1 | 
6 | Clutch carrier assembly | 1 | 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>Circlip</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>Clutch housing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.
CLUTCH

REMOVING THE CLUTCH
1. Remove:
   • Clutch housing assembly
   • Gasket
   • Dowel pins

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 nut “1”
3. Remove:
   • Nut “1”

NOTICE
The clutch carrier assembly nut has lefthanded 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 assembly and clutch housing as a set.
• The one-way clutch bearing must be installed with the flange side facing in.

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
     Out of specification → Replace.

   Clutch shoe thickness
   1.5 mm (0.06 in)
   Limit
   1.0 mm (0.04 in)
ASSEMBLING THE CLUTCH HOUSING

1. Install:
   - Bearing “1”

   Installed depth “a”
   2.5–2.7 mm (0.10–0.11 in)

2. Clutch housing

2. Install:
   - Oil seal “1” New

   Installed depth “a”
   0 mm (0 in)

2. Bearing housing

INSTALLING THE CLUTCH

1. Install:
   - Clutch carrier assembly
   - Nut “1” New

2. Lock the threads with a drift punch.
3. Install:
   - One-way clutch bearing

   The one-way clutch bearing should be installed in the clutch carrier assembly with the “OUT SIDE” mark “a” facing toward the clutch housing.

4. Install:
   - Dowel pins
   - Gasket New
   - Clutch housing assembly

   Clutch housing assembly bolt
   10 Nm (1.0 m·kg, 7.2 ft·lb)

Clutch carrier assembly nut
190 Nm (19.0 m·kg, 140 ft·lb)

NOTICE

The clutch carrier assembly nut has left-handed threads. To tighten the clutch carrier assembly nut, turn it counterclockwise.

TIP

Use a clutch holding tool “2” to hold the clutch carrier assembly.

Universal clutch holder
90890-04086
YM-91042
TIP

- Tighten the bolts in stages, using a crisscross pattern.
- After tightening the bolts, check that the clutch housing assembly rotates smoothly.
Removing the timing chain and oil filter cartridge

### 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>Engine</td>
<td>Refer to “ENGINE REMOVAL” on page 5-1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cylinder head</td>
<td>Refer to “CYLINDER HEAD” on page 5-10.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cylinder/Piston</td>
<td>Refer to “CYLINDER AND PISTON” on page 5-28.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC magneto rotor/Starter wheel gear</td>
<td>Refer to “AC MAGNETO AND STARTER CLUTCH” on page 5-34.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balancer driven gear/Oil pump driven gear</td>
<td>Refer to “BALANCER GEARS AND OIL PUMP GEARS” on page 5-44.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary sheave assembly/Secondary sheave assembly</td>
<td>Refer to “PRIMARY AND SECONDARY SHEAVES” on page 5-47.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clutch carrier assembly</td>
<td>Refer to “CLUTCH” on page 5-56.</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 guide (lower)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Timing chain</td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td>Oil filter cartridge</td>
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<tr>
<td>5</td>
<td>Speed sensor</td>
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</tr>
<tr>
<td>6</td>
<td>Dipstick</td>
<td>1</td>
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</tbody>
</table>
Removing the timing chain and oil filter cartridge

<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>Relief valve assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Reverse switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Gear position switch</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
</tbody>
</table>


- 7 Nm (0.7 m·kg, 5.1 ft·lb)
- 17 Nm (1.7 m·kg, 12 ft·lb)
- 30 Nm (3.0 m·kg, 22 ft·lb)
- 30 Nm (3.0 m·kg, 22 ft·lb)
- 17 Nm (1.7 m·kg, 12 ft·lb)
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
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>1</td>
<td>Shift lever cover</td>
<td>1</td>
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</tr>
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<td>3</td>
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<td>5</td>
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<td>6</td>
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<td>7</td>
<td>Stopper lever stopper</td>
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<td>Spring identification color: red</td>
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</tr>
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<td>9</td>
<td>Dowel pin</td>
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<tr>
<td>10</td>
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For assembly, reverse the disassembly procedure.
Removing the crankcase bearings

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<th>Remarks</th>
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<tbody>
<tr>
<td>1</td>
<td>Crankshaft/Oil pump</td>
<td>1</td>
<td>Refer to “CRANKSHAFT AND OIL PUMP” on page 5-68.</td>
</tr>
<tr>
<td>2</td>
<td>Transmission</td>
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<td>Refer to “TRANSMISSION” on page 5-73</td>
</tr>
<tr>
<td>3</td>
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<td>1</td>
<td>Refer to “MIDDLE GEAR” on page 5-79</td>
</tr>
<tr>
<td>1</td>
<td>Collar</td>
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</tr>
<tr>
<td>2</td>
<td>O-ring</td>
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<td></td>
</tr>
<tr>
<td>3</td>
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<td>1</td>
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</tr>
<tr>
<td>4</td>
<td>Bearing retainer</td>
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<td>5</td>
<td>Spacer</td>
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<td>Crank seal</td>
<td>2</td>
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<tr>
<td>7</td>
<td>Bearing</td>
<td>9</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

10 Nm (1.0 m·kg, 7.2 ft·lb)
SEPARATING THE CRANKCASE

1. Remove:
   • Crankcase bolts
   • Lead holders

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:
   • Right crankcase
   • Dowel pins

NOTICE
Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate evenly.

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”

2. Thoroughly clean the crankcase mating surfaces.
3. Apply:
   - Sealant “1” (onto the crankcase mating surfaces)

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

4. Install:
   - Dowel pins “2”

5. Fit the right crankcase onto the left crankcase. Tap lightly on the case with a soft hammer.

**NOTICE**
Before installing and torquing the crankcase holding bolts, be sure to check whether the transmission is functioning properly by manually rotating the shift drum in both directions.

6. Install:
   - Lead holders
   - Crankcase bolts

7. Tighten:
   - Crankcase bolts

   **Crankcase bolt “1”**
   26 Nm (2.6 m·kg, 19 ft·lb)
   **Crankcase bolt “2”, “3”**
   10 Nm (1.0 m·kg, 7.2 ft·lb)

   M8 × 40 mm “1”
   M6 × 60 mm “2”
   M6 × 30 mm “3”

**TIP**
Tighten the bolts in stages, using a crisscross pattern.

**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.
8. Apply:
   • 4-stroke engine oil
     (to the crankshaft pin, bearings and oil delivery hole)

9. Check:
   • Crankshaft and transmission operation
     Rough operation → Repair.

INSTALLING THE SHIFT LEVER

1. Install:
   • Shift lever 2 assembly “1”
   • Shift lever 1 “2”

   **Shift lever 2 assembly bolt**
   14 Nm (1.4 m·kg, 10 ft·lb)

   **TIP**
   When installing the shift lever 1, align the punch mark “a” on the shift lever 1 with the punch marks “b” on the shift lever 2.
Removing the crankshaft and oil pump

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'nty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Crankcase</td>
<td></td>
<td>Separate. Refer to &quot;CRANKCASE&quot; on page 5-61.</td>
</tr>
<tr>
<td>1</td>
<td>Oil pump</td>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>Gasket</td>
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<tr>
<td>3</td>
<td>Balancer</td>
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<td>4</td>
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Disassembling the oil pump

<table>
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<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>1</td>
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<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>Inner rotor</td>
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<tr>
<td>5</td>
<td>Outer rotor</td>
<td>1</td>
<td></td>
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<tr>
<td>6</td>
<td>Oil pump housing</td>
<td>1</td>
<td>For assembly, reverse the disassembly pro-</td>
</tr>
</tbody>
</table>

5 Nm (0.5 m·kg, 3.6 ft·lb)
REMOVING THE CRANKSHAFT

1. Remove:
   - Crankshaft “1”
   - Crankcase separating tool “2”.
   - Make sure the crankcase separating tool is centered over the crankshaft.

**TIP**

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.

**NOTICE**

- To protect the end of the crankshaft, place an appropriate sized socket between the crankcase separating tool bolt and the crankshaft.
- Do not tap on the crankshaft.

CHECKING THE OIL PUMP

1. Check:
   - Oil pump housing
   - Oil pump housing cover
     - Cracks/damage/wear → Replace the defective part(s).

2. Measure:
   - Inner-rotor-to-outer-rotor-tip clearance “a”
   - Outer-rotor-to-oil-pump-housing clearance “b”
   - Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance “c”
     - Out of specification → Replace the oil pump.

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)
CHECKING THE OIL STRAINER
1. Check:
   • Oil strainer
     Damage → Replace.
     Contaminants → Clean with solvent.

CHECKING THE CRANKSHAFT
1. Measure:
   • Crankshaft width A "a"
     Out of specification → Replace the crankshaft.

   Width A
   74.95–75.00 mm (2.951–2.953 in)

2. Measure:
   • Crankshaft runout C "b"
     Out of specification → Replace the crankshaft.

   Runout limit C
   0.030 mm (0.0012 in)

3. Measure:
   • Big end side clearance D "c"
     Out of specification → Replace the crankshaft.

   Big end side clearance D
   0.350–0.650 mm (0.0138–0.0256 in)

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)

   Recommended lubricant
   Engine oil

2. Install:
   • Oil pump housing “1”
   • Outer rotor “2”
   • 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”.

EAS24990
EAS28P1055
EAS25010
3. Check:
- Oil pump operation
  Refer to “CHECKING THE OIL PUMP” on page 5-70.

**EAS2IP1056**

**INSTALLING THE CRANKSHAFT**

1. Install:
   - Crankshaft “1”

**TIP**

Install the crankshaft assembly with the crankshaft installer pot “2”, crankshaft installer bolt “3”, adapter (M16) “4”, spacer (crankshaft installer) “5” and spacer “6”.

---

**NOTICE**

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.

---

**Crankshaft installer pot**
90890-01274

**Installing pot**
YU-90058

**Crankshaft installer bolt**
90890-01275

**Bolt**
YU-90060

**Adapter (M16)**
90890-04130

**Adapter #13**
YM-04059

**Spacer (crankshaft installer)**
90890-04081

**Pot spacer**
YM-91044

**Spacer**
90890-01309

**Pot spacer**
YU-90059
Removing the transmission, shift drum and shift forks

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<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
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<tbody>
<tr>
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<td>Crankcase</td>
<td></td>
<td>Separate. Refer to &quot;CRANKCASE&quot; on page 5-61</td>
</tr>
<tr>
<td></td>
<td>Middle driven gear</td>
<td></td>
<td>Refer to &quot;MIDDLE GEAR&quot; on page 5-79</td>
</tr>
<tr>
<td>1</td>
<td>Shift drum</td>
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</tr>
<tr>
<td>2</td>
<td>Shift fork assembly</td>
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<td></td>
</tr>
<tr>
<td>3</td>
<td>Shift fork “R”</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spring</td>
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</tr>
<tr>
<td>5</td>
<td>Shift fork “L”</td>
<td>1</td>
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</tr>
<tr>
<td>6</td>
<td>Shift fork guide bar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Secondary shaft</td>
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</tr>
<tr>
<td>8</td>
<td>Drive axle assembly</td>
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</tr>
<tr>
<td>9</td>
<td>Reverse idle gear</td>
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<tr>
<td>10</td>
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<tr>
<td>11</td>
<td>Stopper lever</td>
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<tr>
<td>12</td>
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For installation, reverse the removal procedure.
Disassembling the drive axle assembly

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<th>Q’ty</th>
<th>Remarks</th>
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<td>Washer</td>
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<tr>
<td>5</td>
<td>Clutch dog</td>
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</tr>
<tr>
<td>6</td>
<td>Circlip</td>
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</tr>
<tr>
<td>7</td>
<td>Washer</td>
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</tr>
<tr>
<td>8</td>
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<td>9</td>
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</tr>
<tr>
<td>11</td>
<td>Circlip</td>
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<tr>
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<td>Middle drive gear</td>
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<tr>
<td>13</td>
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<tr>
<td>15</td>
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<td>16</td>
<td>Reverse wheel gear</td>
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<tr>
<td>17</td>
<td>Stopper wheel</td>
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Disassembling the drive axle assembly

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<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”

   a. Pull out the guide bar from the left crankcase.
   b. Push down on the drive shaft, and then slide the shift fork assembly to remove the shift fork cam followers.
   c. Remove the shift drum.
   d. Remove the shift fork assembly.

CHECKING THE SHIFT FORKS
The following procedure applies to all 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.

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.

CHECKING THE STOPPER LEVER AND STOPPER WHEEL
1. Check:
   • Stopper lever pawl “1”
     Bends/damage/wear → Replace the stopper lever and stopper wheel as a set.

   • Stopper wheel “2”
     Damage/wear → Replace the stopper wheel and stopper lever as a set.
   • Stopper lever shaft “3”
     Bends/damage/wear → Replace.

ASSEMBLING THE SHIFT FORK ASSEMBLY
1. Install:
   • Shift fork guide bar “1”
   • Shift fork “L” “2”
   • Spring “3”
   • Shift fork “R” “4”
   • Circlip “5” New

TIP: Install the shift forks with “28P” mark “a” and “3B4” mark “b” facing each other.

INSTALLING THE SHIFT FORKS AND SHIFT DRUM
1. Install:
   • Stopper lever shaft
   • Stopper lever
   • Reverse idle gear “1”
   • Drive axle assembly “2”
   • Secondary shaft “3”
   • Shift fork assembly “4”
   • Shift drum “5”
Install the shift forks “6” with the “L” mark “a” and “R” mark “b” facing towards the left and right sides of the crankcase respectively.

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

! 190 Nm (19.0 m·kg, 140 ft·lb)

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
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<th>Remarks</th>
</tr>
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<td>Separate. Refer to &quot;CRANKCASE&quot; on page 5-61.</td>
</tr>
<tr>
<td>1</td>
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<tr>
<td>2</td>
<td>Middle drive pinion gear nut</td>
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</tr>
<tr>
<td>3</td>
<td>Middle drive pinion gear</td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td>Middle drive pinion gear shim</td>
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<td>Refer to &quot;ALIGNING THE MIDDLE GEAR&quot; on page 5-87.</td>
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<td>5</td>
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<tr>
<td>6</td>
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<td>7</td>
<td>Bearing</td>
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<td>8</td>
<td>Circlip</td>
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</tr>
<tr>
<td>9</td>
<td>Middle driven gear</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

! 32 Nm (3.2 m·kg, 23 ft·lb)

! 29 Nm (2.9 m·kg, 21 ft·lb)
Removing the middle driven shaft

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
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<th>Remarks</th>
</tr>
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<td>Separate. Refer to “CRANKCASE” on page 5-61.</td>
</tr>
<tr>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>Front drive shaft yoke (middle gear side)</td>
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</tr>
<tr>
<td>3</td>
<td>Middle driven pinion gear assembly</td>
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<td>4</td>
<td>Rear drive shaft yoke nut (middle gear side)</td>
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<td>Rear drive shaft yoke (middle gear side)</td>
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<td>Bearing housing</td>
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<td>7</td>
<td>O-ring</td>
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<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Middle driven pinion gear bearing retainer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Middle driven shaft bearing retainer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Torque Specifications:**
- 150 Nm (15.0 m·kg, 110 ft·lb)
- 130 Nm (13.0 m·kg, 94 ft·lb)
- 25 Nm (2.5 m·kg, 18 ft·lb)
- 80 Nm (8.0 m·kg, 58 ft·lb)
- 115 Nm (11.5 m·kg, 85 ft·lb)
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>15</td>
<td>Middle driven shaft</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
EAS28P1062

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.

EAS28P1063

REMOVING THE MIDDLE DRIVEN SHAFT

1. Remove:
   - Front drive shaft yoke nut (middle gear side) “1”
   - Washer
   - Front drive shaft yoke (middle gear side) “2”

TIP

Use the coupling gear/middle shaft tool “3” to hold the front drive shaft coupling sleeve.

2. Remove:
   - Rear drive shaft yoke nut (middle gear side) “1”
   - Washer
   - Rear drive shaft yoke (middle gear side) “2”

TIP

Use the coupling gear/middle shaft tool “3” to hold the rear drive shaft coupling sleeve.

3. Remove:
   - Bearing housing assembly “1”

 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.

Coupling gear/middle shaft tool
90890-01229
Gear holder YM-01229

Coupling gear/middle shaft tool
90890-01229
Gear holder YM-01229
• 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”.

  1. Check:
  • Drive pinion gear teeth
  • Driven pinion gear teeth
  • Pitting/galling/wear → Replace.

  2. Check:
  • O-ring
  • Damage → Replace.

  NOTICE
  The middle driven pinion gear bearing retainer has left-handed threads. To loosen the retainer turn it clockwise.

  NOTICE
  The middle driven shaft bearing retainer has left-handed threads. To loosen the retainer, turn it clockwise.

  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)
• Bearings
  Pitting/damage → Replace.

EAS28P1065
INSTALLING THE BEARING AND OIL SEALS
1. Install:
   • Bearing “1”
   • Oil seal “2” [New]
   • Oil seal “3” [New]

ECA28P1039
NOTICE
The middle driven shaft bearing retainer has left-handed threads. To tighten the retainer turn it counterclockwise.

EAS28P1066
INSTALLING THE MIDDLE DRIVEN SHAFT
1. Install:
   • Middle driven shaft bearing retainer “1”

TIP
Attach the ring nut wrench “2”.

Installed depth of bearing “a”  
0.9–1.4 mm (0.035–0.055 in)

Installed depth of oil seal “b”  
1.0–1.5 mm (0.039–0.059 in)

Installed depth of oil seal “c”  
1.0–1.5 mm (0.039–0.059 in)

4. Middle drive pinion gear bearing retainer
5. Bearing housing
6. Middle driven shaft bearing retainer
7. Crankcase

EAS28P1040
NOTICE
The middle driven pinion gear bearing retainer has left-handed threads. To tighten the retainer turn it counterclockwise.

Ring nut wrench  
90890-01430  
YM-38404

Bearing retainer wrench  
90890-04128  
YM-04128

Bearing retainer  
130 Nm (13.0 m·kg, 94 ft·lb)  
LOCTITE®

Middle driven shaft bearing retainer  
80 Nm (8.0 m·kg, 58 ft·lb)  
LOCTITE®

Bearings housing in a folded rag, and then secure the bearing housing edge in a vise.

b. Attach the bearing retainer wrench “2”.

c. Tighten the bearing retainer.

