Notice

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

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

Note:

Designs and specifications are subject to change without notice.

Important Manual Information

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

⚠️ The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

⚠️ Warning: Failure to follow WARNING instructions could result in severe injury or death to the vehicle operator, a bystander or a person checking or repairing the vehicle.

⚠️ Caution: A CAUTION indicates special precautions that must be taken to avoid damage to the vehicle.

Note: A NOTE provides key information to make procedures easier or clearer.
HOW TO USE THIS MANUAL

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

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

---

CLUTCH

5-42

3. Remove:
   Spacer
   Bearing

NOTE:
Insert M6 bolts "2" into the spacer and then remove the spacer by pulling on the bolts.

CHECKING THE FRICTION PLATES

The following procedure applies to inspection of all friction plates.

1. Check:
   Friction plate
   Damage/wear
   Replace.

2. Measure:
   Friction plate thickness
   Out of specification
   Replace.

   NOTE:
   Measure the friction plate at four places.

CHECKING THE CLUTCH PLATES

The following procedure applies to inspection of clutch plates.

1. Check:
   Clutch plate
   Damage
   Replace.

2. Measure:
   Clutch plate warpage
   (with a plate surface and thickness gauge)
   Over warpage limit
   Replace.

---

Removing the clutch

Order Job/Part Q'ty Remarks

1 Pressure plate2 1
2 Clutch spring 1
3 Clutch spring seat 1
4 Pressure plate1 1
5 short clutch push rod 1
6 Ball 1
7 long clutch push rod 1
8 O-ring 1
9 Friction plate 1
10 Clutch plate 6
11 Friction plate 2 3
12 Friction plate 3 3
13 Clutch boss nut 1
14 Lock washer 1
15 Clutch boss 1
16 Ring 1
17 Clutch plate 1
18 Spring 1
19 Spring seat plate 1
20 Friction plate 1

New

T R.

8 Nm (0.8 kg·m)

70 Nm (7.0 kg·m)

---
SYMBOLS

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

NOTE: 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. Silicon grease
17. Apply locking agent (LOCTITE®)
18. Replace the part
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VEHICLE IDENTIFICATION NUMBER
The vehicle identification number “1” is stamped into the right side of the steering head pipe.

MODEL LABEL
The model label “1” is affixed to the frame. This information will be needed to order spare parts.
OUTLINE OF THE FI SYSTEM
The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions and the atmospheric temperature. In the conventional carburetor system, the air-fuel ratio of the mixture that is supplied to the combustion chamber is created by the volume of the intake air and the fuel that is metered by the jet used in the respective carburetor.

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

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

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

1. Intake air temperature sensor  
2. Engine trouble warning light  
3. Ignition coil  
4. Intake air pressure sensor 1  
5. Fuel pump  
6. Intake air pressure sensor 2  
7. Throttle position sensor  
8. Battery  
9. Lean angle sensor  
10. ECU  
11. EXUP servomotor  
12. \( \text{O}_2 \) sensor  
13. ISC (idle speed control valve)  
14. Crankshaft position sensor  
15. Sub-throttle position sensor  
16. Engine temperature sensor bolt  
17. Fuel injector  
18. Spark plug
The fuel pump delivers fuel to the fuel injector via the fuel filter. The pressure regulator is installed in the fuel rail, and maintains the fuel pressure that is applied to the fuel injector at 387–397 kPa (3.87–3.97 kg/cm²). The fuel injector is operated due to signals from the ECU, and injects fuel into the intake manifold. Since fuel is supplied only for the duration of injection, good fuel economy is obtained. 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 temperature sensor O₂ sensor and engine temperature 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.

1. Fuel pump
2. Injector
3. ECU
4. Throttle position sensor
5. Sub-throttle position sensor
6. ISC (idle speed control valve)
7. O₂ sensor
8. Engine temperature sensor
9. Crankshaft position sensor
10. Intake air pressure sensor
11. Throttle bodies
12. Intake air temperature sensor
13. Air filter case
14. Pressure regulator

A. Fuel system
B. Intake system
C. Control system
FEATURES

IMMOBILIZER SYSTEM
To help prevent theft, the XJR1300 is equipped with an “immobilizer system” that electronically prevents engine starting.

The key has a built-in microchip transponder that disables illegal duplicate keys by dual checking of code between key and immobilizer unit and between immobilizer unit and ECU, thereby improving security.

After turning the main switch “ON” the ECU checks the unique key identification code and random code through the immobilizer unit. The immobilizer unit and ECU computation results are checked with the 2 codes, and if the key is recognized as legal, the ECU releases ignition control (cutoff) and the engine can start.

With a copy key with only identical key grooves, code verification does not proceed correctly, the ECU fails to release ignition control and the engine cannot start.

NOTE:
While the code is being verified after the main switch is turned “ON” the immobilizer warning light is lit. Wait until the immobilizer warning light goes off before starting the engine.