TIP
Attach the ring nut wrench “2”.
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:
- Rear drive shaft yoke (middle gear side) “1”
- Washer
- Rear drive shaft yoke nut (middle gear side) “2”

**TIP**
Use the coupling gear/middle shaft tool “3” to hold the coupling yoke.

5. Install:
- Front drive shaft yoke (middle gear side) “1”
- Washer
- Front drive shaft yoke nut (middle gear side) “2”

**Front drive shaft yoke nut (middle gear side)**
115 Nm (11.5 m·kg, 85 ft·lb)

**TIP**
Use the coupling gear/middle shaft tool “3” to hold the coupling yoke.

**Rear drive shaft yoke nut (middle gear side)**
150 Nm (15.0 m·kg, 110 ft·lb)
LOCTITE®

**TIP**
Use the coupling gear/middle shaft tool “3” to hold the coupling yoke.

**Coupling gear/middle shaft tool**
90890-01229
Gear holder
YM-01229

**Installed depth of middle driven gear “a”**
24.7–24.9 mm (0.97–0.98 in)
2. Tighten:
   • Bearing retainer bolts “1”
   • Middle drive pinion gear nut “2”

**Bearings retainer bolt**
29 Nm (2.9 m·kg, 21 ft·lb)
**Middle drive pinion gear nut**
190 Nm (19.0 m·kg, 140 ft·lb)

**TIP**
Wrap the middle drive shaft in a folded rag, and then secure it in a vise.

3. Lock the threads with a drift punch.

**TIP**
Stake the bearing retainer bolts at the cutouts “a” in the bearing retainers “3”.

---

**MEASURING THE MIDDLE GEAR BACKLASH**

1. Measure:
   • Middle gear backlash
     Out of specification → Refer to “ALIGNING THE MIDDLE GEAR” on page 5-87.

**Middle gear backlash**
0.10–0.30 mm (0.004–0.012 in)

**TIP**
Temporarily install the left crankcase.

b. Wrap a rag “1” around a screwdriver “2”, and then insert it into the installation hole “a” of the left crankcase speed sensor to hold the middle driven gear.

c. Attach the final gear backlash band “3” and dial gauge “4”.

**Final gear backlash band**
90890-01511
**Middle drive gear lash tool**
YM-01230

b. 45 mm (1.8 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 shims and/or middle drive 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 gear
- Middle driven gear
- Middle driven shaft bearing housing

1. Select:
   - Middle drive pinion gear shim(s) “1”
   - Middle driven pinion gear shim(s) “2”

\[ A = e + d - b - c - a \]

a. Position the middle gears with the appropriate shim(s) that has had its respective thickness calculated from information marked on the crankcase, middle driven shaft bearing housing and middle driven pinion gear.
b. To find middle drive pinion gear shim thickness “A”, use the following formula.

<table>
<thead>
<tr>
<th>Middle drive pinion gear shim thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>“A” = “e” + “d” - “b” - “c” - “a”</td>
</tr>
</tbody>
</table>

“a” = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from “0.6”
“b” = 17.0
“c” = 55.0
“d” = a numeral (usually a decimal number) on the right crankcase specifies a thickness of “65.0”
“e” = a numeral (usually a decimal number) on the left crankcase specifies a thickness of “9.0”

Example:
If the bearing housing is marked “-02”, “a” is 0.58

“b” is 17.0
“c” is 55.0
If the right crankcase is marked “64.97”, “d” is 64.97

If the left crankcase is marked “9.01”, “e” is 9.01
Therefore, “A” is 1.40.
“A” = 9.01 + 64.97 - 17.0 - 55.0 - 0.58 = 1.40
Round off hundredths digit and select appropriate shim(s).
In the above example, the calculated shim thickness is 1.40 mm. The following chart instructs you, however, to round off 0 to 0.

<table>
<thead>
<tr>
<th>Hundredth</th>
<th>Rounded value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 1, 2</td>
<td>0</td>
</tr>
<tr>
<td>3, 4, 5, 6, 7</td>
<td>5</td>
</tr>
<tr>
<td>8, 9</td>
<td>10</td>
</tr>
</tbody>
</table>

Shims are supplied in the following thicknesses.

Shims are supplied in the following thicknesses.

Middle drive pinion gear shim thickness
Thickness (mm)
0.50 0.55 0.60 0.70 0.80 0.90 1.00

c. To find middle driven pinion gear shim thickness “B”, use the following formula.

Middle driven pinion gear shim thickness
“B” = “f” - “g” + “h” - “i” - “j” - 0.05

“f” = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from “77.5”
“g” = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from “49.0”
“h” = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from “80.5”
“i” = a numeral (usually a decimal number) on the left crankcase specifies a thickness of “99.98”
“j” = a numeral (usually a decimal number) on the right crankcase specifies a thickness of “8.12”

Example:
If the bearing housing is marked “+03”, “f” is 77.53
If the driven pinion gear is marked “+0”, “g” is 49.0
If the driven pinion gear is marked “-10”, “h” is 80.40

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.
If the left crankcase is marked “99.99”,
“i” is 99.99

If the right crankcase is marked “8.17”,
“j” is 8.17

Therefore, “B” is 0.72.
“B” = 77.53 - 49.0 + 80.40 - 99.99 - 8.17 - 0.05
= 0.72
Round off hundredth digit and select appropriate shim(s).
In the example above, the calculated shim thickness is 0.72 mm. The chart instructs you, however, to round off 2 to 0.

<table>
<thead>
<tr>
<th>Hundredth</th>
<th>Rounded value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 1, 2</td>
<td>0</td>
</tr>
<tr>
<td>3, 4, 5, 6, 7</td>
<td>5</td>
</tr>
<tr>
<td>8, 9</td>
<td>10</td>
</tr>
</tbody>
</table>

Shims are supplied in the following thicknesses.
COOLING SYSTEM

RADIATOR .................................................................................................................. 6-1
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INSTALLING THE RADIATOR .................................................................................... 6-3

THERMOSTAT ......................................................................................................... 6-4
CHECKING THE THERMOSTAT .................................................................................. 6-5
INSTALLING THE THERMOSTAT ............................................................................. 6-5

WATER PUMP ........................................................................................................... 6-7
DISASSEMBLING THE WATER PUMP ................................................................. 6-9
CHECKING THE WATER PUMP ............................................................................... 6-9
ASSEMBLING THE WATER PUMP ........................................................................... 6-9
Removing the radiator

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Front fenders/Front guard/Left footrest board/Air filter case</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td>1</td>
<td>Radiator fan motor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Radiator fan motor breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Coolant reservoir hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Coolant reservoir breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Coolant reservoir cap</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Coolant reservoir</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Radiator outlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Radiator inlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Radiator bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Radiator</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

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

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>11</td>
<td>Radiator fan</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
CHECKING THE RADIATOR

1. Check:
   • Radiator fins
     Obstruction → Clean.
     Apply compressed air to the rear of the radiator.
     Damage → Repair or replace.

TIP
Straighten any flattened fins with a thin, flat-head screwdriver.

2. Check:
   • Radiator hoses
     Cracks/damage → Replace.

3. Measure:
   • Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.

   Radiator cap opening pressure
   93.3–122.7 kPa (0.95–1.25 kgf/cm², 13.5–17.8 psi)

   a. Install the radiator cap tester “1” and radiator cap tester adapter “2” to the radiator cap “3”.

   b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.

4. Check:
   • Radiator fan
     Damage → Replace.
     Malfunction → Check and repair.
     Refer to “COOLING SYSTEM” on page 9-27.

INSTALLING THE RADIATOR

1. Fill:
   • Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-17.

2. Check:
   • Cooling system
     Leaks → Repair or replace any faulty part.

3. Measure:
   • Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to “CHECKING THE RADIATOR” on page 6-3.

− Radiator cap tester
  90890-01325
− Radiator pressure tester
  YU-24460-01
− Radiator cap tester adapter
  90890-01352
− Radiator pressure tester adapter
  YU-33984
Removing the thermostat

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Radiator inlet hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Thermostat cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Thermostat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Coolant temperature sensor coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Coolant temperature sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>For installation, reverse the removal procedure.</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **10 Nm (1.0 m - kg, 7.2 ft - lb)**
- **18 Nm (1.8 m - kg, 13 ft - lb)**

Refer to "GENERAL CHASSIS" on page 4-1.
Refer to "ENGINE REMOVAL" on page 5-1.
Drain. Refer to "CHANGING THE COOLANT" on page 3-17."
CHECKING THE THERMOSTAT

1. Check:
   • Thermostat
     Does not open at 50–54°C (122–129.2°F) → Replace.

   a. Suspend the thermostat “1” in a container “2” filled with water.
   b. Slowly heat the water “3”.
   c. Place a thermometer “4” in the water.
   d. While stirring the water, observe the thermostat and the temperature indicated on the thermometer.

2. Check:
   • Thermostat housing cover
   • Thermostat housing (cylinder head)
     Cracks/damage → Replace.

INSTALLING THE THERMOSTAT

1. Install:
   • Copper washer
   • Coolant temperature sensor

   ![Coolant temperature sensor](image)
   **NOTICE**

   Use extreme care when handling the coolant temperature sensor. Replace any part that was dropped or subjected to a strong impact.

2. Install:
   • Thermostat “1”
   • O-ring “2” New
   • Thermostat cover “3”

   ![Thermostat cover bolt](image)
   **TIP**

   Install the thermostat with its breather hole “a” facing up.

3. Fill:
   • Cooling system
     (with the specified amount of the recommended coolant)
     Refer to “CHANGING THE COOLANT” on page 3-17.

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 6-3.
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>Left footrest board/Left front fender</td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC magneto cover</td>
<td>Refer to “AC MAGNETO AND STARTER CLUTCH” on page 5-34.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coolant</td>
<td>Drain. Refer to “CHANGING THE COOLANT” on page 3-17.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Radiator outlet hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>2</td>
<td>Water jacket joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Water pump outlet hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Water pump outlet pipe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Water pump breather hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Water pump housing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Gasket</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>Impeller shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Water pump seal</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>11</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</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:
   • Water pump seal “1”

TIP
Remove the water pump seal from the inside of the AC magneto cover “2”.

2. Remove:
   • Bearing “1”
   • Oil seal “2”

TIP
Remove the bearing and oil seal from the outside of the AC magneto cover “3”.

CHECKING THE WATER PUMP
1. Check:
   • Water pump housing
   • Impeller shaft
   • Water pump seal
   • Oil seal
      Cracks/damage/wear → Replace.
2. Check:
   • Bearing
      Rough movement → Replace.
3. Check:
   • Water jacket joint
   • Water pump outlet pipe
   • Water pump outlet hose
      Cracks/damage/wear → Replace.

ASSEMBLING THE WATER PUMP
1. Install:
   • Oil seal “1” New
      (into the AC magneto cover “2”)

TIP
• Before installing the oil seal, apply tap water or coolant onto its outer surface.
• Install the oil seal with a socket “3” that matches its outside diameter.

NOTICE
Never lubricate the water pump seal surface with oil or grease.

TIP
Install the water pump seal with the special tools.

**Installed depth of oil seal “a”**
8.1–8.7 mm (0.32–0.34 in)

- Mechanical seal installer 90890-04132
- Water pump seal installer YM-33221-A
- Middle driven shaft bearing driver 90890-04058
- Bearing driver 40 mm YM-04058
3. Measure:
   - Impeller shaft tilt
     Out of specification → Replace.

![Impeller shaft tilt limit](0.15 mm (0.006 in))

4. Install:
   - Impeller shaft “1”
   - Circlip [New]

**TIP**
After installation, check that the impeller shaft rotates smoothly.
FUEL SYSTEM

FUEL TANK................................................................................................................................. 7-1
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  REMOVING THE FUEL PUMP ............................................................................................ 7-2
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  CHECKING THE FUEL TANK BREATHER HOSE JOINT ................................................. 7-2
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  INSTALLING THE FUEL TANK ......................................................................................... 7-3

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  CHECKING THE INJECTOR ................................................................................................. 7-6
  CHECKING THE THROTTLE BODY ................................................................................. 7-6
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  CHECKING THE FUEL PRESSURE .................................................................................. 7-7
  ADJUSTING THE THROTTLE POSITION SENSOR ......................................................... 7-7
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1 Fuel tank side cover 1
2 Fuel pump coupler 1 Disconnect.
3 Fuel hose connector holder 1
4 Fuel hose 1
5 Fuel tank breather hose 2
6 Fuel tank breather hose joint 1
7 Fuel tank overflow hose 1
8 Fuel tank 1
9 Fuel pump assembly 1
10 Final drive case breather hose 1 Disconnect.
11 Fuel tank shield 1
12 Damper 2

For installation, reverse the removal procedure.

Order | Job/Parts to remove | Q'ty | Remarks
--- | --- | --- | ---
Rear fender | Refer to “GENERAL CHASSIS” on page 4-1. | | |
1 | Fuel tank side cover | 1 | |
2 | Fuel pump coupler | 1 | Disconnect. |
3 | Fuel hose connector holder | 1 | |
4 | Fuel hose | 1 | |
5 | Fuel tank breather hose | 2 | |
6 | Fuel tank breather hose joint | 1 | |
7 | Fuel tank overflow hose | 1 | |
8 | Fuel tank | 1 | |
9 | Fuel pump assembly | 1 | |
10 | Final drive case breather hose | 1 | Disconnect. |
11 | Fuel tank shield | 1 | |
12 | Damper | 2 | |

\(7\text{Nm (0.7 m \cdot \text{kg}, 5.1 ft \cdot \text{lb})}\)
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

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

TIP
• When removing the fuel hose from the fuel pump, remove the fuel hose connector holder first, and next, insert a slotted head screwdriver etc. in the slot part “a” of the fuel hose connector cover “1”, then slide it in the direction of the arrow, and remove the fuel hose.
• To remove the fuel hose from the throttle body, slide the fuel hose connector cover “2” on the end of the hose in direction of the arrow shown, press the two buttons “3” on the sides of the connector, and then remove the hose.
• Before removing the hose, place a few rags in the area under where it will be removed.

3. Remove:
   • Fuel tank

TIP
Do not set the fuel tank down on the installation surface of the fuel pump. Be sure to lean the fuel tank in an upright position.

REMOVING THE FUEL PUMP
1. Remove:
   • Fuel pump bracket
   • Fuel pump
   • Fuel pump gasket

NOTICE
• Do not drop the fuel pump or give it a strong shock.
• Do not touch the base section of the fuel sender.

CHECKING THE FUEL PUMP BODY
1. Check:
   • Fuel pump body
     Obstruction → Clean.
     Cracks/damage → Replace the fuel pump assembly.

CHECKING THE FUEL TANK BREATHER HOSE JOINT
1. Check:
   • Fuel tank breather hose joint
     Damage/faulty → Replace.

INSTALLING THE FUEL PUMP
1. Install:
   • Fuel pump gasket New
   • Fuel pump
   • Fuel pump bracket

TIP
• Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
• Always use a new fuel pump gasket.
• Install the fuel pump in the direction shown in the illustration.
• Install the fuel pump bracket by aligning the projections “a” on the fuel pump with the projections on the fuel tank.
• Tighten the fuel pump nuts in the proper tightening sequence as shown.
INSTALLING THE FUEL TANK

1. Install:
   • Dampers “1”

TIP

Fit the projections on each damper into the 3rd and 4th holes in the frame. Determine the 3rd and 4th holes by counting outward from the center hole in the frame.

2. Install:
   • Fuel hose
   • Fuel hose connector holder “1”
   • Fuel pump coupler

NOTICE

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

TIP

• Install the fuel hose connector holder “1” securely onto the fuel pump until a distinct “click” is heard, and then make sure that it does not come loose.
• To install the fuel hose onto the throttle body, slide the fuel hose connector cover “2” on the end of the hose in direction of the arrow shown.
Removing the throttle body

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air filter case</td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
<td></td>
<td></td>
</tr>
<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>ISC unit coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>5</td>
<td>Throttle cable housing cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Throttle cable</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>7</td>
<td>Throttle body joint clamp screw</td>
<td>2</td>
<td>Loosen.</td>
</tr>
<tr>
<td>8</td>
<td>Throttle body assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Fuel hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>10</td>
<td>Fuel injector coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>11</td>
<td>Throttle body joint</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

3 Nm (0.3 m·kg, 2.2 ft·lb)
Disassembling the throttle body assembly

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intake air pressure sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Intake air pressure sensor hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Throttle position sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Injector fuel rail</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fuel injector</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Throttle body</td>
<td>1</td>
<td><strong>NOTICE</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The throttle body should not be disassembled.</td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.
THROTTLE BODY

REMOVING THE THROTTLE BODY ASSEMBLY
1. Disconnect:
   • Fuel hose

**NOTICE**
- Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.
- Although the fuel has been removed from the fuel tank, be careful when disconnecting the fuel hose, since there may be fuel remaining in it.

**TIP**
- To disconnect the fuel hose from the throttle body, slide the fuel hose connector cover “1” on the end of the hose in direction of the arrow shown, press the two buttons “2” on the sides of the connector, and then disconnect the hose.
- Before disconnecting the hose, place a few rags in the area under where it will be disconnected.

CHECKING THE INJECTOR
1. Check:
   • Injector
     Damage → Replace.

CHECKING THE THROTTLE BODY
1. Check:
   • Throttle body
     Cracks/damage → Replace the throttle body.
2. Check:
   • Fuel passages
     Obstructions → Clean.

- Wash the throttle body in a petroleum-based solvent.
- Do not use any caustic carburetor cleaning solution.

b. Blow out all of the passages with compressed air.

INSTALLING THE THROTTLE BODY ASSEMBLY
1. Install:
   • Throttle body joint “1”

**TIP**
Align the projection “a” on the cylinder head with the slot “b” in the throttle body joint.

2. Install:
   • Throttle body assembly “1”

**TIP**
Align the projection “a” on the throttle body assembly with the slot “b” in the throttle body joint.

3. Connect:
   • Fuel hose

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

**TIP**
To connect the fuel hose onto the throttle body, slide the fuel hose connector cover “1” on the end of the hose in direction of the arrow shown.
CHECKING THE FUEL PRESSURE

1. Check:
   • Fuel pressure

   a. Remove the rear fender. Refer to “GENERAL CHASSIS” on page 4-1.
   b. Remove the fuel hose connector holder.
   c. Disconnect the fuel hose “1” from the fuel pump.

   TIP
   • When removing the fuel hose from the fuel pump, remove the fuel hose connector holder first, and next, insert a slotted head screwdriver etc. in the slot part “a” of the fuel hose connector cover “2”, then slide it in the direction of the arrow, and remove the fuel hose.
   • Before removing the hose, place a few rags in the area under where it will be removed.

   d. Connect the pressure gauge “3” and adapter “4” to the fuel pump and fuel hose.

   e. Start the engine.
   f. Measure the fuel pressure.
      Out of specification → Replace the fuel pump.

   Fuel pressure
   324 kPa (3.24 kgf/cm², 46.1 psi)

   ADJUSTING THE THROTTLE POSITION SENSOR

   1. Check:
      • Throttle position sensor
         Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 9-96.

   2. Adjust:
      • Throttle position sensor angle

   a. Connect the throttle position sensor coupler to the throttle position sensor.
   b. Connect the digital circuit tester to the throttle position sensor coupler.

   • Positive tester probe yellow “1”
   • Negative tester probe black/blue “2”

   Digital circuit tester
   90890-03174
   Model 88 Multimeter with tachometer
   YU-A1927
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 (yellow–black/blue)</td>
</tr>
</tbody>
</table>

f. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws “3”.