Diagram:
- a. Recognizing electronic codes
- b. Sub key (black)
- c. Transponder
- d. Antenna
- e. Immobilizer unit
- f. Ignition control
- g. Cut off
- h. ECU
INSTRUMENT FUNCTION
Multi-function display

**WARNING**
Be sure to stop the motorcycle before making any setting change to the multi-function display.

1. Fuel meter
2. Clock
3. Odometer/Trip meter/Fuel reserve trip meter/Self-diagnostic function
4. RESET button
5. SELECT button

The multi-function display is equipped with the following:
- an odometer (which shows the total distance traveled)
- two trip meters (which show the distance traveled since they were last set to zero)
- a fuel reserve trip meter (which shows the distance traveled on the fuel reserve)
- a fuel meter
- a clock
- a self-diagnosis device

**NOTE:**
Be sure to turn the key to “ON” before using the “SELECT” and “RESET” buttons.

Odometer and trip meter modes

1. Odometer/Trip meter/Fuel trip meter

Pushing the “SELECT” button switches the display between the odometer mode “ODO” and the trip meter modes “TRIP 1” and “TRIP 2” in the following order:
ODO → TRIP 1 → TRIP 2 → ODO

When approximately 4.5 L (1.19 US gal) (0.99 Imp.gal) of fuel remains in the fuel tank, the display will automatically change to the fuel reserve trip meter mode “TRIP F” and start counting the distance traveled from that point. In that case, pushing the “SELECT” button switches the display between the various trip meter and odometer modes in the following order:
TRIP F → ODO → TRIP 1 → TRIP 2 → TRIP F

To reset a trip meter, select it by pushing the “SELECT” button, and then push the “RESET” button for at least two seconds. If you do not reset the fuel reserve trip meter manually, it will reset itself automatically and the display will return to the prior mode after refueling and traveling 5 km (3 mi).
FEATURES

Fuel meter

1. Fuel level warning indicator
2. Fuel meter

The fuel meter indicates the amount of fuel in the fuel tank. The display segments of the fuel meter disappear towards “E” (Empty) as the fuel level decreases. When the fuel level warning indicator “□” starts flashing, refuel as soon as possible.

NOTE:
This fuel meter is equipped with a self-diagnosis system. If the electrical circuit is defective, the following cycle will be repeated until the malfunction is corrected: All the display segments and symbol “□” will flash eight times, then go off for approximately 3 seconds. If this occurs, refer to “SIGNALING SYSTEM” on page 7-19.

Self-diagnosis devices

1. Error code display

This model is equipped with a self-diagnosis device for various electrical circuits. If any of those circuits are defective, the engine trouble warning light will come on, and then the odometer/tripmeter display will indicate a two-digit error code. If the multi-function display indicates such an fault code, note the code number, and check the vehicle. Refer to “FUEL INJECTION SYSTEM” on page 7-25.

This model is also equipped with a self-diagnosis device for the immobilizer system. If any of the immobilizer system circuits are defective, the immobilizer system indicator light will flash, and then the display will indicate a two-digit error code.

NOTE:
If the display indicates error code 52, this could be caused by transponder interference. If this error code appears, try the following.

1. Use the code re-registering key to start the engine.

NOTE:
Make sure there are no other immobilizer keys close to the main switch, and do not keep more than one immobilizer key on the same key ring! Immobilizer system keys may cause signal interference, which may prevent the engine from starting.

2. If the engine starts, turn it off and try starting the engine with the standard keys.
3. If one or both of the standard keys do not start the engine, re-register standard keys. If the display indicates any error codes, note the code number, and then check the vehicle. Refer to “IMMOBILIZER SYSTEM” on page 7-69.

Clock mode

1. Clock

To set the clock:
1. Turn the key to “ON”.
2. Push the “SELECT” button and “RESET” button together for at least two 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.
CAUTION:

If the multi-function display indicates an error 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 1-11.

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

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

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**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.

---

1. **Bearings**

---

**a. Shaft**
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.

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

4. Connect:
   - Lead
   - Coupler
   - Connector

   **NOTE:**
   Make sure all connections are tight.

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

---

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

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

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

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

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<td>Fuel pressure adapter</td>
<td><img src="image" alt="Fuel pressure adapter" /></td>
<td>6-7</td>
</tr>
<tr>
<td>Tool name/Tool No.</td>
<td>Illustration</td>
<td>Reference pages</td>
</tr>
<tr>
<td>-------------------</td>
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<td>-----------------</td>
</tr>
<tr>
<td>Vacuum/pressure pump gauge set 90890-06756 Mityvac brake bleeding tool YS-42423</td>
<td><img src="/image" alt="Image" /></td>
<td>6-7</td>
</tr>
<tr>
<td>Universal clutch holder 90890-04086 YM-91042</td>
<td><img src="/image" alt="Image" /></td>
<td>5-44, 5-47</td>
</tr>
<tr>
<td>Valve lapper 90890-04101 Valve lapping tool YM-A8998</td>
<td><img src="/image" alt="Image" /></td>
<td>5-20</td>
</tr>
<tr>
<td>Tappet adjusting tool 90890-04110 Valve adjustment tool YM-33966</td>
<td><img src="/image" alt="Image" /></td>
<td>3-5</td>
</tr>
<tr>
<td>Ignition checker 90890-06754 Opama pet-4000 spark checker YM-34487</td>
<td><img src="/image" alt="Image" /></td>
<td>7-92</td>
</tr>
<tr>
<td>Yamaha bond No. 1215 (Three Bond No.1215®) 90890-85505</td>
<td><img src="/image" alt="Image" /></td>
<td>5-63</td>
</tr>
<tr>
<td>Digital tachometer 90890-06760 YU-39951-B</td>
<td><img src="/image" alt="Image" /></td>
<td>3-7, 3-9, 3-11</td>
</tr>
</tbody>
</table>
### GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>5WMG (EUR)</th>
<th>5WMJ (OCE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall length</td>
<td>2175 mm (85.6 in)</td>
<td></td>
</tr>
<tr>
<td>Overall width</td>
<td>765 mm (30.1 in)</td>
<td></td>
</tr>
<tr>
<td>Overall height</td>
<td>1115 mm (43.9 in)</td>
<td></td>
</tr>
<tr>
<td>Seat height</td>
<td>795 mm (31.3 in)</td>
<td></td>
</tr>
<tr>
<td>Wheelbase</td>
<td>1500 mm (59.1 in)</td>
<td></td>
</tr>
<tr>
<td>Ground clearance</td>
<td>125 mm (4.92 in)</td>
<td></td>
</tr>
<tr>
<td>Minimum turning radius</td>
<td>2800 mm (110.2 in)</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With oil and fuel</td>
<td>245.0 kg (540 lb)</td>
<td></td>
</tr>
<tr>
<td>Maximum load</td>
<td>205 kg (452 lb)</td>
<td></td>
</tr>
</tbody>
</table>
ENGINE SPECIFICATIONS

**Engine**
- **Engine type**: Air cooled 4-stroke, DOHC
- **Displacement**: 1251.0 cm³
- **Cylinder arrangement**: Forward-inclined parallel 4-cylinder
- **Bore x stroke**: 79.0 × 63.8 mm (3.11 × 2.51 in)
- **Compression ratio**: 9.70 :1
- **Standard compression pressure (at sea level)**: 1050 kPa/400 r/min (149.3 psi/400 r/min) (10.5 kgf/cm²/400 r/min)
- **Minimum–maximum**: 900–1200 kPa (128.0–170.7 psi) (9.0–12.0 kgf/cm²)
- **Starting system**: Electric starter

**Fuel**
- **Recommended fuel**: Premium unleaded gasoline only
- **Fuel tank capacity**: 21.0 L (5.55 US gal) (4.62 Imp.gal)
- **Fuel reserve amount**: 4.5 L (1.19 US gal) (0.99 Imp.gal)

**Engine oil**
- **Lubrication system**: Wet sump
- **Type**: SAE10W30, SAE10W40, SAE15W40, SAE20W40 or SAE20W50
- **Recommended engine oil grade**: API service SG type or higher, JASO standard MA
- **Engine oil quantity**
  - **Total amount**: 4.20 L (4.44 US qt) (3.70 Imp.qt)
  - **Without oil filter element replacement**: 2.80 L (2.96 US qt) (2.46 Imp.qt)
  - **With oil filter element replacement**: 3.15 L (3.33 US qt) (2.77 Imp.qt)
  - **Oil cooler capacity (including all routes)**: 0.2 L (0.21 US qt) (0.18 Imp.qt)
  - **Oil pressure (hot)**: 80.0 kPa/1000 r/min (11.6 psi/1000 r/min) (0.80 kgf/cm²/1000 r/min)
  - **Oil filter type**: Paper

**Oil pump**
- **Oil pump type**: Trochoid
- **Inner-rotor-to-outer-rotor-tip clearance**
  - **Limit**: 0.20 mm (0.0079 in)
- **Outer-rotor-to-oil-pump-housing clearance**
  - **Limit**: 0.160 mm (0.0063 in)
- **Oil-pump-housing-to-inner-and-outer-rotor clearance**
  - **Limit**: 0.15 mm (0.0059 in)
- **Bypass valve opening pressure**: 180.0–220.0 kPa (26.1–31.9 psi) (1.80–2.20 kgf/cm²)
- **Relief valve operating pressure**: 480.0–580.0 kPa (69.6–84.1 psi) (4.80–5.80 kgf/cm²)
- **Pressure check location**: MAIN GALLERY

**Spark plug (s)**
- **Manufacturer/model**: NGK/DPR8EA-9
- **Spark plug gap**: 0.8–0.9 mm (0.031–0.035 in)

**Cylinder head**
ENGINE SPECIFICATIONS

Volume: 33.90–34.70 cm³ (2.07–2.12 cu.in)
Warpage limit: 0.20 mm (0.0079 in)