[Diagram of throttle position sensor]
DRIVE TRAIN

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CHECKING NOISES..................................................................................... 8-1
TROUBLESHOOTING CHART ...................................................................... 8-2

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ASSEMBLY AND FRONT DRIVE SHAFT ..................................................... 8-3
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The following conditions may indicate damaged shaft drive components:

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Possible Causes</th>
</tr>
</thead>
</table>
| 1. A pronounced hesitation or “jerky” movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.) | 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. |
| 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. |  |

**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 “TROUBLESHOOTING CHART” on page 8-2.

---

**WARNING**

Stop riding immediately if broken gear teeth are suspected. This condition could result in the shaft drive assembly locking up, causing a loss of control and possible injury to the rider.

---

2. Check:

   - Drained oil
   
   Drained oil shows large amounts of metal particles → Check the bearing for seizure.

---

**TIP**

A small amount of metal particles in the oil is normal.

3. Check:

   - Oil leakage

---

a. Clean the entire vehicle thoroughly, then dry it.

b. Apply a leak-localizing compound or dry powder spray to the shaft drive.

c. Road test the vehicle for the distance necessary to locate the leak.

   Leakage → Check the component housing, gasket, and/or seal for damage.

   Damage → Replace the component.

---

**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) exist, check the following points:

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Elevate and spin both wheels. Feel for wheel bearing damage.</td>
<td>YES → Replace the wheel bearing. (Refer to “TIE-RODS AND STEERING KNUCKLES” on page 4-55 and “REAR KNUCKLES AND STABILIZER” on page 4-64.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NO ↓</td>
</tr>
<tr>
<td>2.</td>
<td>Check the wheel nuts and axle nuts for tightness.</td>
<td>NO → Torque to specification. (Refer to “FRONT WHEELS” on page 4-14 and “REAR WHEELS” on page 4-18.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>YES ↓</td>
</tr>
<tr>
<td>3.</td>
<td>Check the front constant velocity shaft assemblies. Feel for bearing damage.</td>
<td>NO → Constant velocity shaft bearings and differential bearings are probably not damaged. Repeat the test or remove the individual components.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>YES ↓</td>
</tr>
<tr>
<td>4.</td>
<td>Check the rear brake adjustment.</td>
<td>NO → Adjust per instructions. (Refer to “ADJUSTING THE REAR DISC BRAKE” on page 3-20.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>YES ↓</td>
</tr>
<tr>
<td>5.</td>
<td>Check the rear constant velocity shaft assemblies. Feel for bearing damage.</td>
<td>NO → Constant velocity shaft bearings and final gear bearings are probably not damaged. Repeat the test or remove the individual components.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>YES ↓</td>
</tr>
<tr>
<td></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>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 case breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Differential assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Front drive shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Damper</td>
<td>1</td>
<td></td>
</tr>
</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>8</td>
<td>Front drive shaft coupling sleeve</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Dust seal</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

55 Nm (5.5 m·kg, 40 ft·lb)
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>Clip</td>
<td>1</td>
<td>The following procedure applies to both of the front constant velocity shaft assemblies.</td>
</tr>
<tr>
<td>2</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Double offset joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Ball bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Constant velocity joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
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>14</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>
<tbody>
<tr>
<td>1</td>
<td>Differential motor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Front drive shaft yoke nut (differential case side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Front drive shaft yoke (differential case side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Differential case cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Differential gear assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Differential gear assembly shim</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Differential pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**TIP**

Do not disassemble the differential motor or remove the differential motor pinion gear.

Refer to "ADJUSTING THE DIFFERENTIAL GEAR BACKLASH" on page 8-13.
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>15</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Oil seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Differential case</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.
DISASSEMBLING THE FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the front constant velocity shaft assemblies.

1. Remove:
   - Boot bands
   - Clip “1”
   - Double offset joint “2”
   - Circlip “3”
   - Ball bearing “4”
   - Dust boot “5”

TIP

Before removing the clip, slide the dust boot away from the double offset joint.

2. Remove:
   - Boot band “1”

Use the boot band installation tool “2”.

A. Differential side

2. Remove:
   - Boot band “1”

Use the boot band installation tool “2”.

A. Differential side

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.

B. Wheel side

CHECKING THE FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the front constant velocity shaft assemblies.

1. Check:
   - Double offset joint splines
   - Constant velocity joint splines
   - Constant velocity shaft splines
   - Wear/damage → Replace.

2. Check:
   - Dust boots
   - Cracks/damage → Replace.

NOTICE

Always use 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 the clip.
   b. Install the constant velocity joint.

   **TIP**
   - Install the clip into the groove in the constant velocity shaft as shown.
   - Secure the constant velocity joint in a vise, and then fit the constant velocity shaft into the constant velocity joint using a hammer.

2. Install:
   - Dust boot
   - Ball bearing “1”
   - Circlip “2” New
   - Double offset joint “3”
   - Clip “4” New

   **TIP**
   - Securely install the circlip into the groove in the constant velocity shaft.
   - Securely install the clip into the groove in the double offset joint.

3. Apply:
   - Molybdenum disulfide grease (into the double offset joint, constant velocity joint, and dust boots)

   **TIP**
   - Molybdenum disulfide grease is included in the repair kit.

4. Install:
   - Dust boots “1”
   - Boot bands “2”, “3”, “4”, “5” New

   **TIP**
   - The new boot bands may differ from the original ones.

---

A. Wheel side

B. Differential side

Molybdenum disulfide grease

- 50 g (1.8 oz) per dust boot (wheel side)
- 65 g (2.3 oz) per dust boot (differential side)
FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

- 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.

CHECKING THE DIFFERENTIAL ASSEMBLY
1. Check:
   • Gear teeth
     Pitting/galling/wear → Replace differential pinion gear and differential gear assembly as a set.
   • Bearings
     Pitting/damage → Replace.
   • Oil seals
   • O-rings
     Damage → Replace.
2. Check:
   • Drive shaft splines
   • Pinion gear splines
     Wear/damage → Replace.
   • Spring
     Fatigue → Replace.
3. Check:
   • Front drive shaft
     Bends → Replace.

WARNING
Do not attempt to straighten a bent shaft; this may dangerously weaken it.

CHECKING THE DIFFERENTIAL MOTOR
1. Check:
   • Differential motor

NOTICE
Do not disassemble the differential motor or remove the differential motor pinion gear.

REMOVING THE DIFFERENTIAL GEAR ASSEMBLY
1. Remove:
   • Differential gear assembly “1”
FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

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.

**A**

- a. Check that the differential motor pinion gear “2” turns counterclockwise.
- b. Check that the differential motor pinion gear “2” turns clockwise.

**B**

ASSEMBLING THE DIFFERENTIAL ASSEMBLY

1. Measure:
   - Gear backlash
     Refer to “MEASURING THE DIFFERENTIAL GEAR BACKLASH” on page 8-13.
2. Install:
   - Differential motor

**A**

a. Slide the shift fork sliding gear “1”, which is installed to the differential case cover, to the left as shown in the illustration to put it into the 2WD mode.

b. Connect two C-size batteries to the differential motor terminal “2” to operate the differential motor pinion gear “3”. Operate the differential motor pinion gear until the mark “4” on the differential motor pinion gear is aligned with the mark “5” on the differential motor case.

**NOTICE**

Do not use a 12 V battery to operate the differential motor pinion gear.

c. Insert 6 mm bolts “6” into the differential motor “7” and use them as a guide to set the motor on the differential case cover “8” so that the shift fork sliding gear “9” does not move.

**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·kg, 8.0 ft·lb)

3. Check:
   - Differential assembly operation
   - Unsmooth operation → Replace the differential assembly.
   - Insert the double offset joint into the differential assembly, and turn the gears back and forth.

5. Measure:
   - Gear backlash
   - Gently rotate the differential pinion gear from engagement to engagement.

**Differential gear backlash**

0.05–0.25 mm (0.002–0.010 in)

**TIP**

Measure the gear backlash at four positions. Rotate the differential pinion gear 90° each time.

---

**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)

4. Attach:
   - Gear lash measurement tool “2”
   - Dial gauge “3”

**Ring gear fix bolt (M10)**

90890-01527 YM-01527

**NOTICE**

Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.

**Gear lash measurement tool**

90890-01475 YM-01475

**ADJUSTING THE DIFFERENTIAL GEAR BACKLASH**

1. Remove:
   - Differential gear assembly shim(s) “1”
   - Differential gear assembly “2”

2. Adjust:
   - Gear backlash

<table>
<thead>
<tr>
<th>Thinner shim</th>
<th>Differential gear backlash is increased.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thicker shim</td>
<td>Differential gear backlash is decreased.</td>
</tr>
</tbody>
</table>

**Differential gear assembly shims**

Thickness (mm)

0.1 0.2 0.3 0.4
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></td>
<td>Rear engine skid plate/Rear fender</td>
<td></td>
<td>Refer to “GENERAL CHASSIS” on page 4-1</td>
</tr>
<tr>
<td></td>
<td>Rear arms</td>
<td></td>
<td>Refer to “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” on page 4-67</td>
</tr>
<tr>
<td></td>
<td>Final gear oil</td>
<td></td>
<td>Drain. Refer to “CHANGING THE FINAL GEAR OIL” on page 3-26</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 case breather hose</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Trailer hitch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Final drive assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear drive shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Damper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Rear drive shaft coupling sleeve</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
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>10</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
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>1</td>
<td>Clip</td>
<td>1</td>
<td>The following procedure applies to both of the</td>
</tr>
<tr>
<td>2</td>
<td>Boot band</td>
<td>1</td>
<td>rear constant velocity shaft assemblies.</td>
</tr>
<tr>
<td>3</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Double offset joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Ball bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Boot band</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Constant velocity joint</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Clip</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
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>14</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: 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>Final drive pinion gear shim</td>
<td></td>
<td>Refer to “SELECTING THE FINAL DRIVE PINION GEAR SHIM(S)” on page 8-25.</td>
</tr>
<tr>
<td>3</td>
<td>Final drive case cover</td>
<td>1</td>
<td>TIP Working in a crisscross pattern, loosen each bolt 1/4 of a turn. After all the bolts are loosened, remove them.</td>
</tr>
<tr>
<td>4</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Wheel gear shim</td>
<td></td>
<td>Refer to “SELECTING THE WHEEL GEAR SHIM(S)” on page 8-28.</td>
</tr>
<tr>
<td>10</td>
<td>Wheel gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Final driven pinion gear shim (final drive case cover side)</td>
<td></td>
<td>Refer to “SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE COVER SIDE)” on page 8-28.</td>
</tr>
<tr>
<td>12</td>
<td>Pinion gear</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Disassembling the final drive assembly

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Final driven pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Thrust washer</td>
<td></td>
<td>Refer to “SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE SIDE) AND THRUST WASHER” on page 8-26.</td>
</tr>
<tr>
<td>15</td>
<td>Final driven pinion gear shim (final drive case side)</td>
<td></td>
<td>Refer to “SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE SIDE) AND THRUST WASHER” on page 8-26.</td>
</tr>
<tr>
<td>16</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Final drive case</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Rear drive shaft yoke nut (final drive case side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Rear drive shaft yoke (final drive case side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Final drive pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Disassembling the final drive assembly

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Expander</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Final drive pinion gear bearing housing</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>

*Note: The diagram includes various parts and their corresponding torque values.*

*Example values: 23 Nm (2.3 m·kg, 17 ft·lb), 10 Nm (1.0 m·kg, 7.2 ft·lb).*
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 band “1”

   Use the boot band installation tool “2”.

A. Final drive side

2. Remove:
   • Boot band “1”

   Use the boot band installation tool “2”.

B. Wheel side

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 REAR CONSTANT VELOCITY SHAFT ASSEMBLIES
The following procedure applies to both of the rear constant velocity shaft assemblies.

1. Check:
   • Double offset joint splines
   • Constant velocity joint splines
   • Constant velocity shaft splines
   Wear/damage → Replace.

2. Check:
   • Dust boots
   Cracks/damage → Replace.

NOTICE
Always use a new boot band.

3. Check:
   • Balls and ball races
   • Inner surface of double offset joint
   Pitting/wear/damage → Replace.
ASSEMBLING THE REAR CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the rear constant velocity shaft assemblies.

1. Install:
   - Clip “1” New
   - Constant velocity joint “2”
   - Constant velocity shaft “3”
   - Dust boot

\[ \text{TIP} \]
- Install the clip.
- Securely install the clip into the groove in the constant velocity shaft as shown.
- Secure the constant velocity joint in a vise, and then fit the constant velocity shaft into the constant velocity joint using a hammer.

2. Install:
   - Dust boot
   - Ball bearing “1”
   - Circlip “2” New
   - Double offset joint “3”
   - Clip “4” New

\[ \text{TIP} \]
- 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)

\[ \text{TIP} \]
- Molybdenum disulfide grease is included in the repair kit.

4. Install:
   - Dust boots “1”
   - Boot bands “2”, “3”, “4”, “5” New

\[ \text{TIP} \]
- The new boot bands may differ from the original ones.
The dust boots should be fastened with the boot bands “3” and “5” at the grooves in the constant velocity shaft.

**REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT**

- Place a folded rag as shown.
- Secure the final drive pinion gear in the vise.
- Remove the rear drive shaft yoke nut.

**CHECKING THE REAR DRIVE SHAFT**
1. Check:
   - Drive shaft splines
   - Coupling sleeve splines
     Wear/damage → Replace.

**CHECKING THE FINAL DRIVE ASSEMBLY**
1. Check:
   - Final drive case
   - Final drive case cover
     Cracks/damage → Replace.

**TIP**
When the final drive case and/or the final drive case cover are replaced, be sure to adjust the shim of the final drive pinion gear and/or final driven pinion gear.

2. Check:
   - Gear teeth
     Pitting/galling/wear → Replace the final drive pinion gear and final driven pinion gear as a set.

**TIP**
When the final drive pinion gear, final driven pinion gear and/or wheel gear are replaced, be sure to adjust the shim of the final drive pinion gear, final driven pinion gear and/or wheel gear.

- Oil seals
- O-ring
  Damage → Replace.

3. Check:
   - Bearings
     Damage → Replace.

**DISASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY**
1. Remove:
   - Rear drive shaft yoke nut “1”
ASSEMBLING THE FINAL DRIVE CASE
1. Install:
   • Oil seals “1”

Installed depth of oil seal “a”
5.5 mm (0.22 in)

ASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY
1. Install:
   • Rear drive shaft yoke nut “1”

a. Place a folded rag as shown.
b. Secure the final drive pinion gear in the vise.
c. Tighten the rear drive shaft yoke nut.
   (temporarily)
d. Secure the final drive pinion gear bearing housing in a vice, and then turn the nut with a torque wrench to check the starting torque.

Rear drive shaft yoke nut (temporarily)
82 Nm (8.2 m·kg, 59 ft·lb)
LOCTITE®

2. Check:
   • Final drive assembly operation
     Unsmooth operation → Replace the final drive assembly.
     Insert the double offset joint into the final drive assembly, and turn the gears back and forth.

SELECTING THE FINAL DRIVE PINION GEAR SHIM(S)
1. Select:
   • Final drive pinion gear shim(s) “1”

a. To find the final drive pinion gear shim thickness “A”, use the following formula.

\[
A = a + (c - b) - d
\]

“a” = 55 mm
“b” = a numeral (usually a decimal number) on the final drive pinion gear either added to or subtracted from “22.2”
“c” = a numeral (usually a decimal number) on the final drive pinion gear bearing housing either added to or subtracted from “67.8”
“d” = a numeral (usually a decimal number) on the final drive case either added to or subtracted from “100”
Example:
“a” = 55
If “-02” is stamped on the final drive pinion gear,
“b” = 22.2 - 0.02
= 22.18

If “-05” is stamped on the final drive pinion gear bearing housing,
“c” = 67.8 - 0.05
= 67.75

If “-01” is stamped on the final drive case,
“d” = 100 - 0.01
= 99.99

Therefore, “A” is 0.58.
“A” = 55 + (67.75 - 22.18) - 99.99
= 0.58
Round off the hundredth digit and select the appropriate shim(s).
In the example above, the calculated number is 0.58. The chart instructs you to round off 8 to 10 at the hundredth place. Thus, the shim thickness is 0.60 mm (0.024 in).

<table>
<thead>
<tr>
<th>Hundredth</th>
<th>Rounded value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 1, 2</td>
<td>0</td>
</tr>
<tr>
<td>3, 4, 5, 6, 7</td>
<td>5</td>
</tr>
<tr>
<td>8, 9</td>
<td>10</td>
</tr>
</tbody>
</table>

Shims are supplied in the following thicknesses.

Final drive pinion gear shims
Thickness (mm)
0.25 0.30 0.35 0.40 0.45 0.50

SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE SIDE) AND THRUST WASHER
1. Select:
   • Final driven pinion gear shim (final drive case side) “1”
   • Thrust washer “2”

a. To find the final driven pinion gear shim (final drive case side) and thrust washer thickness “B”, use the following formula.

Final driven pinion gear shim (final drive case side) and thrust washer thickness
“B” = “h” - (“e” - “f” + “g”)

“e” = a numeral (usually a decimal number) on the final drive case either added to or subtracted from “71.6”
“f” = a numeral (usually a decimal number) on the final driven pinion gear either added to or subtracted from “51.0”
“g” = a numeral (usually a decimal number) on the final driven pinion gear either added to or subtracted from “24.0”
“h” = 49.8

If “-12” is stamped on the outside of the final driven pinion gear, 
“f” = 51.0 - 0.12 = 50.88

If “-05” is stamped on the outside of the final driven pinion gear, 
“g” = 24.0 - 0.05 = 23.95

“h” = 49.8
Therefore, shim and thrust washer thickness “B” is 5.16.
“B” = 49.8 - (71.57 - 50.88 + 23.95) = 5.16
Round off the hundredth digit and select the appropriate shim(s).
In the example above, the calculated number is 5.16. The chart instructs you to round off 6 to 5 at the hundredth place.
Thus, the shim and thrust washer thickness is 5.15 mm.

<table>
<thead>
<tr>
<th>Hundredth</th>
<th>Rounded value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 1, 2</td>
<td>0</td>
</tr>
<tr>
<td>3, 4, 5, 6, 7</td>
<td>5</td>
</tr>
<tr>
<td>8, 9</td>
<td>10</td>
</tr>
</tbody>
</table>

Shim and thrust washer are supplied in the following thicknesses.

Final driven pinion gear shims (final drive case side) “1”
Thickness (mm) 0.25 0.30 0.35 0.40 0.45 0.50
REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

**Thrust washer “2”**

| Thickness (mm) | 4.50 | 4.80 | 5.10 | 5.40 |

**TIP**

Be sure to use one of each of the final driven pinion gear shim (final drive case side) “1” and thrust washer “2” to obtain the shim and thrust washer thickness.

---

**SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE COVER SIDE)**

1. Measure:
   - Final driven pinion gear thrust clearance “C”

---

**TIP**

Do not turn the final drive pinion gear, wheel gear, and driven pinion gear when measuring the clearance with Plastigauge®.

- c. Remove the final driven pinion gear assembly.
- d. Measure the thrust clearance. Calculate the width of the flattened Plastigauge® “1”.

---

**Final driven pinion gear thrust clearance**

0.08–0.12 mm (0.0031–0.0047 in)

---

**SELECTING THE WHEEL GEAR SHIM(S)**

1. Measure:
   - Wheel gear thrust clearance “D”

---

**Final drive case cover bolt**

23 Nm (2.3 m·kg, 17 ft·lb)
a. Place four pieces of Plastigauge® between the originally fitted wheel gear shim(s) and the wheel gear.
b. Install the wheel gear and tighten the bolts to specification.

c. Remove the wheel gear.
d. Measure the thrust clearance. Calculate the width of the flattened Plastigauge® “1”.
e. If out of specification, remove the originally fitted shim(s), and then select the correct shim(s).

2. Select:
   • Wheel gear shim(s)

a. Select suitable wheel gear shims using the following chart.

<table>
<thead>
<tr>
<th>Wheel gear shims Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
</tr>
</tbody>
</table>

**TIP**
Do not turn the drive pinion gear, wheel gear, or driven pinion gear when measuring the clearance with Plastigauge®.

**TIP**
Measure the thickness of the originally fitted shim(s), and then calculate the required new shim thickness to bring the wheel gear thrust clearance within the specified limits.

b. Repeat the measurement steps until the wheel gear thrust clearance is within the specified limits.

**MEASURING THE FINAL GEAR BACKLASH**

1. Secure the final drive case in a vise or another supporting device.

2. Remove:
   • Drain plug
   • Gasket

3. Install:
   • Ring gear fix bolt (M14) “1” (into the drain plug hole)

**NOTICE**
Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.

4. Attach:
   • Final gear backlash band “2”
   • Dial gauge “3”

**Final gear backlash band**
90890-01511
Middle drive gear lash tool
YM-01230
5. Measure:
   - Gear backlash
     Gently rotate the final drive pinion gear from engagement to engagement.

<table>
<thead>
<tr>
<th>Final gear backlash</th>
<th>0.10–0.20 mm (0.004–0.008 in)</th>
</tr>
</thead>
</table>

   **TIP**
   - When measuring the gear backlash, be sure the right side (gear oil level check bolt side) of the final drive case assembly is facing downward.
   - Measure the gear backlash at four positions. Rotate the final drive pinion gear 90° each time.

---

**ADJUSTING THE FINAL GEAR BACKLASH**

1. Remove:
   - Final driven pinion gear assembly “1”
   - Final driven pinion gear shim (final drive case side) “2”
   - Thrust washer “3”
   - Final driven pinion gear shim (final drive case cover side) “4”

2. Adjust:
   - Gear backlash

   a. Select a suitable shim(s) and thrust washer(s) using the following chart.

<table>
<thead>
<tr>
<th>Thinner shim</th>
<th>Final gear backlash is increased.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thicker shim</td>
<td>Final gear backlash is decreased.</td>
</tr>
</tbody>
</table>

b. If increased by more than 0.2 mm (0.008 in):
   Reduce the final driven pinion gear shim (final drive case cover side) “4” thickness by 0.2 mm (0.008 in) for every 0.2 mm (0.008 in) that the final driven pinion gear shim (final drive case side) “2” and thrust washer “3” are increased.

c. If reduced by more than 0.2 mm (0.008 in):
   Increase the final driven pinion gear shim (final drive case cover side) “4” thickness by 0.2 mm (0.008 in) for every 0.2 mm (0.008 in) that the final driven pinion gear shim (final drive case side) “2” and thrust washer “3” are decreased.

   | Final driven pinion gear shims (final drive case side) “2” |
   |-------------------------|-----------------|-----------------|
   | Thickness (mm)          | 0.25 0.30 0.35 0.40 0.45 0.50 |

   | Thrust washers “3” |
   |-------------------|-----------------|
   | Thickness (mm)    | 4.50 4.80 5.10 5.40 |

   **TIP**
   Be sure to use one of each of the final driven pinion gear shim (final drive case side) “2” and thrust washer “3” to obtain the shim and thrust washer thickness.
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4. Main switch
5. Frame ground
6. Main fuse
8. Battery
20. ECU (engine control unit)
21. Ignition coil
22. Spark plug
29. Lean angle sensor
54. Engine stop switch
59. Ignition fuse
**TROUBLESHOOTING**
The ignition system fails to operate (no spark or intermittent spark).

**TIP**
- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Right side panel
  4. V-belt cooling exhaust duct

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuses. (Main and ignition) Refer to &quot;CHECKING THE FUSES&quot; on page 9-83.</td>
<td>NG → Replace the fuse(s).</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check the battery. Refer to &quot;CHECKING AND CHARGING THE BATTERY&quot; on page 9-84.</td>
<td>NG → • Clean the battery terminals. • Recharge or replace the battery.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Check the spark plug. Refer to &quot;CHECKING THE SPARK PLUG&quot; on page 3-7.</td>
<td>NG → Re-gap, clean, or replace the spark plug.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Check the ignition spark gap. Refer to &quot;CHECKING THE IGNITION SPARK GAP&quot; on page 9-91.</td>
<td>OK → Ignition system is OK.</td>
</tr>
<tr>
<td></td>
<td>NG ↓</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Check the spark plug cap. Refer to &quot;CHECKING THE SPARK PLUG CAP&quot; on page 9-90.</td>
<td>NG → Replace the spark plug cap.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Check the ignition coil. Refer to &quot;CHECKING THE IGNITION COIL&quot; on page 9-90.</td>
<td>NG → Replace the ignition coil.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Check the crankshaft position sensor. Refer to &quot;CHECKING THE CRANKSHAFT POSITION SENSOR&quot; on page 9-91.</td>
<td>NG → The crankshaft position sensor is faulty. Replace the crankshaft position sensor/stator assembly.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
</tbody>
</table>
### IGNITION SYSTEM

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>Check the main switch. Refer to &quot;CHECKING THE SWITCHES&quot; on page 9-79.</td>
<td>NG → Replace the main switch.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Check the engine stop switch. Refer to &quot;CHECKING THE SWITCHES&quot; on page 9-79.</td>
<td>NG → The engine stop switch is faulty. Replace the left handlebar switch.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Check the lean angle sensor. Refer to &quot;CHECKING THE LEAN ANGLE SENSOR&quot; on page 9-92.</td>
<td>NG → Replace the lean angle sensor.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Check the entire ignition system wiring. Refer to &quot;CIRCUIT DIAGRAM&quot; on page 9-1.</td>
<td>NG → Properly connect or repair the ignition system wiring.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
</tbody>
</table>

Replace the ECU.
4. Main switch
5. Frame ground
6. Main fuse
8. Battery
10. Starter relay
11. Starter motor
16. Diode 1
20. ECU (engine control unit)
30. Gear position switch
54. Engine stop switch
55. Start switch
59. Ignition fuse
60. Signaling system fuse
62. Rear brake light switch
If the engine stop switch is set to “ ” and the main switch is set to “ON” (both switch circuits are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch circuit of the gear position switch is closed).
- The transmission is in park (the park switch circuit of the gear position switch is closed).
- The rear brake lever is pulled to the handlebar or the brake pedal is pushed down (the rear brake light switch circuit is closed).
1. Battery
2. Main fuse
3. Main switch
4. Ignition fuse
5. Engine stop switch
6. Start switch
7. Signaling system fuse
8. Rear brake light switch
9. ECU (engine control unit)
10. Park switch (gear position switch)
11. Neutral switch (gear position switch)
12. Diode 1
13. Starter relay
14. Starter motor
TROUBLESHOOTING
The starter motor fails to turn.

TIP

- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Side covers

1. Check the fuses.
   (Main, ignition and signaling system)
   Refer to “CHECKING THE FUSES” on page 9-83.

   NG → Replace the fuse(s).

   OK ↓

2. Check the battery.
   Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.

   NG → • Clean the battery terminals.
         • Recharge or replace the battery.

   OK ↓

3. Check the starter motor operation.
   Refer to “CHECKING THE STARTER MOTOR OPERATION” on page 9-92.

   OK → Starter motor is OK. Perform the electric starting system troubleshooting, starting with step 5.

   NG ↓

4. Check the starter motor.
   Refer to “CHECKING THE STARTER MOTOR” on page 5-42.

   NG → Repair or replace the starter motor.

   OK ↓

5. Check the starter relay.
   Refer to “CHECKING THE RELAYS” on page 9-87.

   NG → Replace the starter relay.

   OK ↓

6. Check the main switch.
   Refer to “CHECKING THE SWITCHES” on page 9-79.

   NG → Replace the main switch.

   OK ↓

7. Check the engine stop switch.
   Refer to “CHECKING THE SWITCHES” on page 9-79.

   NG → The engine stop switch is faulty. Replace the left handlebar switch.

   OK ↓

8. Check the start switch.
   Refer to “CHECKING THE SWITCHES” on page 9-79.

   NG → The start switch is faulty. Replace the left handlebar switch.

   OK ↓
### ELECTRIC STARTING SYSTEM

<table>
<thead>
<tr>
<th>Step</th>
<th>Check</th>
<th>Result</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>Check the rear brake light switch. Refer to “CHECKING THE SWITCHES” on page 9-79.</td>
<td>NG →</td>
<td>Replace the rear brake light switch.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Check the gear position switch. Refer to “CHECKING THE SWITCHES” on page 9-79.</td>
<td>NG →</td>
<td>Replace the gear position switch.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Check the entire starting system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-5.</td>
<td>NG →</td>
<td>Properly connect or repair the starting system wiring.</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Replace the diode 1 or ECU.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. AC magneto
3. Rectifier/regulator
5. Frame ground
6. Main fuse
8. Battery
## TROUBLESHOOTING
The battery is not being charged.

### TIP
- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Right side cover
  4. V-belt cooling exhaust duct

1. **Check the fuse.**
   - (Main)
   - Refer to “CHECKING THE FUSES” on page 9-83.
   - NG → Replace the fuse.

2. **Check the battery.**
   - Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.
   - NG → • Clean the battery terminals.
   - • Recharge or replace the battery.

3. **Check the stator coil.**
   - Refer to “CHECKING THE STATOR COIL” on page 9-92.
   - NG → The stator coil is faulty. Replace the crankshaft position sensor/stator assembly.

4. **Check the rectifier/regulator.**
   - Refer to “CHECKING THE RECTIFIER/REGULATOR” on page 9-93.
   - NG → Replace the rectifier/regulator.

5. **Check the entire charging system wiring.**
   - Refer to “CIRCUIT DIAGRAM” on page 9-11.
   - NG → Properly connect or repair the charging system wiring.

The charging system circuit is OK.
4. Main switch
5. Frame ground
6. Main fuse
8. Battery
53. Light switch
57. Headlight
58. Headlight relay
61. Headlight fuse
65. Tail/brake light
TROUBLESHOOTING
Any of the following fail to light: headlight or taillight.

TIP
• Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Tail/brake light cover

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Result</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Check the condition of each bulb and bulb socket. Refer to &quot;CHECKING THE BULBS AND BULB SOCKETS&quot; on page 9-82.</td>
<td>NG</td>
<td>Replace the bulb(s) and bulb socket(s).</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Check the fuses. (Main and headlight) Refer to &quot;CHECKING THE FUSES&quot; on page 9-83.</td>
<td>NG</td>
<td>Replace the fuse(s).</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 3    | Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-84. | NG     | • Clean the battery terminals.  
                                      |      | • Recharge or replace the battery. |
|      | OK ↓                                                                         |        |        |
| 4    | Check the main switch. Refer to "CHECKING THE SWITCHES" on page 9-79.        | NG     | Replace the main switch. |
|      | OK ↓                                                                         |        |        |
| 5    | Check the light switch. Refer to "CHECKING THE SWITCHES" on page 9-79.       | NG     | The light switch is faulty. Replace the left handlebar switch. |
|      | OK ↓                                                                         |        |        |
| 6    | Check the headlight relay. Refer to "CHECKING THE RELAYS" on page 9-87.      | NG     | Replace the headlight relay. |
|      | OK ↓                                                                         |        |        |
| 7    | Check the entire lighting system wiring. Refer to “CIRCUIT Diagram” on page 9-15. | NG     | Properly connect or repair the lighting system wiring. |
|      | OK ↓                                                                         |        |        |

The lighting system circuit is OK.
4. Main switch
5. Frame ground
6. Main fuse
8. Battery
18. Reverse switch
20. ECU (engine control unit)
25. Coolant temperature sensor
26. Speed sensor
30. Gear position switch
32. Multifunction meter
34. Coolant temperature warning light
35. Park indicator light
36. Reverse indicator light
37. Neutral indicator light
38. High-range indicator light
39. Low-range indicator light
41. Fuel sender
48. Differential motor
56. Override switch
59. Ignition fuse
60. Signaling system fuse
62. Rear brake light switch
63. Front brake light switch
64. Diode 3
65. Tail/brake light
TROUBLESHOOTING

- Any of the following fail to light: warning light, brake light or an indicator light.

TIP

- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Side panels
  4. V-belt cooling exhaust duct
  5. Rear fender

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check the fuses. (Main, ignition and signaling system) Refer to &quot;CHECKING THE FUSES&quot; on page 9-83. NG →</td>
<td>Replace the fuse(s). OK ↓</td>
</tr>
<tr>
<td>2. Check the battery. Refer to &quot;CHECKING AND CHARGING THE BATTERY&quot; on page 9-84. NG →</td>
<td>• Clean the battery terminals. • Recharge or replace the battery. OK ↓</td>
</tr>
<tr>
<td>3. Check the main switch. Refer to &quot;CHECKING THE SWITCHES&quot; on page 9-79. NG →</td>
<td>Replace the main switch. OK ↓</td>
</tr>
<tr>
<td>4. Check the entire signaling system wiring. Refer to &quot;CIRCUIT DIAGRAM&quot; on page 9-19. NG →</td>
<td>Properly connect or repair the signaling system wiring. OK ↓</td>
</tr>
</tbody>
</table>

Check the condition of each of the signaling system circuits. Refer to "Checking the signaling system".

Checking the signaling system

The tail/brake light fails to come on.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check the tail/brake light bulb and socket. Refer to &quot;CHECKING THE BULBS AND BULB SOCKETS&quot; on page 9-82. NG →</td>
<td>Replace the tail/brake light bulb, socket or both. OK ↓</td>
</tr>
</tbody>
</table>
The neutral, park, high-range, and/or low-range indicator light fails to come on.

1. Check the gear position switch. Refer to “CHECKING THE SWITCHES” on page 9-79.
   NG → Replace the gear position switch.
   OK ↓

2. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-19.
   NG → Properly connect or repair the signaling system wiring.
   OK ↓

Replace the meter assembly or ECU.

The reverse indicator light fails to come on.

1. Check the reverse switch. Refer to “CHECKING THE SWITCHES” on page 9-79.
   NG → Replace the reverse switch.
   OK ↓
The differential gear lock indicator light and/or four-wheel-drive motor indicator light fails to come on.

1. Check the four-wheel-drive motor switch (differential motor).
   Refer to “CHECKING THE SWITCHES” on page 9-79.
   NG → Replace the differential motor.
   OK ↓

2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 9-19.
   NG → Properly connect or repair the signaling system wiring.
   OK ↓

Replace the meter assembly or ECU.

While the override switch is pushed, the segments of the speedometer digits will not appear as shown in the illustration.

1. Check the override switch.
   Refer to “CHECKING THE SWITCHES” on page 9-79.
   NG → The override switch is faulty. Replace the left handlebar switch.
   OK ↓
The coolant temperature warning light fails to come on.

1. Check the coolant temperature sensor.
Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 9-95.

NG → Replace the coolant temperature sensor.

OK ↓

2. Check the entire signaling system wiring.
Refer to “CIRCUIT DIAGRAM” on page 9-19.

NG → Properly connect or repair the signaling system wiring.

OK ↓

Replace the meter assembly or ECU.

The fuel level indicator fails to come on.

1. Check the fuel sender.
Refer to “CHECKING THE FUEL SENDER” on page 9-93.

NG → Replace the fuel pump assembly.

OK ↓

2. Check the entire signaling system wiring.
Refer to “CIRCUIT DIAGRAM” on page 9-19.

NG → Properly connect or repair the signaling system wiring.

OK ↓

Replace the meter assembly.

The speedometer fails to operate.

1. Check the speed sensor.
Refer to “CHECKING THE SPEED SENSOR” on page 9-94.

NG → Replace the speed sensor.

OK ↓
2. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-19.  

| NG → | Properly connect or repair the signaling system wiring. |

| OK ↓ | Replace the meter assembly or ECU. |
4. Main switch
5. Frame ground
6. Main fuse
8. Battery
20. ECU (engine control unit)
25. Coolant temperature sensor
59. Ignition fuse
66. Radiator fan motor
67. Radiator fan motor circuit breaker
68. Radiator fan motor relay
69. Radiator fan motor fuse
TROUBLESHOOTING
The radiator fan motor fails to turn.

TIP

• Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Side panels
  4. Front fenders

<table>
<thead>
<tr>
<th>Step</th>
<th>NG →</th>
<th>OK ↓</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check the fuses. (Main, ignition and radiator fan motor)</td>
<td>Replace the fuse(s).</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE FUSES” on page 9-83.</td>
<td>OK ↓</td>
</tr>
<tr>
<td>2. Check the battery.</td>
<td>• Clean the battery terminals.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.</td>
<td>• Recharge or replace the battery.</td>
</tr>
<tr>
<td>3. Check the main switch.</td>
<td>Replace the main switch.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE SWITCHES” on page 9-79.</td>
<td>OK ↓</td>
</tr>
<tr>
<td>4. Check the radiator fan motor.</td>
<td>The radiator fan motor is faulty and must be replaced.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE RADIATOR FAN MOTOR” on page 9-94.</td>
<td>OK ↓</td>
</tr>
<tr>
<td>5. Check the radiator fan motor relay.</td>
<td>Replace the radiator fan motor relay.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE RELAYS” on page 9-87.</td>
<td>OK ↓</td>
</tr>
<tr>
<td>6. Check the radiator fan motor circuit breaker.</td>
<td>Replace the radiator fan motor circuit breaker.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE RADIATOR FAN MOTOR CIRCUIT BREAKER” on page 9-95.</td>
<td>OK ↓</td>
</tr>
<tr>
<td>7. Check the coolant temperature sensor.</td>
<td>Replace the coolant temperature sensor.</td>
<td>NG →</td>
</tr>
<tr>
<td></td>
<td>Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 9-95.</td>
<td>OK ↓</td>
</tr>
</tbody>
</table>
8. Check the entire cooling system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-27.

   NG →
   Properly connect or repair the cooling system wiring.