Camshaft
- Drive system: Chain drive (center)
- Camshaft cap inside diameter: 25.000–25.021 mm (0.9843–0.9851 in)
- Camshaft journal diameter: 24.967–24.980 mm (0.9830–0.9835 in)
- Camshaft-journal-to-camshaft-cap clearance: 0.020–0.054 mm (0.0008–0.0021 in)
- Intake A: 35.849–35.949 mm (1.4114–1.4153 in)
- Intake B: 28.010–28.110 mm (1.1023–1.1067 in)
- Exhaust A: 35.950–36.050 mm (1.4154–1.4193 in)
- Exhaust B: 28.045–28.145 mm (1.1041–1.1081 in)
- Camshaft runout limit: 0.030 mm (0.0012 in)

Timing chain
- Model/number of links: 79RH2015/156
- Tensioning system: Automatic

Valve, valve seat, valve guide
- Valve clearance (cold)
  - Intake: 0.11–0.15 mm (0.0043–0.0059 in)
  - Exhaust: 0.16–0.20 mm (0.0063–0.0079 in)
- Valve dimensions
  - Valve head diameter A (intake): 28.90–29.10 mm (1.1378–1.1457 in)
  - Valve head diameter A (exhaust): 24.90–25.10 mm (0.9803–0.9882 in)
  - Valve face width B (intake): 1.980–2.550 mm (0.0780–0.1004 in)
  - Valve face width B (exhaust): 1.980–2.550 mm (0.0780–0.1004 in)
Valve seat width C (intake) 0.90–1.10 mm (0.0354–0.0433 in)
Valve seat width C (exhaust) 0.90–1.10 mm (0.0354–0.0433 in)

Valve margin thickness D (intake) 0.80–1.20 mm (0.0315–0.0472 in)
Valve margin thickness D (exhaust) 0.80–1.20 mm (0.0315–0.0472 in)

Valve stem diameter (intake) 5.475–5.490 mm (0.2156–0.2161 in)
Limit 5.445 mm (0.2144 in)
Valve stem diameter (exhaust) 5.460–5.475 mm (0.2150–0.2156 in)
Limit 5.430 mm (0.2138 in)
Valve guide inside diameter (intake) 5.500–5.512 mm (0.2165–0.2170 in)
Limit 5.552 mm (0.2186 in)
Valve guide inside diameter (exhaust) 5.500–5.512 mm (0.2165–0.2170 in)
Limit 5.552 mm (0.2186 in)
Valve-stem-to-valve-guide clearance (intake) 0.010–0.037 mm (0.0004–0.0015 in)
Limit 0.080 mm (0.0032 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)
Valve stem runout 0.010 mm (0.0004 in)

Valve spring
Inner spring
Free length (intake) 39.65 mm (1.56 in)
Free length (exhaust) 39.65 mm (1.56 in)
Installed length (intake) 32.80 mm (1.29 in)
Installed length (exhaust) 32.80 mm (1.29 in)
Spring rate K1 (intake) 9.80 N/mm (55.96 lb/in) (1.00 kgf/mm)
Spring rate K2 (intake) 12.40 N/mm (70.80 lb/in) (1.26 kgf/mm)
Spring rate K1 (exhaust) 9.80 N/mm (55.96 lb/in) (1.00 kgf/mm)
Spring rate K2 (exhaust) 12.40 N/mm (70.80 lb/in) (1.26 kgf/mm)
Installed compression spring force (intake) 61.70–72.50 N (13.87–16.30 lbf) (6.29–7.39 lbf)
## ENGINE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installed compression spring force (exhaust)</td>
<td>61.70–72.50 N (13.87–16.30 lbf)</td>
</tr>
<tr>
<td>Spring tilt (intake)</td>
<td>2.5 °/1.7 mm (2.5 °/0.067 in)</td>
</tr>
<tr>
<td>Spring tilt (exhaust)</td>
<td>2.5 °/1.7 mm (2.5 °/0.067 in)</td>
</tr>
<tr>
<td>Winding direction (intake)</td>
<td>Clockwise</td>
</tr>
<tr>
<td>Winding direction (exhaust)</td>
<td>Clockwise</td>
</tr>
<tr>
<td>Outer spring</td>
<td></td>
</tr>
<tr>
<td>Free length (intake)</td>
<td>41.10 mm (1.62 in)</td>
</tr>
<tr>
<td>Free length (exhaust)</td>
<td>41.10 mm (1.62 in)</td>
</tr>
<tr>
<td>Installed length (intake)</td>
<td>34.80 mm (1.37 in)</td>
</tr>
<tr>
<td>Installed length (exhaust)</td>
<td>34.80 mm (1.37 in)</td>
</tr>
<tr>
<td>Spring rate K1 (intake)</td>
<td>22.60 N/mm (129.05 lb/in)</td>
</tr>
<tr>
<td>Spring rate K2 (intake)</td>
<td>28.80 N/mm (164.45 lb/in)</td>
</tr>
<tr>
<td>Spring rate K1 (exhaust)</td>
<td>22.60 N/mm (129.05 lb/in)</td>
</tr>
<tr>
<td>Spring rate K2 (exhaust)</td>
<td>28.80 N/mm (164.45 lb/in)</td>
</tr>
<tr>
<td>Installed compression spring force (intake)</td>
<td>130.40–154.00 N (29.31–34.62 lbf)</td>
</tr>
<tr>
<td>Installed compression spring force (exhaust)</td>
<td>130.40–154.00 N (29.31–34.62 lbf)</td>
</tr>
<tr>
<td>Spring tilt (intake)</td>
<td>2.5 °/1.8 mm (2.5 °/0.071 in)</td>
</tr>
<tr>
<td>Spring tilt (exhaust)</td>
<td>2.5 °/1.8 mm (2.5 °/0.071 in)</td>
</tr>
<tr>
<td>Winding direction (intake)</td>
<td>Counter clockwise</td>
</tr>
<tr>
<td>Winding direction (exhaust)</td>
<td>Counter clockwise</td>
</tr>
</tbody>
</table>