   OK ↓
   Replace the ECU.
1. Crankshaft position sensor
4. Main switch
5. Frame ground
6. Main fuse
8. Battery
9. Fuel injection system fuse
17. Fuel injection system relay
19. ISC (idle speed control) unit
20. ECU (engine control unit)
21. Ignition coil
22. Spark plug
23. Fuel injector
24. Intake air temperature sensor
25. Coolant temperature sensor
26. Speed sensor
27. TPS (throttle position sensor)
28. Intake air pressure sensor
29. Lean angle sensor
30. Gear position switch
32. Multifunction meter
33. Engine trouble warning light
42. Fuel pump
43. Diode 2
54. Engine stop switch
59. Ignition fuse
68. Radiator fan motor relay
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 flashes when the start switch is being pushed to start the engine.
• If a malfunction is detected in the system by the self-diagnostic function, the ECU provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating the engine trouble warning light.
• After the engine has been stopped, the lowest fault code number appears on the clock LCD. 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 FI system operation

<table>
<thead>
<tr>
<th>Warning light indication</th>
<th>ECU operation</th>
<th>FI operation</th>
<th>Vehicle operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashing*</td>
<td>Warning provided when unable to start engine</td>
<td>Operation stopped</td>
<td>Cannot be operated</td>
</tr>
<tr>
<td>Remains on</td>
<td>Malfunction detected</td>
<td>Operated with substitute characteristics in accordance with the description of the malfunction</td>
<td>Can or cannot be operated depending on the fault code</td>
</tr>
</tbody>
</table>

* The warning light flashes when any one of the conditions listed below is present and the start switch is pushed:

12: Crankshaft position sensor
11: Lean angle sensor (open or short-circuit)
30: Lean angle sensor (latch up detected)
41: Lean angle sensor (open or short-circuit)
50: ECU internal malfunction (faulty ECU memory)
50: ECU internal malfunction (faulty ECU memory)

SELF-DIAGNOSTIC FUNCTION TABLE

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.
<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
<th>Symptom</th>
<th>Able / unable to start</th>
<th>Able / unable to drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Crankshaft position sensor</td>
<td>No normal signals are received from the crankshaft position sensor.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>13</td>
<td>Intake air pressure sensor</td>
<td>Intake air pressure sensor–open or short circuit detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>14</td>
<td>Intake air pressure sensor</td>
<td>Intake air pressure sensor: hose line malfunction (clogged or detached hose).</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>15</td>
<td>Throttle position sensor</td>
<td>Throttle position sensor: open or short circuit detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>16</td>
<td>Throttle position sensor</td>
<td>Stuck throttle position sensor detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>21</td>
<td>Coolant temperature sensor</td>
<td>Coolant temperature sensor: open or short circuit detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>22</td>
<td>Intake air temperature sensor</td>
<td>Intake air temperature sensor: open or short circuit detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>30</td>
<td>Lean angle sensor (latch up detected)</td>
<td>The vehicle has overturned.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>33</td>
<td>Ignition coil (faulty ignition)</td>
<td>Malfunction detected in the primary wire of the ignition coil.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>37</td>
<td>ISC valve (stuck fully open)</td>
<td>Engine speed is high when the engine is idling.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>39</td>
<td>Fuel injector (open circuit)</td>
<td>Fuel injector: open circuit detected.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>41</td>
<td>Lean angle sensor (open or short circuit)</td>
<td>Lean angle sensor: open or short circuit detected.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>42</td>
<td>Speed sensor</td>
<td>No normal signals are received from the speed sensor.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>43</td>
<td>Fuel system voltage (monitoring voltage)</td>
<td>The ECU is unable to monitor the battery voltage (an open or short circuit in the line to the ECU).</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>44</td>
<td>Error in writing the amount of CO adjustment on EEPROM</td>
<td>Error is detected while reading or writing on EEPROM (CO adjustment value).</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>46</td>
<td>Vehicle system power supply (Monitoring voltage)</td>
<td>Power supply to the fuel injection system is not normal.</td>
<td>Able</td>
<td>Able</td>
</tr>
</tbody>
</table>
The engine operation is not normal and the engine trouble warning light comes on.

1. Check:
   • Fault code number

   a. Check the fault code number displayed on the meter.
   b. Identify the system with the malfunction. Refer to “Self-Diagnostic Function table”.
   c. Identify the probable cause of malfunction. Refer to “Diagnostic code table”.

Communication error with the meter

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
<th>Symptom</th>
<th>Able / unable to start</th>
<th>Able / unable to drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Er-1</td>
<td>ECU internal malfunction (output signal error)</td>
<td>No signals are received from the ECU.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>Er-2</td>
<td>ECU internal malfunction (output signal error)</td>
<td>No signals are received from the ECU within the specified duration.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>Er-3</td>
<td>ECU internal malfunction (output signal error)</td>
<td>Data from the ECU cannot be received correctly.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>Er-4</td>
<td>ECU internal malfunction (input signal error)</td>
<td>Non-registered data has been received from the meter.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
</tbody>
</table>

2. Check and repair the probable cause of malfunction.

3. Perform ECU reinstatement action. Refer to “Reinstatement method” of table in “TROUBLESHOOTING DETAILS”.

4. Turn the main switch to “OFF” and back to “ON”, then check the fault code number is not displayed.

**TIP**

If fault codes are displayed, repeat steps (1) to (4) until no fault code number is displayed.
5. Erase the malfunction history in the diagnostic mode. Refer to “Sensor operation table (diagnostic code No.d62)”. 

**The engine operation is not normal but the engine trouble warning light does not come on.**

1. Check the operation of following sensors and actuators in the Diagnostic mode. Refer to “Sensor operation table” and “Actuator operation table”.

| d01: Throttle position sensor (throttle angle) |
| d30: Ignition coil |
| d36: Injector |

### DIAGNOSTIC MODE

It is possible to monitor the sensor output data or check the activation of actuators without connecting the measurement equipment by simply switching the meter indication from the normal mode to the diagnostic monitoring mode.

**Setting the diagnostic mode**

1. Set the main switch to “OFF” and set the engine stop switch to “OFF”.
2. Disconnect the wire harness coupler from the fuel pump.
3. Simultaneously press and hold the “SELECT” and “RESET” buttons, turn the main switch to “ON”, and continue to press the buttons for 8 seconds or more.

4. Simultaneously press the “SELECT” and “RESET” buttons for 2 seconds or more to execute the selection.

5. Select the diagnostic code number that applies to the item that was verified with the fault code number by pressing the “SELECT” or “RESET” buttons.

**TIP**

- All elements on the meter disappear.
- “dIAG” appears on the multifunction meter.

6. If a malfunction is detected in the sensors or actuators, repair or replace all faulty parts.

7. If no malfunction is detected in the sensors and actuators, check and repair inner parts of the engine.

The diagnostic code number appears on the multifunction meter (d01–d70).

- To decrease the selected diagnostic code number, press the “RESET” button. Press the “RESET” button for 1 second or longer to automatically decrease the diagnostic code numbers.
- To increase the selected diagnostic code number, press the “SELECT” button. Press the “SELECT” button for 1 second or longer to automatically increase the diagnostic code numbers.
6. Verify the operation of the sensor or actuator.
   - Sensor operation
     The data representing the operating conditions of the sensor appears on the multifunction meter.
   - Actuator operation
     Set the engine stop switch to “ON” to operate the actuator.

   **TIP**

   If the engine stop switch is set to “ON”, set it to “OFF”, and then set it to “ON” again.

7. Turn the main switch to “OFF” to cancel the diagnostic mode.

   **TIP**

   To perform a reliable diagnosis, make sure to turn off the power supply before every check and then start right from the beginning.

### Diagnostic code table

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Symptom</th>
<th>Probable cause of malfunction</th>
<th>Diagnostic code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>No normal signals are received from the crankshaft position sensor.</td>
<td>• Open or short circuit in wire harness. &lt;br&gt; • Defective crankshaft position sensor. &lt;br&gt; • Malfunction in crankshaft position sensor rotor. &lt;br&gt; • Malfunction in ECU. &lt;br&gt; • Improperly installed sensor.</td>
<td>—</td>
</tr>
<tr>
<td>13</td>
<td>Intake air pressure sensor: open or short circuit detected.</td>
<td>• Open or short circuit in wire harness. &lt;br&gt; • Defective intake air pressure sensor. &lt;br&gt; • Malfunction in ECU.</td>
<td>d03</td>
</tr>
<tr>
<td>14</td>
<td>Intake air pressure sensor: hose line malfunction (clogged or detached hose).</td>
<td>• Intake air pressure sensor hose is detached, clogged, kinked, or pinched. &lt;br&gt; • Malfunction in ECU.</td>
<td>d03</td>
</tr>
<tr>
<td>15</td>
<td>Throttle position sensor: open or short circuit detected.</td>
<td>• Open or short circuit in wire harness. &lt;br&gt; • Defective throttle position sensor. &lt;br&gt; • Malfunction in ECU. &lt;br&gt; • Improperly installed throttle position sensor.</td>
<td>d01</td>
</tr>
<tr>
<td>16</td>
<td>Stuck throttle position sensor detected.</td>
<td>• Stuck throttle position sensor. &lt;br&gt; • Malfunction in ECU.</td>
<td>d01</td>
</tr>
<tr>
<td>21</td>
<td>Coolant temperature sensor: open or short circuit detected.</td>
<td>• Open or short circuit in wire harness. &lt;br&gt; • Defective coolant temperature sensor. &lt;br&gt; • Malfunction in ECU. &lt;br&gt; • Improperly installed coolant temperature sensor.</td>
<td>d06</td>
</tr>
<tr>
<td>Fault code No.</td>
<td>Symptom</td>
<td>Probable cause of malfunction</td>
<td>Diagnostic code No.</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>---------------------</td>
</tr>
</tbody>
</table>
| 22            | Intake air temperature sensor: open or short circuit detected. | • Open or short circuit in wire harness.  
• Defective intake temperature sensor.  
• Malfunction in ECU.  
• Improperly installed intake air temperature sensor. | d05                 |
| 30            | The vehicle has overturned.                  | • The vehicle has overturned.  
• Malfunction in ECU. | d08                 |
| 33            | Malfunction detected in the primary lead of the ignition coil. | • Open or short circuit in wire harness.  
• Malfunction in ignition coil.  
• Malfunction in ECU.  
• Malfunction in a component of ignition cut-off circuit system. | d30                 |
| 37            | Engine speed is high when the engine is idling. | • Open circuit in wire harness.  
• Malfunction in throttle body.  
• Malfunction in throttle cables.  
• ISC valve is stuck fully open due to disconnected ISC unit hose or coupler. (High engine idle speed is detected with the ISC valve stuck fully open even though signals for the valve to close are continuously being transmitted by the ECU.)  
• Malfunction in ECU.  
• Fuel injection system fuse is blown. | d54                 |
| 39            | Fuel injector: open or short circuit detected. | • Open or short circuit in wire harness.  
• Defective fuel injector.  
• Improperly installed fuel injector. | d36                 |
| 41            | Lean angle sensor: open or short circuit detected. | • Open or short circuit in wire harness.  
• Defective lean angle sensor.  
• Malfunction in ECU. | d08                 |
| 42            | No normal signals are received from the speed sensor. | • Open circuit in wiring harness.  
• Defective speed sensor.  
• Malfunction in vehicle speed sensor detected.  
• Malfunction in the engine side of the neutral switch.  
• Malfunction in ECU. | d07                 |
| 43            | Power supply to the fuel injector and fuel pump is not normal. | • Open or short circuit in wire harness.  
• Malfunction in ECU. | d09                 |
| 44            | Error is detected while reading or writing on EE-PROM (CO adjustment value). | • Malfunction in ECU. (The CO adjustment value is not properly written on or read from the internal memory.) | d60                 |
| 46            | Power supply to the fuel injection system is not normal. | • Malfunction in charging system. Refer to “CHARGING SYSTEM” on page 9-11. | __                  |
### FUEL INJECTION SYSTEM

#### Sensor operation table

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Meter display</th>
<th>Checking method</th>
</tr>
</thead>
<tbody>
<tr>
<td>d01</td>
<td>Throttle angle</td>
<td>12–22</td>
<td>Check with throttle fully closed.</td>
</tr>
<tr>
<td></td>
<td>• Fully closed position</td>
<td></td>
<td>Check with throttle fully closed.</td>
</tr>
<tr>
<td></td>
<td>• Fully opened position</td>
<td>91–111</td>
<td></td>
</tr>
<tr>
<td>d03</td>
<td>Pressure difference (atmospheric pressure and intake air pressure)</td>
<td>Displays the intake air pressure.</td>
<td>Set the engine stop switch to “RUN”, then operate the throttle while pushing the start switch. (If the display value changes, the performance is OK.)</td>
</tr>
<tr>
<td>d05</td>
<td>Intake air temperature</td>
<td>Displays the intake air temperature.</td>
<td>Compare the actually measured intake air temperature with the meter display value.</td>
</tr>
<tr>
<td>d06</td>
<td>Coolant temperature</td>
<td>Displays the coolant temperature.</td>
<td>Compare the actually measured coolant temperature with the meter display value.</td>
</tr>
<tr>
<td>d07</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>d08</td>
<td>Lean angle sensor</td>
<td>3.7–4.4</td>
<td>Remove the lean angle sensor and incline it more than 65 degrees.</td>
</tr>
<tr>
<td></td>
<td>• Upright</td>
<td>0.4–1.4</td>
<td></td>
</tr>
<tr>
<td>d09</td>
<td>Fuel system voltage (battery voltage)</td>
<td>Approximately 12.0</td>
<td>Set the engine stop switch to “RUN”, and then compare with the actually measured battery voltage. (If the battery voltage is lower, perform recharging.)</td>
</tr>
</tbody>
</table>
### Actuator operation table

- **Actuator operation**
  - Set the engine stop switch to “OFF” and then to “RUN”.

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Actuation</th>
<th>Checking method</th>
</tr>
</thead>
<tbody>
<tr>
<td>d30</td>
<td>Ignition coil</td>
<td>Actuates the ignition coil five times in one-second intervals. The engine trouble warning light also flashes five times.</td>
<td>Check the spark five times. <strong>Connect an ignition checker.</strong></td>
</tr>
<tr>
<td>d36</td>
<td>Injector</td>
<td>Actuates the injector five times in one-second intervals. The engine trouble warning light also flashes five times.</td>
<td>Check the operating sound of the injector five times.</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>Item</td>
<td>Actuation</td>
<td>Checking method</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>d50</td>
<td>Fuel injection system</td>
<td>Actuates the fuel injection system relay five times in one-second intervals. The engine trouble warning light also flashes five times. (The engine trouble warning light is OFF when the relay is ON, and the engine trouble warning light is ON when the relay is OFF).</td>
<td>Check the operating sound of the fuel injection system relay five times.</td>
</tr>
<tr>
<td>d51</td>
<td>Radiator fan motor relay</td>
<td>Actuates the radiator fan motor relay and illuminates the engine trouble warning light five cycles (5 seconds per cycle—2 seconds ON, 3 seconds OFF).</td>
<td>Check the operating sound of the radiator fan motor relay five times.</td>
</tr>
<tr>
<td>d54</td>
<td>ISC valve</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 12 seconds until it is completed. Illuminates the engine trouble warning light.</td>
<td>The ISC unit vibrates when the ISC valve operates.</td>
</tr>
</tbody>
</table>

**TROUBLESHOOTING DETAILS**

This section describes the measures per fault code number displayed on the meter. Check and service the items or components that are the probable cause of the malfunction following the order given.

After the check and service of the malfunctioning part have been completed, reset the meter display according to the reinstatement method.

Fault code No.:
Code number displayed on the meter when the engine failed to work normally. Refer to “Self-Diagnostic Function table”.

Diagnostic code No.:
Diagnostic code number to be used when the diagnostic mode is operated. Refer to “DIAGNOSTIC MODE” on page 9-36.
<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Installed condition of crankshaft position sensor</td>
<td>Check for looseness or pinching.</td>
<td>Cranking the engine.</td>
</tr>
</tbody>
</table>
| 2     | Connections  
- Crankshaft position sensor coupler  
- Main wire harness-ECU coupler | • Check the coupler for any pins that may have pulled out.  
• Check the locking condition of the coupler.  
• If there is a malfunction, repair it and connect the coupler securely. | |
| 3     | Open or short circuit in wire harness. | • Repair or replace if there is an open or short circuit.  
• Between the crankshaft position sensor coupler and ECU coupler.  
(white–white)  
(white–white–white) | |
| 4     | Defective crankshaft position sensor. | • Replace the crankshaft position sensor/stator assembly.  
Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 9-91. | |
<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>13</th>
<th>Symptom</th>
<th>Intake air pressure sensor: open or short circuit detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>d03</td>
<td>Intake air pressure sensor</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
</table>
| 1     | Connections                       | • Check the coupler for any pins that may have pulled out.  
• Check the locking condition of the coupler.  
• If there is a malfunction, repair it and connect the coupler securely. | Setting the main switch to “ON”. |
|       | • Intake air pressure sensor coupler  
• Main wire harness-ECU coupler |                          |                      |
| 2     | Open or short circuit in wire harness. | • Repair or replace if there is an open or short circuit.  
• Between intake air pressure sensor coupler and ECU coupler  
  (black/blue–black/blue)  
  (pink–pink)  
  (blue–blue) |                          |
| 3     | Defective intake air pressure sensor. | • Execute the diagnostic mode.  
(Code No. d03)  
• Replace if defective.  
Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 9-96. |                          |
<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>Intake air pressure sensor hose.</td>
<td>• Check the intake air pressure sensor hose condition.</td>
<td>Starting the engine and operating it at idle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Repair or replace the sensor hose.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Intake air pressure sensor malfunction at intermediate electrical potential.</td>
<td>• Check and repair the connection.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace it if there is a malfunction.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Connections</td>
<td>• Check the coupler for any pins that may have pulled out.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Intake air pressure sensor coupler</td>
<td>• Check the locking condition of the coupler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Main wire harness-ECU coupler</td>
<td>• If there is a malfunction, repair it and connect the coupler securely.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Defective intake air pressure sensor.</td>
<td>• Execute the diagnostic mode. (Code No. d03)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace if defective.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 9-96.</td>
<td></td>
</tr>
<tr>
<td>Order</td>
<td>Item/components and probable cause</td>
<td>Check or maintenance job</td>
<td>Reinstatement method</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------------------------</td>
<td>--------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>1</td>
<td>Installed condition of throttle position sensor.</td>
<td>• Check for looseness or pinching. • Check that the sensor is installed in the specified position.</td>
<td>Setting the main switch to “ON”.</td>
</tr>
<tr>
<td>2</td>
<td>Connections • Throttle position sensor coupler • Main wire harness-ECU coupler</td>
<td>• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Open or short circuit in wire harness.</td>
<td>• Repair or replace if there is an open or short circuit. • Between throttle position sensor coupler and ECU coupler (black/blue–black/blue) (yellow–yellow) (blue–blue)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Throttle position sensor lead wire open circuit output voltage check.</td>
<td>• Check for open circuit and replace the throttle position sensor. (Yellow–Black/Blue)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Defective throttle position sensor.</td>
<td>• Execute the diagnostic mode. (Code No. d01) • Replace if defective. Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 9-96.</td>
<td></td>
</tr>
<tr>
<td>Fault code No.</td>
<td>16</td>
<td>Symptom</td>
<td>Stuck throttle position sensor detected.</td>
</tr>
<tr>
<td>---------------</td>
<td>----</td>
<td>---------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>d01</td>
<td>Throttle position sensor</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
</table>
| 1     | Installed condition of throttle position sensor. | • Check the installed area for looseness or pinching.  
• Check that the throttle position sensor is installed in the specified position.  
Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-7. | Reinstated by starting the engine, operating it at idle, and then racing it. |
| 2     | Defective throttle position sensor. | • Execute the diagnostic mode. (Code No. d01)  
• Replace if defective.  
Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 9-96. | |

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>21</th>
<th>Symptom</th>
<th>Coolant temperature sensor: open or short circuit detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>d06</td>
<td>Coolant temperature sensor</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Installed condition of coolant temperature sensor.</td>
<td>Check the installed area for looseness or pinching.</td>
<td>Setting the main switch to “ON”.</td>
</tr>
</tbody>
</table>
| 2     | Connections  
• Coolant temperature sensor coupler  
• Main wire harness-ECU coupler | • Check the coupler for any pins that may have pulled out.  
• Check the locking condition of the coupler.  
• If there is a malfunction, repair it and connect the coupler securely. | |
| 3     | Open or short circuit in wire harness. | • Repair or replace if there is an open or short circuit.  
• Between coolant temperature sensor coupler and ECU coupler.  
(black/blue–black/blue)  
(green/yellow–green/yellow) | |
| 4     | Defective coolant temperature sensor. | • Execute the diagnostic mode. (Code No. d06)  
• Replace if defective.  
Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 9-95. | |
### FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Symptom</th>
<th>Diagnostic code No.</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Intake air temperature sensor: open or short circuit detected.</td>
<td>d05</td>
<td>Intake air temperature sensor</td>
<td>Check for looseness or pinching.</td>
<td>Setting the main switch to “ON”.</td>
</tr>
</tbody>
</table>

#### Order 1
- Installed condition of intake air temperature sensor.

#### Order 2
- Connections
  - Intake air temperature sensor coupler
  - Main wire harness-ECU 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.

#### Order 3
- Open or short circuit in wire harness.
- Repair or replace if there is an open or short circuit.
- Between intake air temperature sensor coupler and ECU coupler.
  - (black/blue–black/blue)
  - (brown/white–brown/white)

#### Order 4
- Defective intake air temperature sensor.
- Execute the diagnostic mode.
  - (Code No. d05)
- Replace if defective.
  - Refer to “CHECKING THE INTAKE AIR TEMPERATURE SENSOR” on page 9-96.

---

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Symptom</th>
<th>Diagnostic code No.</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>The vehicle has overturned.</td>
<td>d08</td>
<td>Lean angle sensor</td>
<td>Raise the vehicle upright.</td>
<td>Setting the main switch to “ON” (however, the engine cannot be restarted unless the main switch is first set to “OFF”).</td>
</tr>
</tbody>
</table>

#### Order 1
- The vehicle has overturned.

#### Order 2
- Installed condition of the lean angle sensor.

#### Order 3
- Connections
  - Lean angle sensor coupler
  - Main wire harness-ECU coupler
- Check the coupler for any pins that may be pulled out.
- Check the locking condition of the coupler.
- If there is a malfunction, repair it and connect the coupler securely.

#### Order 4
- Defective lean angle sensor.
- Execute the diagnostic mode.
  - (Code No. d08)
- Replace if defective.
  - Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 9-92.
<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>33</th>
<th>Symptom</th>
<th>Malfunction detected in the primary lead of the ignition coil.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>d30</td>
<td>Ignition coil</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connections</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ignition coil connector (primary coil side)</td>
<td>• Check the connector and coupler for any pins that may have pulled out.</td>
<td>Starting the engine and operating it at idle.</td>
</tr>
<tr>
<td></td>
<td>• Main wire harness-ECU coupler</td>
<td>• Check the locking condition of the connector and coupler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If there is a malfunction, repair it and connect the connector or coupler securely.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness.</td>
<td>• Repair or replace if there is an open or short circuit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Between ignition coil connector and ECU coupler. (orange–orange)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Between ignition coil connector and left handlebar switch coupler. (red/black–red/black)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective ignition coil</td>
<td>• Execute the diagnostic mode. (Code No. d30)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Test the primary and secondary coils for continuity.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace if defective. Refer to “CHECKING THE IGNITION COIL” on page 9-90.</td>
<td></td>
</tr>
<tr>
<td>Order</td>
<td>Item/components and probable cause</td>
<td>Check or maintenance job</td>
<td>Reinstatement method</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Fuel injection system fuse is blown.</td>
<td>• Check the fuel injection system fuse. Refer to “CHECKING THE FUSES” on page 9-83.</td>
<td>ISC valve returns to its original position by setting the main switch to “ON” and back to “OFF”. Reinstated if the engine idle speed is within specification after starting the engine.</td>
</tr>
<tr>
<td>2</td>
<td>Throttle valve does not fully close.</td>
<td>• Check the throttle body. Refer to “THROTTLE BODY” on page 7-4. • Check the throttle cables. Refer to “ADJUSTING THE THROTTLE LEVER FREE PLAY” on page 3-6.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>ISC valve is stuck fully open due to disconnected ISC unit coupler. (High engine idle speed is detected with the ISC valve stuck fully open even though signals for the valve to close are continuously being transmitted by the ECU.)</td>
<td>• Check that the ISC unit coupler is not disconnected. • The ISC valve is stuck fully open if it does not operate when the main switch is turned “OFF”. (Touch the ISC unit with your hand and check if it is vibrating to confirm if the ISC valve is operating.)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ISC valve is not moving correctly.</td>
<td>• Execute the diagnostic mode. (Code No. d54) • After the ISC valve is fully closed, it opens to the standby opening position when the engine is started. This operation takes approximately 12 seconds. Start the engine. If the error recurs, replace the throttle body assembly.</td>
<td></td>
</tr>
</tbody>
</table>
### FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Symptom</th>
<th>Diagnostic code No.</th>
<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>39</td>
<td>Fuel injector: open or short circuit detected.</td>
<td>d36</td>
<td>1</td>
<td>Connections</td>
<td>• Fuel injector coupler</td>
<td>Cranking the engine. (Connect the fuel injector coupler.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Main wire harness-ECU coupler</td>
<td>• Check the couplers for any pins that may have pulled out.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Main wire harness fuel pump coupler</td>
<td>• Check the locking condition of the couplers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• If there is a malfunction, repair it and connect the coupler securely.</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Lean angle sensor: open or short circuit detected.</td>
<td>d08</td>
<td>1</td>
<td>Connections</td>
<td>• Lean angle sensor coupler</td>
<td>Setting the main switch to “ON”.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Main wire harness-ECU coupler</td>
<td>• Check the coupler for any pins that may have pulled out.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Check the locking condition of the coupler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• If there is a malfunction, repair it and connect the coupler securely.</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Lean angle sensor: open or short circuit detected.</td>
<td>d08</td>
<td>2</td>
<td>Open or short circuit in wire harness.</td>
<td>• Repair or replace if there is an open or short circuit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Between fuel injector coupler and ECU coupler. (red/black–red/black)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(red/blue–red/blue)</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Lean angle sensor: open or short circuit detected.</td>
<td>d08</td>
<td>3</td>
<td>Defective lean angle sensor</td>
<td>• Execute the diagnostic mode. (Code No. d08)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Replace if defective.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Refer to “CHECKING THE INJECTOR” on page 7-6.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 9-92</td>
<td></td>
</tr>
<tr>
<td>Fault code No.</td>
<td>Symptom</td>
<td>Diagnostic code No.</td>
<td>Order</td>
<td>Item/components and probable cause</td>
<td>Check or maintenance job</td>
<td>Reinstatement method</td>
</tr>
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<td>---------------</td>
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<td>---------------------</td>
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<td>------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>42</td>
<td>No normal signals are received from the speed sensor.</td>
<td>d07</td>
<td>1</td>
<td>Connections</td>
<td>• Check the coupler for any pins that may have pulled out.</td>
<td>Starting the engine, and activating the vehicle speed sensor by operating the vehicle at 20 to 30 km/h.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Speed sensor coupler</td>
<td>• Check the locking condition of the coupler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Main wire harness-ECU coupler</td>
<td>• If there is a malfunction, repair it and connect the coupler securely.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>Open or short circuit in speed sensor lead.</td>
<td>• Repair or replace if there is an open or short circuit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Between speed sensor coupler and ECU coupler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(blue–blue)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(white–white)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(black/blue–black/blue)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>Gear for detecting vehicle speed has broken.</td>
<td>• Replace if defective. Refer to “TRANSMISSION” on page 5-73.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>Defective speed sensor</td>
<td>• Execute the diagnostic mode. (Code No. d07)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Replace if defective. Refer to “CHECKING THE SPEED SENSOR” on page 9-94.</td>
<td></td>
</tr>
<tr>
<td>Fault code No.</td>
<td>43</td>
<td>Symptom</td>
<td>Power supply to the fuel injector and fuel pump is not normal.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>----</td>
<td>---------</td>
<td>-------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>d09</td>
<td>Fuel system voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Order Item/components and probable cause</strong></td>
<td><strong>Check or maintenance job</strong></td>
<td><strong>Reinstatement method</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1 | Connections  
   • Fuel injection system relay  
   • Main wire harness-ECU coupler |  
   • Check the coupler for any pins that may have pulled out.  
   • Check the locking condition of the coupler.  
   • If there is a malfunction, repair it and connect the coupler securely. | Starting the engine and operating it at idle. |
| 2 | Open or short circuit in the wire harness. |  
   • Repair or replace if there is an open or short circuit.  
   • Between fuel injection system relay coupler and ECU coupler. (blue/red–blue/red) (red/blue–red/blue)  
   • Between fuel injection system relay coupler and starter relay coupler. (brown/black–brown/black)  
   • Between fuel injection system relay coupler and left handle bar switch coupler. (red/black–red/black) |  |
| 3 | Malfunction or open circuit in fuel injection system relay |  
   • Execute the diagnostic mode. (Code No. d09)  
   • Replace if defective.  
   • If there is no malfunction with the fuel injection system relay, replace the ECU. |  |
| **Fault code No.** | 44 | Symptom | Error is detected while reading or writing on EEPROM (CO adjustment value). |
| Diagnostic code No. | d60 | EEPROM improper cylinder indication |
| **Order Item/components and probable cause** | **Check or maintenance job** | **Reinstatement method** |
| 1 | Malfunction in ECU. |  
   • Execute the diagnostic mode. (Code No. d60)  
   • Replace the ECU if defective. | Setting the main switch to "ON". |
### FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>46</th>
<th>Symptom</th>
<th>Power supply to the fuel injection system is not normal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connections • Main wire harness-ECU coupler</td>
<td>• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.</td>
<td>Starting the engine and operating it at idle.</td>
</tr>
<tr>
<td>2</td>
<td>Faulty battery.</td>
<td>• Charge or replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.</td>
<td>—</td>
</tr>
<tr>
<td>3</td>
<td>Malfunction in rectifier/regulator.</td>
<td>• Replace if defective. Refer to “CHARGING SYSTEM” on page 9-11.</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>Open or short circuit in the wire harness.</td>
<td>• Repair or replace if there is an open or short circuit. • Between battery and main switch coupler (red–red) • Between main switch coupler and ignition fuse (brown/blue–brown/blue) • Between ignition fuse and ECU coupler (brown–brown)</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>50</th>
<th>Symptom</th>
<th>Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Malfunction in ECU</td>
<td>Replace the ECU. <strong>TIP</strong> Do not perform this procedure with the main switch turned to “ON”.</td>
<td>Setting the main switch to “ON”.</td>
</tr>
</tbody>
</table>
4. Main switch
5. Frame ground
6. Main fuse
8. Battery
9. Fuel injection system fuse
17. Fuel injection system relay
20. ECU (engine control unit)
42. Fuel pump
43. Diode 2
54. Engine stop switch
59. Ignition fuse
TROUBLESHOOTING
If the fuel pump fails to operate.

**TIP**

- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover
  3. Rear fender

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuses. (Main, ignition and fuel injection system) Refer to “CHECKING THE FUSES” on page 9-83.</td>
<td>NG → Replace the fuse(s).</td>
</tr>
<tr>
<td></td>
<td>OK ↓</td>
<td></td>
</tr>
</tbody>
</table>
| 2.   | Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84. | NG → | • Clean the battery terminals.  
      |          |         | • Recharge or replace the battery. |
|      | OK ↓        |         |
| 3.   | Check the main switch. Refer to “CHECKING THE SWITCHES” on page 9-79. | NG → Replace the main switch. |
|      | OK ↓        |         |
| 4.   | Check the engine stop switch. Refer to “CHECKING THE SWITCHES” on page 9-79. | NG → The engine stop switch is faulty. Replace the left handlebar switch. |
|      | OK ↓        |         |
| 5.   | Check the fuel injection system relay. Refer to “CHECKING THE RELAYS” on page 9-87. | NG → Replace the fuel injection system relay. |
|      | OK ↓        |         |
| 6.   | Check the fuel pump. Refer to “CHECKING THE FUEL PUMP BODY” on page 7-2. | NG → Replace the fuel pump. |
|      | OK ↓        |         |
| 7.   | Check the entire fuel pump system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-55. | NG → Properly connect or repair the fuel pump system wiring. |
|      | OK ↓        |         |

Replace the diode 2 or ECU.
CIRCUIT DIAGRAM

2WD/4WD SELECTING SYSTEM
4. Main switch
5. Frame ground
6. Main fuse
8. Battery
20. ECU (engine control unit)
44. Four-wheel-drive motor relay 1
45. Four-wheel-drive motor relay 2
46. Four-wheel-drive motor relay 3
47. On-command four-wheel-drive motor switch and differential lock switch
48. Differential motor
49. Four-wheel-drive motor fuse
**TROUBLESHOOTING**
The four-wheel-drive motor indicator light fails to come on.

**TIP**
- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Battery cover

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuses. (Main and four-wheel-drive motor) Refer to “CHECKING THE FUSES” on page 9-83.</td>
</tr>
<tr>
<td>NG</td>
<td>Replace the fuse(s).</td>
</tr>
<tr>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.</td>
</tr>
<tr>
<td>NG</td>
<td>• Clean the battery terminals. • Recharge or replace the battery.</td>
</tr>
<tr>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Check the main switch. Refer to “CHECKING THE SWITCHES” on page 9-79.</td>
</tr>
<tr>
<td>NG</td>
<td>Replace the main switch.</td>
</tr>
<tr>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Check the on-command four-wheel-drive motor switch and differential lock switch. Refer to “CHECKING THE SWITCHES” on page 9-79.</td>
</tr>
<tr>
<td>NG</td>
<td>Replace the on-command four-wheel-drive motor switch and differential lock switch.</td>
</tr>
<tr>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Check the four-wheel-drive motor relay 1. Refer to “CHECKING THE RELAYS” on page 9-87.</td>
</tr>
<tr>
<td>NG</td>
<td>Replace the four-wheel-drive motor relay 1.</td>
</tr>
<tr>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Check the four-wheel-drive motor relay 2. Refer to “CHECKING THE RELAYS” on page 9-87.</td>
</tr>
<tr>
<td>NG</td>
<td>Replace the four-wheel-drive motor relay 2.</td>
</tr>
<tr>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Check the four-wheel-drive motor relay 3. Refer to “CHECKING THE RELAYS” on page 9-87.</td>
</tr>
<tr>
<td>NG</td>
<td>Replace the four-wheel-drive motor relay 3.</td>
</tr>
<tr>
<td>OK</td>
<td></td>
</tr>
</tbody>
</table>
8. Check the differential motor. Refer to “CHECKING THE DIFFERENTIAL MOTOR” on page 8-11.

   OK ↓

   9. Check the entire 2WD/4WD selecting system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-59.

   NG →
   Replace the differential motor.

   NG →
   Properly connect or repair the 2WD/4WD selecting system wiring.

   OK ↓

   Replace the ECU.
CIRCUIT DIAGRAM
4. Main switch
5. Frame ground
6. Main fuse
7. EPS fuse
8. Battery
12. EPS torque sensor
13. EPS motor
14. EPS (electric power steering) control unit
15. EPS self-diagnosis signal connectors
20. ECU (engine control unit)
26. Speed sensor
40. EPS warning light
59. Ignition fuse
A. YFM5FGPY/YFM7FGPY only
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 set to “ON”, and then goes off once the engine is started. If the warning light remains on or comes on after the engine is started, the EPS system may be defective.
- The electrical circuit of the warning light can be checked by setting the main switch to “ON”. If the warning light does not come on, the electrical circuit may be defective.

**TIP**

- If the engine is stopped using the engine stop switch and the main switch is in the “ON” position, the EPS warning light comes on to indicate that the power assistance for the steering is not functioning.
- If the steering usage is too heavy (i.e., excessive steering use when the vehicle is traveling at a slow speed), the power assist is reduced to protect the EPS motor from overheating.

**EPS WARNING LIGHT DURING NORMAL OPERATION**

The EPS warning light comes on initially for 2 seconds after the main switch is set to “ON”. However, the warning light remains on until the engine is started. In addition, if a malfunction is detected while the warning light comes on initially, the warning light remains on. Furthermore, the warning light comes on whenever a malfunction has occurred.

**TIP**

The EPS system does not operate while the EPS warning light is on.
DIAGNOSTIC MODE

Setting the diagnostic mode (present and past malfunctions)
1. Set 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. Set the main switch to “OFF” to cancel the diagnostic mode.

TIP
- The diagnostic mode can also be canceled by riding the vehicle at speeds above 2 km/h (1.2 mi/h).
- When the diagnostic mode is selected and during the initial lighting of the EPS warning light, the EPS control unit does not receive input from the EPS self-diagnosis signal connector.

5. Connect the EPS self-diagnosis signal connector.

Identifying fault codes
When the diagnostic mode is activated, the fault codes determined by the fail-safe specifications are signaled by the EPS warning light as follows.
• Present malfunction signaling mode: Currently detected fault codes are signaled.
• Past malfunction signaling mode: Both previously detected fault codes and currently detected fault codes are signaled.