### Valve lifter

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve lifter outside diameter (intake)</td>
<td>27.978–28.002 mm (1.1015–1.1024 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>27.958 mm (1.1007 in)</td>
</tr>
<tr>
<td>Valve lifter outside diameter (exhaust)</td>
<td>27.978–28.002 mm (1.1015–1.1024 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>27.958 mm (1.1007 in)</td>
</tr>
<tr>
<td>Valve lifter hole inside diameter (intake)</td>
<td>27.996–28.020 mm (1.1022–1.1031 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>28.050 mm (1.1043 in)</td>
</tr>
<tr>
<td>Valve lifter hole inside diameter (exhaust)</td>
<td>27.996–28.020 mm (1.1022–1.1031 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>28.050 mm (1.1043 in)</td>
</tr>
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</table>

### Cylinder

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bore</td>
<td>79.000–79.010 mm (3.1102–3.1106 in)</td>
</tr>
<tr>
<td>Wear limit</td>
<td>79.100 mm (3.1142 in)</td>
</tr>
<tr>
<td>Taper limit</td>
<td>0.050 mm (0.0020 in)</td>
</tr>
<tr>
<td>Out of round limit</td>
<td>0.100 mm (0.0039 in)</td>
</tr>
<tr>
<td>Warp limit</td>
<td>0.03 mm (0.0012 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>0.015–0.040 mm (0.0006–0.0016 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.15 mm (0.0059 in)</td>
</tr>
<tr>
<td>Diameter D</td>
<td>78.970–78.985 mm (3.1090–3.1096 in)</td>
</tr>
<tr>
<td>Height H</td>
<td>5.0 mm (0.20 in)</td>
</tr>
<tr>
<td>Offset</td>
<td>1.00 mm (0.0394 in)</td>
</tr>
<tr>
<td>Offset direction</td>
<td>Intake side</td>
</tr>
<tr>
<td>Piston pin bore inside diameter</td>
<td>18.004–18.015 mm (0.7088–0.7093 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>18.045 mm (0.7104 in)</td>
</tr>
<tr>
<td>Piston pin outside diameter</td>
<td>17.991–18.000 mm (0.7083–0.7087 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>17.971 mm (0.7075 in)</td>
</tr>
</tbody>
</table>

### Piston ring

#### Top ring
- Ring type: Barrel

#### 2nd ring
- Ring type: Taper

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (B × T)</td>
<td>1.00 × 3.05 mm (0.04 × 0.12 in)</td>
</tr>
<tr>
<td>End gap (installed)</td>
<td>0.20–0.35 mm (0.0079–0.0138 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.60 mm (0.0236 in)</td>
</tr>
<tr>
<td>Ring side clearance</td>
<td>0.045–0.080 mm (0.0018–0.0032 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.100 mm (0.0039 in)</td>
</tr>
</tbody>
</table>
### ENGINE SPECIFICATIONS

<table>
<thead>
<tr>
<th><strong>Dimensions (B × T)</strong></th>
<th>1.20 × 3.00 mm (0.05 × 0.12 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>End gap (installed)</strong></td>
<td>0.35–0.50 mm (0.0138–0.0197 in)</td>
</tr>
<tr>
<td><strong>Limit</strong></td>
<td>0.75 mm (0.0295 in)</td>
</tr>
<tr>
<td><strong>Ring side clearance</strong></td>
<td>0.030–0.070 mm (0.0012–0.0028 in)</td>
</tr>
<tr>
<td><strong>Limit</strong></td>
<td>0.100 mm (0.0039 in)</td>
</tr>
</tbody>
</table>

**Oil ring**

<table>
<thead>
<tr>
<th><strong>Dimensions (B × T)</strong></th>
<th>2.50 × 2.90 mm (0.10 × 0.11 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>End gap (installed)</strong></td>
<td>0.20–0.50 mm (0.0079–0.0197 in)</td>
</tr>
<tr>
<td><strong>Ring side clearance</strong></td>
<td>0.050–0.155 mm (0.0020–0.0061 in)</td>
</tr>
</tbody>
</table>

#### Connecting rod

<table>
<thead>
<tr>
<th><strong>Oil clearance</strong></th>
<th>0.021–0.045 mm (0.0008–0.0018 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Limit</strong></td>
<td>0.08 mm (0.0032 in)</td>
</tr>
</tbody>
</table>