**Signaling method**

**Example 1: Fault code No. 23**

![Diagram](image)

- a. EPS self-diagnosis signal connector
- b. Diagnostic mode
- c. EPS warning light
- d. Disconnected
- e. On
- f. Off
- g. Grounded
- h. Normal mode (diagnostic mode not activated)
- i. Mode selection judgment
- j. Present malfunction signaling mode
- k. Past malfunction signaling mode

A. The EPS warning light comes on for 5 seconds during the diagnostic mode selection judgment.

B. Display of the present malfunctions stops when the past malfunction display mode is selected.

After the mode selection judgment is completed (present or past malfunction mode), the current fault code signaling stops immediately, and then the first code of the mode is signaled 2 seconds later. When a fault code is signaled, the EPS warning light goes off for 1 second between the units of 10 and the units of 1 for the code. After a fault code is signaled, the warning light goes off for 3 seconds, and then the next code is signaled.
Example 2: No malfunctions are detected

a. EPS self-diagnosis signal connector
b. EPS warning light
c. Disconnected
d. Comes on.
e. Goes off.
f. Grounded
g. Mode selection judgment
A. The EPS warning light comes on for 5 seconds during the diagnostic mode selection judgment.

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.

T1: Connector grounded - - - - 0.1 \leq T1 \leq 1.6 seconds
T2: Fault codes deleted - - - - Maximum 1.5 seconds required
## SELF-DIAGNOSTIC FUNCTION TABLE (EPS SYSTEM)

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
<th>Symptom</th>
<th>Probable cause of malfunction</th>
</tr>
</thead>
</table>
| 11 13 15 16   | EPS torque sensor     | No normal signals are received from the torque sensor. | • Open or short circuit in wire harness.  
  • Malfunction in torque sensor.  
  • Malfunction in EPS control unit. |
| 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 42 43 45   | EPS motor             | No normal signals are received from the EPS motor. | • Open or short circuit in wire harness.  
  • Malfunction in EPS motor.  
  • Malfunction in EPS control unit. |
| 52            | EPS control unit      | Relay contacts in the EPS control unit are welded together. | Malfunction in EPS control unit. |
| 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. |
TROUBLESHOOTING DETAILS (EPS SYSTEM)

TIP

The malfunction history is stored even if the main switch is turned to “OFF”, therefore, be sure to erase the history (present and past malfunction signaling modes) after repairing the cause of the EPS system malfunction. The malfunction history must be erased in the diagnostic mode. Refer to “DIAGNOSTIC MODE” on page 9-66.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>11, 13, 15, 16</th>
<th>Symptom</th>
<th>EPS torque sensor: open or short circuit detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order</td>
<td>Item/components and probable cause</td>
<td>Check or maintenance job</td>
<td>Reinstatement method</td>
</tr>
<tr>
<td>1</td>
<td>Connections • EPS torque sensor 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>Setting the main switch to “OFF”.</td>
</tr>
<tr>
<td>2</td>
<td>Defective EPS torque sensor.</td>
<td>• Replace if defective. Refer to “CHECKING THE EPS TORQUE SENSOR (for YFM5FGP/YFM7FGP)” on page 9-97.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Open or short circuit in EPS torque sensor lead.</td>
<td>• Repair or replace if there is an open or short circuit. • Between EPS torque sensor coupler and EPS control unit coupler. (white–white) (red–red) (green–green) (black–black)</td>
<td></td>
</tr>
</tbody>
</table>
### EPS (ELECTRIC POWER STEERING) SYSTEM (for YFM5FGP/YFM7FGP)

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Symptom</th>
<th>Speed sensor: open or short circuit detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order</td>
<td>Item/components and probable cause</td>
<td>Check or maintenance job</td>
</tr>
</tbody>
</table>
| 1 | Connections  
• Speed sensor coupler  
• EPS control unit coupler at the wire harness | • Check the coupler for any pins that may have pulled out.  
• Check the locking condition of the coupler.  
• If there is a malfunction, repair it and connect the coupler securely. | Starting the engine and activating the vehicle speed sensor by operating the vehicle above 5 km/h (3 mi/h), or setting the main switch to “OFF”, then to “ON”, and then deleting the fault codes. Refer to “DIAGNOSTIC MODE” on page 9-66. |
| 2 | Open or short circuit in wire harness. | • Repair or replace if there is an open or short circuit.  
• Between speed sensor coupler and EPS control unit coupler. (white–white) | |
| 3 | Defective speed sensor. | • Execute the diagnostic mode. (Code No. 21)  
• Replace if defective. Refer to “CHECKING THE SPEED SENSOR” on page 9-94. | |

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Symptom</th>
<th>No normal signals are received from the ECU.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order</td>
<td>Item/components and probable cause</td>
<td>Check or maintenance job</td>
</tr>
</tbody>
</table>
| 1 | Connections  
• EPS control unit coupler at the wire harness  
• ECU coupler at the wire harness | • 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. | Setting the main switch to “OFF”. |
| 2 | Open or short circuit in wire harness. | • Repair or replace if there is an open or short circuit.  
• Between ECU coupler and EPS control unit coupler. (orange/white–orange/white) | |
| 3 | Malfunction in ECU. | Replace the ECU. | |
### EPS (ELECTRIC POWER STEERING) SYSTEM (for YFM5FGP/YFM7FGP)

#### Fault code No. 41, 42, 43, 45

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connections • 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>Setting the main switch to “OFF”.</td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in EPS motor lead.</td>
<td>• Repair or 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

<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>Setting the main switch to “OFF”.</td>
</tr>
</tbody>
</table>

#### Fault code No. 53

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Faulty battery.</td>
<td>Charge or replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.</td>
<td>Setting the main switch to “OFF”.</td>
</tr>
<tr>
<td>2</td>
<td>Malfunction in rectifier/regulator or charging system.</td>
<td>Replace if defective. Refer to “CHECKING THE RECTIFIER/REGULATOR” on page 9-93.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Malfunction in EPS control unit.</td>
<td>Replace the EPS control unit.</td>
<td></td>
</tr>
</tbody>
</table>
### Fault code No. 54
**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>Setting the main switch to “OFF”.</td>
</tr>
</tbody>
</table>

### Fault code No. 55
**Symptom:** 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 9-84.</td>
<td>Setting the main switch to “OFF”.</td>
</tr>
<tr>
<td>2</td>
<td>Malfunction in rectifier/regulator.</td>
<td>Replace if defective. Refer to “CHECKING THE RECTIFIER/REGULATOR” on page 9-93.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Malfunction in EPS control unit.</td>
<td>Replace the EPS control unit.</td>
<td></td>
</tr>
</tbody>
</table>
1. Four-wheel-drive motor relay 1
2. Four-wheel-drive motor relay 2
3. Headlight relay
4. Fuel injection system fuse
5. Starter relay
6. EPS fuse (YFM5FGP/YFM7FGP only)
7. Main fuse
8. Fuse box (ignition, headlights, four-wheel-drive motor, radiator fan motor, signaling system, auxiliary DC jack)
9. Radiator fan motor circuit breaker
10. Rectifier/regulator
11. Reverse switch
12. Gear position switch
13. Auxiliary DC jack
14. Main switch
15. Differential motor
16. EPS torque sensor (YFM5FGP/YFM7FGP only)
17. EPS motor (YFM5FGP/YFM7FGP only)
18. Radiator fan motor
ELECTRICAL COMPONENTS
1. Lean angle sensor
2. Radiator fan motor relay
3. Fuel injection system relay
4. Four-wheel drive motor relay 3
5. Front brake light switch
6. Rear brake light switch
7. Intake air temperature sensor
8. Intake air pressure sensor
9. TPS (throttle position sensor)
10. ISC (idle speed control) unit
11. Fuel pump
12. Speed sensor
13. Crankshaft position sensor
14. Coolant temperature sensor
15. Ignition coil
16. Battery
17. ECU (engine control unit)
18. EPS (electric power steering) control unit (YFM5FGP/YFM7FGP only)
CHECKING THE SWITCHES

1. R/Br/L Br
   - ON
   - OFF

2. R/Y L Y
   -
   [Diagram of switches]

3. Br R/B
   [Diagram of switches]

4. R/B L/Y
   -
   [Diagram of switches]

5. Lg B
   - OFF
   - PUSH

6. [Diagram of switches]
   - 2WD
   - 4WD
   - LOCK
   - G/R Gy Br
   - B Br
   - (GRAY)
   - L/R LG Sb
   - LB Br
   - (BLACK)

7. [Diagram of switches]

8. [Diagram of switches]
   - L P GY W

9. [Diagram of switches]
   - GY W
   - L P

10. [Diagram of switches]
   - Br Y
   - Y/W

11. [Diagram of switches]
   - Br Y
   - (GRAY)

[Diagram of the vehicle with switches labeled]

ELECTRICAL COMPONENTS
1. Main switch
2. Light switch
3. Engine stop switch
4. Start switch
5. Override switch
6. On-command four-wheel-drive motor switch and differential gear lock switch
7. Four-wheel-drive motor switch (differential motor)
8. Gear position switch
9. Reverse switch
10. Rear brake light switch
11. Front brake light switch
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.

<table>
<thead>
<tr>
<th>Pocket tester</th>
</tr>
</thead>
<tbody>
<tr>
<td>90890-03112</td>
</tr>
<tr>
<td>Analog pocket tester</td>
</tr>
<tr>
<td>YU-03112-C</td>
</tr>
</tbody>
</table>

**TIP**

- Before checking for continuity, set the pocket tester to “0” and to the “Ω x 1” range.
- When checking for continuity, switch back and forth between the switch positions a few times.

The switches and their terminal connections are illustrated as in the following example of the main switch.

The switch positions “a” are shown in the far left column and the switch lead colors “b” are shown in the top row.

The continuity (i.e., a closed circuit) between switch terminals at a given switch position is indicated by “----” or “——”. There is continuity between red, brown/blue, and brown when the switch is set to “ON”.

![Diagram of switch and pocket tester connection](image)
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 sockets 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.

WARNING
Since headlight bulbs get extremely hot, keep flammable products and your hands away from them until they have cooled down.

NOTICE
• Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.
• Avoid touching the glass part of a headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb, and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

2. Check:
• Bulb (for continuity) (with the pocket tester)
No continuity → Replace.

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

TIP
Before checking for continuity, set the pocket tester to “0” and to the “Ω × 1” range.

a. Connect the positive tester probe to terminal “1” and the negative tester probe to terminal “2”, and check the continuity.
b. Connect the positive tester probe to terminal “1” and the negative tester probe to terminal “3”, and check the continuity.
c. If either of the readings indicate no continuity, replace the bulb.
Checking the condition of the bulb sockets
The following procedure applies to all of the bulb sockets.
1. Check:
   • Bulb socket (for continuity)
     (with the pocket tester)
     No continuity → Replace.

TIP
Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

a. Install a good bulb into the bulb socket.
b. Connect the pocket tester probes to the respective leads of the bulb socket.
c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

CHECKING THE FUSES
The following procedure applies to all of the fuses.

NOTICE
To avoid a short circuit, always set the main switch to “OFF” when checking or replacing a fuse.

1. Remove:
   • Battery cover
     Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
   • Fuse

TIP
Set the pocket tester selector to “Ω × 1”.

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

b. If the pocket tester indicates “∞”, replace the fuse.

3. Replace:
   • Blown fuse

a. Set the main switch to “OFF”.
b. Install a new fuse of the correct amperage rating.
c. Set the switch(es) to on to verify if the electrical circuit is operational.
d. If the fuse immediately blows again, check the electrical circuit.

<table>
<thead>
<tr>
<th>Fuses</th>
<th>Amperage rating</th>
<th>Q’ty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main</td>
<td>40 A</td>
<td>1</td>
</tr>
<tr>
<td>EPS (YFM5FGP/YFM7FGP</td>
<td>40 A</td>
<td>1</td>
</tr>
<tr>
<td>Only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiator fan motor</td>
<td>20 A</td>
<td>1</td>
</tr>
<tr>
<td>Headlight</td>
<td>15 A</td>
<td>1</td>
</tr>
<tr>
<td>Ignition</td>
<td>15 A</td>
<td>1</td>
</tr>
<tr>
<td>Fuel injection system</td>
<td>15 A</td>
<td>1</td>
</tr>
<tr>
<td>Four-wheel-drive motor</td>
<td>15 A</td>
<td>1</td>
</tr>
<tr>
<td>Auxiliary DC jack</td>
<td>15 A</td>
<td>1</td>
</tr>
<tr>
<td>Signaling system</td>
<td>5 A</td>
<td>1</td>
</tr>
<tr>
<td>Spare</td>
<td>40 A</td>
<td>1</td>
</tr>
<tr>
<td>Spare</td>
<td>20 A</td>
<td>1</td>
</tr>
<tr>
<td>Spare</td>
<td>15 A</td>
<td>1</td>
</tr>
<tr>
<td>Spare</td>
<td>5 A</td>
<td>1</td>
</tr>
</tbody>
</table>
ELECTRICAL COMPONENTS

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.

4. Install:
   • Battery cover
   Refer to “GENERAL CHASSIS” on page 4-1.

CHECKING AND CHARGING THE BATTERY

WARNING

Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid. Therefore, always follow these preventive measures:
   • Wear protective eye gear when handling or working near batteries.
   • Charge batteries in a well-ventilated area.
   • Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).
   • DO NOT SMOKE when charging or handling batteries.
   • KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.
   • Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.
FIRST AID IN CASE OF BODILY CONTACT:
   EXTERNAL
   • Skin — Wash with water.
   • Eyes — Flush with water for 15 minutes and get immediate medical attention.
   INTERNAL
   • Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.

NOTICE

• This is a VRLA (Valve Regulated Lead Acid) battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.

• Charging time, charging amperage and charging voltage for a VRLA (Valve Regulated Lead Acid) battery are different from those of conventional batteries. The VRLA (Valve Regulated Lead Acid) battery should be charged as explained in the charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

TIP

Since VRLA (Valve Regulated Lead Acid) batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

1. Remove:
   • Battery cover
   • Front carrier
   • Battery holding bracket
   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”.

3. Remove:
   • Battery

4. Check:
   • Battery charge

a. Connect a pocket tester to the battery terminals.

   • Positive tester probe → positive battery terminal
   • Negative tester probe → negative battery terminal
The charge state of a VRLA (Valve Regulated Lead Acid) battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive battery terminal is disconnected).

No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.

b. Check the charge of the battery, as shown in the charts and the following example.

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)
D. These values vary with the temperature, the condition of the battery plates, and the electrolyte level.

Do not quick charge a battery.

WARNING
Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.

If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.

When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the negative battery lead from the battery terminal.)

To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.

Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.

Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.

If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!

As shown in the following illustration, the open-circuit voltage of a VRLA (Valve Regulated Lead Acid) battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.

5. Charge:
• Battery
  (refer to the appropriate charging method)
Charging method using a variable-current (voltage) charger

a. Measure the open-circuit voltage prior to charging.

TIP

Voltage should be measured 30 minutes after the engine is stopped.

b. Connect a charger and ammeter to the battery and start charging.

TIP

Set the charging voltage at 16–17 V. If the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.

c. Make sure that the current is higher than the standard charging current written on the battery.

TIP

If the current is lower than the standard charging current written on the battery, set the charging voltage adjust dial at 20–24 V and monitor the amperage for 3–5 minutes to check the battery.

- Reaches the standard charging current → Battery is good.
- Does not reach the standard charging current → Replace the battery.

d. Adjust the voltage so that the current is at the standard charging level.

e. Set the time according to the charging time suitable for the open-circuit voltage.

f. If charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging current.

g. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

<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>

Charging method using a constant voltage charger

a. Measure the open-circuit voltage prior to charging.

TIP

Voltage should be measured 30 minutes after the engine is stopped.

b. Connect a charger and ammeter to the battery and start charging.

c. Make sure that the current is higher than the standard charging current written on the battery.

TIP

If the current is lower than the standard charging current written on the battery, this type of battery charger cannot charge the VRLA (Valve Regulated Lead Acid) battery. A variable voltage charger is recommended.

d. Charge the battery until its charging voltage is 15 V.

TIP

Set the charging time at 20 hours (maximum).

e. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

<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–12.0 V</td>
<td>Recharging is required.</td>
</tr>
<tr>
<td>Under 12.0 V</td>
<td>Replace the battery.</td>
</tr>
</tbody>
</table>

6. Install:
- Battery
7. Connect:
- Battery leads
  (to the battery terminals)
First, connect the positive battery lead “1”, and then the negative battery lead “2”.

8. Check:
   - Battery terminals
     Dirt → Clean with a wire brush.
     Loose connection → Connect properly.

9. Lubricate:
   - Battery terminals

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

10. Install:
   - Battery holding bracket
   - Front carrier
   - Battery cover
   Refer to “GENERAL CHASSIS” on page 4-1.

EAS28040

CHECKING THE RELAYS
Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, replace the relay.

<table>
<thead>
<tr>
<th>Pocket tester</th>
</tr>
</thead>
<tbody>
<tr>
<td>90890-03112</td>
</tr>
<tr>
<td>Analog pocket tester</td>
</tr>
<tr>
<td>YU-03112-C</td>
</tr>
</tbody>
</table>

1. Disconnect the relay from the wire harness.
2. Connect the pocket tester (Ω × 1) and battery (12 V) to the relay terminal as shown.
   Check the relay operation.
   Out of specification → Replace.

Starter relay

![Starter relay diagram]

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:

![Headlight relay diagram]

1. Positive tester probe
2. Negative tester probe
3. Negative tester probe

Result
Continuity
(between “1” and “2”)
No continuity
(between “1” and “3”)

9-87
Second step:

- Positive battery terminal
- Negative battery terminal
- Positive tester probe
- Negative tester probe
- Negative tester probe

**Result**
- No continuity (between “3” and “4”)
- Continuity (between “3” and “5”)

---

Fuel injection system relay

- Positive battery terminal
- Negative battery terminal
- Positive tester probe
- Negative tester probe
- Negative tester probe

**Result**
- Continuity (between “3” and “4”)

---

Radiator fan motor relay

- Positive battery terminal
- Negative battery terminal
- Positive tester probe
- Negative tester probe
- Negative tester probe

**Result**
- Continuity (between “3” and “4”)

---

Four-wheel-drive motor relay 1

**First step:**

- Positive tester probe
- Negative tester probe
- Negative tester probe

**Result**
- Continuity (between “1” and “2”)
- No continuity (between “1” and “3”)

---
Second step:

Four-wheel-drive motor relay 2

First step:

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe
5. Negative tester probe

Result

No continuity (between “3” and “4”)
Continuity (between “3” and “5”)

Four-wheel-drive motor relay 3

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result

Continuity (between “3” and “4”)
No continuity (between “1” and “3”)

CHECKING THE DIODE

1. Check:
   • Diode 3
   Out of specification → Replace.

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

The pocket tester or the analog pocket tester readings are shown in the following table.

<table>
<thead>
<tr>
<th>No continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive tester probe → yellow/white “1”</td>
</tr>
<tr>
<td>Negative tester probe → yellow “2”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive tester probe → yellow “2”</td>
</tr>
<tr>
<td>Negative tester probe → yellow/white “1”</td>
</tr>
</tbody>
</table>

---

a. Disconnect the diode 3 from the wire harness.
b. Connect the pocket tester (Ω × 1) to the diode 3 coupler as shown.
c. Check the diode 3 for continuity.
d. Check the diode 3 for no continuity.