#### Crankshaft

<table>
<thead>
<tr>
<th><strong>Width A</strong></th>
<th>62.25–63.85 mm (2.451–2.514 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Width B</strong></td>
<td>382.00–383.20 mm (15.04–15.09 in)</td>
</tr>
<tr>
<td><strong>Runout limit C</strong></td>
<td>0.020 mm (0.0008 in)</td>
</tr>
<tr>
<td><strong>Big end side clearance D</strong></td>
<td>0.160–0.262 mm (0.0063–0.0103 in)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Limit</strong></th>
<th>0.50 mm (0.0197 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Big end radial clearance E</strong></td>
<td>0.023–0.047 mm (0.0009–0.0019 in)</td>
</tr>
<tr>
<td><strong>Journal oil clearance (using plastigauge®)</strong></td>
<td>0.020–0.044 mm (0.0008–0.0017 in)</td>
</tr>
<tr>
<td><strong>Limit</strong></td>
<td>0.09 mm (0.0035 in)</td>
</tr>
</tbody>
</table>

#### Clutch

<table>
<thead>
<tr>
<th><strong>Clutch type</strong></th>
<th>Wet, multiple-disc</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clutch release method</strong></td>
<td>Hydraulic inner push</td>
</tr>
<tr>
<td><strong>Friction plate thickness</strong></td>
<td>2.90–3.10 mm (0.114–0.122 in)</td>
</tr>
<tr>
<td><strong>Wear limit</strong></td>
<td>2.80 mm (0.1102 in)</td>
</tr>
<tr>
<td><strong>Plate quantity</strong></td>
<td>8 pcs</td>
</tr>
<tr>
<td><strong>Clutch plate thickness</strong></td>
<td>1.90–2.10 mm (0.075–0.083 in)</td>
</tr>
<tr>
<td><strong>Plate quantity</strong></td>
<td>7 pcs</td>
</tr>
<tr>
<td><strong>Warpage limit</strong></td>
<td>0.15 mm (0.059 in)</td>
</tr>
<tr>
<td><strong>Clutch spring height</strong></td>
<td>6.78 mm (0.27 in)</td>
</tr>
<tr>
<td><strong>Spring quantity</strong></td>
<td>1 pcs</td>
</tr>
<tr>
<td><strong>Push rod bending limit</strong></td>
<td>0.300 mm (0.0118 in)</td>
</tr>
</tbody>
</table>
### ENGINE SPECIFICATIONS

**Transmission**
- **Transmission type**: Constant mesh 5-speed
- **Primary reduction system**: Spur gear
- **Primary reduction ratio**: 98/56 (1.750)
- **Secondary reduction system**: Chain drive
- **Secondary reduction ratio**: 38/17 (2.235)
- **Operation**: Left foot operation
- **Gear ratio**:
  - 1st: 40/14 (2.857)
  - 2nd: 36/18 (2.000)
  - 3rd: 33/21 (1.571)
  - 4th: 31/24 (1.292)
  - 5th: 29/26 (1.115)
- **Main axle runout limit**: 0.60 mm (0.0236 in)
- **Drive axle runout limit**: 0.60 mm (0.0236 in)

**Shifting mechanism**
- **Shift mechanism type**: Guide bar
- **Shift fork guide bar bending limit**: 0.100 mm (0.0039 in)
- **Shift fork thickness**: 6.26–6.39 mm (0.2465–0.2516 in)

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

**Fuel injector**
- **Model/quantity**: 1150/4
- **Manufacturer**: DENSO

**Throttle body**
- **Type/quantity**: ACW34/2
- **Manufacturer**: MIKUNI
- **ID mark**: 5UXB 00
- **Throttle valve size**: #50

**Throttle position sensor**
- **Resistance**: 4.0–6.0 kΩ L-B
- **Output voltage**: 0.63–0.74 V

**Idling condition**
- **Engine idling speed**: 970–1170 r/min
- **CO%**: 3.5–4.5 %
- **Intake vacuum**: 32.5 kPa (9.6 inHg) (244 mmHg)
- **Oil temperature**: 85.0–95.0 °C (185.00–203.00 °F)
- **Throttle cable free play**: 3.0–5.0 mm (0.12–0.20 in)
- **Fuel pressure**: 387–397 kPa (3.87–3.97 kg/cm²)
<table>
<thead>
<tr>
<th>CHASSIS SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chassis</strong></td>
</tr>
<tr>
<td>Frame type</td>
</tr>
<tr>
<td>Caster angle</td>
</tr>
<tr>
<td>Trail</td>
</tr>
</tbody>
</table>

| Front wheel             |
| Wheel type              | Cast wheel             |
| Rim size                | 17M/C x MT3.50         |
| Rim material            | Aluminum               |
| Wheel travel            | 130.0 mm (5.12 in)     |
| Radial wheel runout limit | 1.0 mm (0.04 in)     |
| Lateral wheel runout limit | 0.5 mm (0.02 in)  |
| Wheel axle bending limit | 0.25 mm (0.01 in)     |