---

CHECKING THE SPARK PLUG CAP

1. Check:
   - Spark plug cap resistance
     Out of specification → Replace.

---

2. Check:
   - Positive tester probe red/black “1”
   - Negative tester probe orange “2”

---

CHECKING THE IGNITION COIL

1. Check:
   - Primary coil resistance
     Out of specification → Replace.

---

2. Check:
   - Secondary coil resistance
     Out of specification → Replace.
Secondary coil resistance
8.64–12.96 kΩ at 20 °C (68 °F)

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 red/black “1”
• Negative tester probe Spark plug lead “2”

c. Measure the secondary coil resistance.

CHECKING THE IGNITION SPARK GAP
1. Check:
• Ignition spark gap
  Out of specification → Perform the ignition system troubleshooting, starting with step 5.
  Refer to “TROUBLESHOOTING” on page 9-3.

Minimum ignition spark gap
6.0 mm (0.24 in)

TIP
If the ignition spark gap is within specification, the ignition system circuit is operating normally.

a. Disconnect the spark plug cap from the spark plug.
b. Connect the ignition checker “1” as shown.

c. Set the main switch to “ON” and engine stop switch to “○”.
d. Measure the ignition spark gap “a”.
e. Crank the engine by pushing the start switch “○” 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
459–561 Ω at 20 °C (68 °F)

a. Connect the pocket tester (Ω × 100) to the crankshaft position sensor coupler as shown.

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

• Positive tester probe gray “1”
• Negative tester probe black “2”
b. Measure the crankshaft position sensor resistance.

CHECKING THE LEAN ANGLE SENSOR
1. Remove:
   • Lean angle sensor
2. Check:
   • Lean angle sensor output voltage
     Out of specification → Replace.

Lean angle sensor output voltage
Less than 65°: 3.55–4.45 V
More than 65°: 0.65–1.35 V

a. Connect the lean angle sensor coupler to the wire harness.
b. Connect the pocket tester (DC 20 V) to the lean angle sensor coupler as shown.

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

• Positive tester probe yellow/green “1”
• Negative tester probe black/blue “2”

c. Set the main switch to “ON”.
d. Tilt the lean angle sensor to 65°.

e. Measure the lean angle sensor output voltage.

CHECKING THE STARTER MOTOR OPERATION
1. Check:
   • Starter motor operation
     Does not operate → Perform the electric starting system troubleshooting, starting with step 4.
     Refer to “TROUBLESHOOTING” on page 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:
   • AC magneto coupler (from the wire harness)
2. Check:
   • Stator coil resistance
     Out of specification → Replace the crankshaft position sensor/stator assembly.

Stator coil resistance
0.108–0.132 Ω at 20 °C (68 °F)

a. Connect the pocket tester (Ω × 1) to the AC magneto coupler as shown.
b. Measure the stator coil resistance.

CHECKING THE RECTIFIER/REGULATOR
1. Check:
   • Charging voltage
     Out of specification → Replace the rectifier/regulator.

   Charging voltage above 14 V at 5000 r/min

   a. Connect the engine tachometer to the spark plug lead.
   b. Connect the pocket tester (DC 20 V) to the rectifier/regulator coupler as shown.

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

• Positive tester probe red “1”
• Negative tester probe black “2”

c. Start the engine and let it run at approximately 5000 r/min.
d. Measure the 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.

Sender unit resistance (full)
19.00–21.00 Ω
Sender unit resistance (empty)
139.00–141.00 Ω

a. Connect the pocket tester (Ω × 10) to the fuel sender terminal as shown.

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

• Positive tester probe green/yellow “1”
• Negative tester probe black/white “2”
b. Move the fuel sender float to the minimum “3” and maximum “4” level positions.

c. Measure the fuel sender resistance.

CHECKING THE SPEED SENSOR
1. Check:
   • Speed sensor output voltage
     Out of specification → Replace.

   Output voltage reading cycle
   0.6 V–4.8 V–0.6 V–4.8 V–0.6 V

   a. Connect the pocket tester (DC 20 V) to the speed sensor coupler as shown.

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

b. Set the main switch to “ON”.

c. Elevate the rear wheels and slowly rotate them.

d. Measure the voltage (DC 20 V) of white and black/blue. With each full rotation of the rear wheel, 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. Measure the radiator fan motor movement.
CHECKING THE RADIATOR FAN MOTOR CIRCUIT BREAKER

1. Remove:
   • Radiator fan motor circuit breaker (from the wire harness)

TIP

The radiator fan motor circuit breaker “1” is attached to the wire harness with black tape near the tail/brake light connectors “2”.

2. Check:
   • Radiator fan motor circuit breaker resistance
     Out of specification → Replace the radiator fan motor circuit breaker.

   Radiator fan motor circuit breaker resistance
   Zero Ω at 20 ºC (68 ºF)

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

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
   2.45 kΩ at 20 ºC (68 ºF)
   290–354 Ω at 80 ºC (176 ºF)

a. Connect the pocket tester (Ω × 100) to the coolant temperature sensor terminals as shown.

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

b. Immerse the coolant temperature sensor “1” in a container filled with coolant “2”.

tip

Make sure the coolant temperature sensor terminals do not get wet.

c. Place a thermometer “3” in the coolant.

d. Slowly heat the coolant, and then let it cool down to the specified temperature.

e. Measure the coolant temperature sensor resistance.

b. Measure the radiator fan motor circuit breaker resistance.
ELECTRICAL COMPONENTS

CHECKING THE THROTTLE POSITION SENSOR
1. Remove:
   • Throttle position sensor (from the throttle body)
2. Check:
   • Throttle position sensor maximum resistance
     Out of specification → Replace the throttle position sensor.

   Resistance 3.08–5.72 kΩ

a. Connect the pocket tester (Ω x 1k) to the throttle position sensor terminal as shown.

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

• Positive tester probe
  blue “1”
• Negative tester probe
  black/blue “2”

b. Measure the throttle position sensor resistance.

CHECKING THE INTAKE AIR PRESSURE SENSOR
1. Check:
   • Intake air pressure sensor output voltage
     3.75–4.25 V

   a. Connect the pocket tester (DC 20 V) to the intake air pressure sensor coupler as shown.

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

• Positive tester probe
  pink “1”
• Negative tester probe
  black/blue “2”

b. Set the main switch to “ON”.
c. Measure the intake air pressure sensor output voltage.

CHECKING THE INTAKE AIR TEMPERATURE SENSOR
1. Remove:
   • Intake air temperature sensor
     (from the air filter case.)

   WARNING
   Handle the intake air temperature sensor with special care.
   Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.

2. Check:
   • Intake air temperature sensor resistance
     290–390 Ω at 80 °C (176 °F)

   Out of specification → Replace.
a. Connect the pocket tester (Ω × 100) to the intake air temperature sensor terminal as shown.

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

b. Immerse the intake air temperature sensor “1” in a container filled with water “2”.

TIP
Make sure that the air temperature sensor terminals do not get wet.

c. Place a thermometer “3” in the water.
d. Slowly heat the water, then let it cool down to the specified temperature.
e. Measure the intake air temperature sensor resistance.

CHECKING THE EPS MOTOR (for YFM5FGP/YFM7FGP)
1. Remove:
   • EPS unit
2. Check:
   • EPS motor
      Out of specification → Replace the EPS unit.

TIP
The pocket tester and the analog pocket tester readings are shown in the following table.

| Continuity | Positive tester probe → red “1” |
|           | Negative tester probe → black “2” |
|           | No continuity                        |
|           | Positive tester probe → red “1” |
|           | Negative tester probe → EPS motor body “3” |
|           | No continuity                        |
|           | Positive tester probe → black “2” |
|           | Negative tester probe → EPS motor body “3” |

CHECKING THE EPS TORQUE SENSOR (for YFM5FGP/YFM7FGP)
1. Remove:
   • EPS unit
2. Check:
   • EPS torque sensor resistance
      Out of specification → Replace the EPS unit.

| EPS torque sensor resistance | 1.00–1.50 kΩ |

| Checking the EPS motor for continuity.
| Checking the EPS motor for no continuity.

a. Connect the pocket tester (Ω × 1) to the EPS motor coupler terminal and EPS motor body.

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

b. Check the EPS motor for continuity.
c. Check the EPS motor for no continuity.
b. Measure the EPS torque sensor resistance.

---

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

- Positive tester probe → red “1”
- Negative tester probe → black “2”
# Troubleshooting

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The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

**STARTING FAILURES**

**Engine**
1. Cylinder and cylinder head
   - Loose spark plug
   - Loose cylinder head or cylinder
   - Damaged cylinder head gasket
   - Damaged cylinder gasket
   - Worn or damaged cylinder
   - Incorrect valve clearance
   - Improperly sealed valve
   - Incorrect valve-to-valve-seat contact
   - Incorrect valve timing
   - Faulty valve spring
   - Seized valve
2. Piston and piston ring(s)
   - Improperly installed piston ring
   - Damaged, worn or fatigued piston ring
   - Seized piston ring
   - Seized or damaged piston
3. Air filter
   - Improperly installed air filter
   - Clogged air filter element
4. Crankcase and crankshaft
   - Improperly assembled crankcase
   - Seized crankshaft

**Fuel system**
1. Fuel tank
   - Empty fuel tank
   - Clogged fuel tank drain hose
   - Clogged rollover valve
   - Clogged rollover valve hose
   - Deteriorated or contaminated fuel
2. Fuel pump
   - Faulty fuel pump
   - Faulty fuel injection system relay
   - Clogged or damaged fuel hose
3. Throttle body
   - Deteriorated or contaminated fuel
   - Sucked-in air

**Electrical system**
1. Battery
   - Discharged battery
   - Faulty battery
2. Fuse(s)
   - Blown, damaged or incorrect fuse
   - Improperly installed fuse
3. Spark plug
   - Incorrect spark plug gap
   - Incorrect spark plug heat range
   - Fouled spark plug
   - Worn or damaged electrode
   - Worn or damaged insulator
   - Faulty spark plug cap
4. Ignition coil
   - Cracked or broken ignition coil body
   - Broken or shorted primary or secondary coils
   - Faulty spark plug lead
5. Ignition system
   - Faulty ECU
   - Faulty crankshaft position sensor
   - Broken AC magneto rotor woodruff key
6. Switches and wiring
   - Faulty main switch
   - Faulty engine stop switch
   - Broken or shorted wiring
   - Faulty gear position switch
   - Faulty start switch
   - Faulty brake light switch
   - Improperly grounded circuit
   - Loose connections
7. Starting system
   - Faulty starter motor
   - Faulty starter relay
   - Faulty starter clutch

**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
**Electrical system**

1. Battery
   - Discharged battery
   - Faulty battery
2. Spark plug
   - Incorrect spark plug gap
   - Incorrect spark plug heat range
   - Fouled spark plug
   - Worn or damaged electrode
   - Worn or damaged insulator
   - Faulty spark plug cap
3. Ignition coil
   - Broken or shorted primary or secondary coils
   - Faulty spark plug lead
   - Cracked or broken ignition coil
4. Ignition system
   - Faulty ECU
   - Faulty crankshaft position sensor

**Fuel system**

1. Fuel pump
   - Faulty fuel pump

**Engine**

1. Air filter
   - Clogged air filter element

**Faulty Drive Train**

The following conditions may indicate damaged shaft drive components:

<table>
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<th>Symptoms</th>
<th>Possible Causes</th>
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<tr>
<td>A pronounced hesitation or “jerky” movement during acceleration, deceleration, or sustained speed.</td>
<td>A. Bearing damage.</td>
</tr>
<tr>
<td>B. Improper gear backlash.</td>
<td></td>
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<tr>
<td>C. Gear tooth damage.</td>
<td></td>
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<tr>
<td>D. Broken drive shaft.</td>
<td></td>
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<tr>
<td>E. Broken gear teeth.</td>
<td></td>
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<tr>
<td>F. Seizure due to lack of lubrication.</td>
<td></td>
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<tr>
<td>G. Small foreign objects lodged between the moving parts.</td>
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</tbody>
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**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

EAS28580

FAULTY CLUTCH

Engine operates but vehicle will not move
1. V-belt
   • Damaged or worn V-belt
   • Slipping V-belt
2. Primary pulley cam and primary pulley slider
   • Damaged or worn primary pulley cam
   • Damaged or worn primary pulley slider
3. Clutch spring(s)
   • Damaged clutch spring
4. Transmission gear(s)
   • Damaged transmission gear

Clutch slips
1. Clutch spring
   • Damaged, loose or worn clutch spring
2. Clutch shoe
   • Damaged or worn clutch shoe
3. Primary sliding sheave
   • Seized primary sliding sheave

Poor starting performance
1. V-belt
   • V-belt slips
   • Oil or grease on the V-belt
2. Primary sliding sheave
   • Faulty operation
   • Worn pin groove
   • Worn pin
3. Clutch shoe
   • Bent, damaged or worn clutch shoe

Poor speed performance
1. V-belt
   • Oil or grease on the V-belt
2. Primary pulley weight(s)
   • Faulty operation
   • Worn primary pulley weight
3. Primary fixed sheave
   • Worn primary fixed sheave
4. Primary sliding sheave
   • Worn primary sliding sheave
5. Secondary fixed sheave
   • Worn secondary fixed sheave
6. Secondary sliding sheave
   • Worn secondary sliding sheave

EAS28600

OVERHEATING

Engine
1. Clogged coolant passages
2. Cylinder head and piston
   • Heavy carbon buildup
3. Engine oil
   • Incorrect oil level
   • Incorrect oil viscosity
   • Inferior oil quality

Cooling system
1. Coolant
   • Low coolant level
2. Radiator
   • Damaged or leaking radiator
   • Faulty radiator cap
   • Bent or damaged radiator fin
3. Water pump
   • Damaged or faulty water pump
4. Thermostat
   • Thermostat stays closed
5. Hose(s) and pipe(s)
   • Damaged hose
   • Improperly connected hose
   • Damaged pipe
   • Improperly connected pipe

Fuel system
1. Throttle body
   • Damaged or loose throttle body joint
2. Air filter
   • Clogged air filter element

Chassis
1. Brake(s)
   • Dragging brake

Electrical system
1. Spark plug
   • Incorrect spark plug gap
   • Incorrect spark plug heat range
2. Ignition system
   • Faulty ECU

EAS28610

OVERCOOLING

Cooling system
1. Thermostat
   • Thermostat stays open
TROUBLESHOOTING

EAS28620
POOR BRAKING PERFORMANCE
• Worn brake pad
• Worn brake disc
• Air in hydraulic brake system
• Leaking brake fluid
• Faulty brake caliper kit
• Faulty brake caliper piston seal
• Loose union bolt
• Damaged brake hose
• Oil or grease on the brake disc
• Oil or grease on the brake pad
• Incorrect brake fluid level

EAS3B41029
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

EAS28670
UNSTABLE HANDLING
1. Handlebar
   • Bent or improperly installed handlebar
2. Steering
   • Incorrect toe-in
   • Bent steering stem
   • Improperly installed steering stem
   • Damaged bearing or bearing race
   • Bent tie-rods
   • Deformed steering knuckles
3. Shock absorber
   • Faulty shock absorber spring
   • Leaking oil
4. Tire(s)
   • Uneven tire pressures (left and right)
   • Incorrect tire pressure
   • Uneven tire wear
5. Wheel(s)
   • Incorrect wheel balance
   • Deformed wheel
   • Damaged or loose wheel bearing
   • Bent or loose wheel axle
   • Excessive wheel runout
6. Frame
   • Bent frame
   • Damaged frame

EAS28710
FAULTY LIGHTING OR SIGNALING SYSTEM

Headlight does not come on
• Wrong headlight bulb
• Too many electrical accessories
• Hard charging
• Incorrect connection
• Improperly grounded circuit
• Poor contacts (main or light switch)
• Burnt-out headlight bulb

Headlight bulb burnt out
• Wrong headlight bulb
• Faulty battery
• Faulty rectifier/regulator
• Improperly grounded circuit
• Faulty main switch
• Faulty light switch
• Headlight bulb life expired

Tail/brake light does not come on
• Wrong tail/brake light bulb
• Too many electrical accessories
• Incorrect connection
• Burnt-out tail/brake light bulb

Tail/brake light bulb burnt out
• Wrong tail/brake light bulb
• Faulty battery
• Incorrectly adjusted rear brake light switch
• Tail/brake light bulb life expired
**WIRING DIAGRAM**

**YFM5FGY/YFM5FGPY/ YFM7FGY/YFM7FGPY 2009**

1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Main switch
5. Frame ground
6. Main fuse
7. EPS fuse
8. Battery
9. Fuel injection system fuse
10. Starter relay
11. Starter motor
12. EPS torque sensor
13. EPS motor
14. EPS (electric power steering) control unit
15. EPS self-diagnosis signal connectors
16. Diode 1
17. Fuel injection system relay
18. Reverse switch
19. ISC (idle speed control) unit
20. ECU (engine control unit)
21. Ignition coil
22. Spark plug
23. Fuel injector
24. Intake air temperature sensor
25. Coolant temperature sensor
26. Speed sensor
27. TPS (throttle position sensor)
28. Intake air pressure sensor
29. Lean angle sensor
30. Gear position switch
31. Meter assembly
32. Multifunction meter
33. Engine trouble warning light
34. Coolant temperature warning light
35. Park indicator light
36. Reverse indicator light
37. Neutral indicator light
38. High-range indicator light
39. Low-range indicator light
40. EPS warning light
41. Fuel sender
42. Fuel pump
43. Diode 2
44. Four-wheel-drive motor relay 1
45. Four-wheel-drive motor relay 2
46. Four-wheel-drive motor relay 3
47. On-command four-wheel-drive motor switch and differential lock switch
48. Differential motor
49. Four-wheel-drive motor fuse
50. Auxiliary DC jack fuse
51. Auxiliary DC jack
52. Left handlebar switch
53. Light switch
54. Engine stop switch
55. Start switch
56. Override switch
57. Headlight
58. Headlight relay
59. Ignition fuse
60. Signaling system fuse
61. Headlight fuse
62. Rear brake light switch
63. Front brake light switch
64. Diode 3
65. Tail/brake light
66. Radiator fan motor
67. Radiator fan motor circuit breaker
68. Radiator fan motor relay
69. Radiator fan motor fuse

**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/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/G**: Blue/Green
- **L/R**: Blue/Red
- **L/Y**: Blue/Yellow
- **O/W**: Orange/White
- **P/L**: Pink/Blue
- **R/B**: Red/Black
- **R/G**: Red/Green
- **R/L**: Red/Blue
- **R/W**: Red/White
- **R/Y**: Red/Yellow
- **W/B**: White/Black
- **W/G**: White/Green
- **W/R**: White/Red
- **Y/B**: Yellow/Black
- **Y/G**: Yellow/Green
- **Y/L**: Yellow/Blue
- **Y/R**: Yellow/Red
- **Y/W**: Yellow/White