| Rear wheel              |
| Wheel type              | Cast wheel             |
| Rim size                | 17M/C x MT5.50         |
| Rim material            | Aluminum               |
| Wheel travel            | 110.0 mm (4.33 in)     |
| Radial wheel runout limit | 1.0 mm (0.04 in)     |
| Lateral wheel runout limit | 0.5 mm (0.02 in)  |
| Wheel axle bending limit | 0.25 mm (0.01 in)     |

| Front tire              |
| Type                    | Tubeless               |
| Size                    | 120/70 ZR17M/C (58W)   |
| Manufacturer/model      | DUNLOP/D252F L         |
| Wear limit (front)      | 1.6 mm (0.06 in)       |

| Rear tire               |
| Type                    | Tubeless               |
| Size                    | 180/55 ZR17M/C (73W)   |
| Manufacturer/model      | DUNLOP/D252 L          |
| Wear limit (rear)       | 1.6 mm (0.06 in)       |

| Tire air pressure (measured on cold tires) |
| Loading condition | 0–90 kg (0–198 lb) |
| Front            | 250 kPa (36 psi) (2.50 kgf/cm²) (2.50 bar) |
| Rear             | 250 kPa (36 psi) (2.50 kgf/cm²) (2.50 bar) |
| Loading condition | 90–205 kg (198–452 lb) |
| Front            | 250 kPa (36 psi) (2.50 kgf/cm²) (2.50 bar) |
| Rear             | 290 kPa (42 psi) (2.90 kgf/cm²) (2.90 bar) |
| High-speed riding | 250 kPa (36 psi) (2.50 kgf/cm²) (2.50 bar) |
| Rear             | 290 kPa (42 psi) (2.90 kgf/cm²) (2.90 bar) |

| Front brake            |
| Type                  | Dual disc brake        |
| Operation             | Right hand operation   |
| Front disc brake       |                         |
| Disc outside diameter × thickness | 298.0 × 5.0 mm (11.73 × 0.20 in) |
| Brake disc thickness limit | 4.5 mm (0.18 in)     |
### CHASSIS SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake disc deflection limit</td>
<td>0.10 mm (0.0039 in)</td>
</tr>
<tr>
<td>Brake pad lining thickness (inner)</td>
<td>5.5 mm (0.22 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.5 mm (0.02 in)</td>
</tr>
<tr>
<td>Brake pad lining thickness (outer)</td>
<td>5.5 mm (0.22 in)</td>
</tr>
<tr>
<td>Limit</td>
<td>0.5 mm (0.02 in)</td>
</tr>
<tr>
<td>Master cylinder inside diameter</td>
<td>15.00 mm (0.59 in)</td>
</tr>
<tr>
<td>Caliper cylinder inside diameter</td>
<td>30.23 mm (1.19 in)</td>
</tr>
<tr>
<td>Caliper cylinder inside diameter</td>
<td>27.00 mm (1.06 in)</td>
</tr>
<tr>
<td>Recommended fluid</td>
<td>DOT 4</td>
</tr>
</tbody>
</table>

**Rear brake**

- **Type**: Single disc brake
- **Operation**: Right foot operation
- **Brake pedal position**: 40.0 mm (1.57 in)

**Disc brake**

- **Disc outside diameter × thickness**: 267.0 × 5.0 mm (10.51 × 0.20 in)
- **Brake disc thickness limit**: 4.5 mm (0.18 in)
- **Brake disc deflection limit**: 0.15 mm (0.0059 in)
- **Brake pad lining thickness (inner)**: 5.5 mm (0.22 in)
- **Limit**: 0.5 mm (0.02 in)
- **Brake pad lining thickness (outer)**: 5.5 mm (0.22 in)
- **Limit**: 0.5 mm (0.02 in)
- **Master cylinder inside diameter**: 12.7 mm (0.50 in)
- **Caliper cylinder inside diameter**: 42.85 mm (1.69 in)
- **Recommended fluid**: DOT 4

**Steering**

- **Steering bearing type**: Angular bearing
- **Center to lock angle (left)**: 37.0 °
- **Center to lock angle (right)**: 37.0 °

**Front suspension**

- **Type**: Telescopic fork
- **Spring/shock absorber type**: Coil spring/oil damper
- **Front fork travel**: 130.0 mm (5.12 in)
- **Fork spring free length**: 284.0 mm (11.18 in)
- **Limit**: 275.5 mm (10.85 in)
- **Collar length**: 150.0 mm (5.91 in)
- **Installed length**: 273.0 mm (10.75 in)
- **Spring rate K1**: 9.00 N/mm (51.39 lb/in) (0.92 kgf/mm)
- **Spring stroke K1**: 0.0–130.0 mm (0.00–5.12 in)
- **Inner tube outer diameter**: 43.0 mm (1.69 in)
- **Inner tube bending limit**: 0.2 mm (0.01 in)
- **Optional spring available**: No
- **Recommended oil**: Suspension oil 01 or equivalent
- **Quantity**: 516.0 cm³ (17.45 US oz) (18.20 Imp.oz)
- **Level**: 125.0 mm (4.92 in)
- **Spring preload adjusting positions**: Minimum: 8, Standard: 5, Maximum: 1
- **Rebound damping adjusting positions**: Minimum: 10, Standard: 5
<table>
<thead>
<tr>
<th>CHASSIS SPECIFICATIONS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Maximum</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression damping adjusting positions</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>13</td>
</tr>
<tr>
<td>Standard</td>
<td>6</td>
</tr>
<tr>
<td>Maximum</td>
<td>1</td>
</tr>
</tbody>
</table>

**Rear suspension**

<table>
<thead>
<tr>
<th>Type</th>
<th>Swingarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring/shock absorber type</td>
<td>Coil spring/gas-oil damper</td>
</tr>
<tr>
<td>Rear shock absorber assembly travel</td>
<td>91.0 mm (3.58 in)</td>
</tr>
<tr>
<td>Spring free length</td>
<td>205.0 mm (8.07 in)</td>
</tr>
<tr>
<td>Installed length</td>
<td>186.0 mm (7.32 in)</td>
</tr>
<tr>
<td>Optional spring available</td>
<td>No</td>
</tr>
<tr>
<td>Enclosed gas/air pressure (STD)</td>
<td>1200 kPa (170.7 psi) (12.0 kgf/cm²)</td>
</tr>
</tbody>
</table>

| Spring preload adjusting positions |
| Minimum       | 0 mm (0 in) |
| Standard      | 17 mm (0.67 in) |
| Maximum       | 28 mm (1.10 in) |

| Rebound damping adjusting positions |
| Minimum       | 36 |
| Standard      | 10 |
| Maximum       | 1  |

| Compression damping adjusting positions |
| Minimum       | 20 |
| Standard      | 16 |
| Maximum       | 1  |

**Swingarm**

| Swingarm end free play limit (radial) | 1.0 mm (0.04 in) |
| Swingarm end free play limit (axial)  | 1.0 mm (0.04 in) |

**Drive chain**

<table>
<thead>
<tr>
<th>Type/manufacturer</th>
<th>50VA8/DAIDO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link quantity</td>
<td>110</td>
</tr>
<tr>
<td>Drive chain slack</td>
<td>20.0–30.0 mm (0.79–1.18 in)</td>
</tr>
<tr>
<td>15-link length limit</td>
<td>239.3 mm (9.42 in)</td>
</tr>
</tbody>
</table>
## ELECTRICAL SPECIFICATIONS

### Ignition system
- **Ignition system**: Transistorized coil ignition (digital)
- **Advancer type**: Digital
- **Ignition timing (B.T.D.C.)**: 5.0 °/1070 r/min

### Engine control unit
- **Model/manufacturer**: TBDF55/DENSO

### Transistorized coil ignition
- **Crankshaft position sensor resistance**: 248–372 Ω

### Ignition coil
- **Model/manufacturer**: 83R/MORIC
- **Minimum ignition spark gap**: 6.0 mm (0.24 in)
- **Primary coil resistance**: 1.92–2.88 Ω
- **Secondary coil resistance**: 9.52–14.28 kΩ

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

### AC generator
- **Model/manufacturer**: B3GB/DENSO
- **Standard output**: 13.5 V, 28.0 A @ 5000 r/min
- **Field coil resistance**: 2.75–3.04 Ω
- **Armature coil resistance**: 0.19–0.21 Ω
- **Brush overall length**: 13.7 mm (0.54 in)
- **Limit**: 4.7 mm (0.19 in)
- **Brush spring pressure**: 5.10–5.69 N (18.36–20.48 oz) (520–580 gf)
- **Rectifier/regulator type**: Semi conductor-field control
- **Model/manufacturer**: B3GB/DENSO
- **No load regulated voltage**: 14.2–14.8 V

### Battery
- **Model**: YTZ14S
- **Voltage, capacity**: 12 V, 11.2 Ah
- **Specific gravity**: 1.310
- **Manufacturer**: GYM
- **Ten hour rate amperage**: 1.12 A

### Headlight
- **Bulb type**: Halogen bulb
- **Bulb voltage, wattage x quantity**:
  - **Headlight**: 12 V, 60 W/55.0 W x 1
  - **Auxiliary light**: 12 V, 4.0 W x 1
  - **Tail/brake light**: LED
  - **Front turn signal light**: 12 V, 21.0 W x 2
  - **Rear turn signal light**: 12 V, 21.0 W x 2
  - **License plate light**: 12 V, 5.0 W x 1

### Indicator light
- **Neutral indicator light**: 12 V, 1.7 W x 1
## ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Turn signal indicator light</th>
<th>12 V, 1.7 W × 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil level warning light</td>
<td>12 V, 1.7 W × 2</td>
</tr>
<tr>
<td>High beam indicator light</td>
<td>12 V, 1.7 W × 1</td>
</tr>
<tr>
<td>Engine trouble warning light</td>
<td>12 V, 1.7 W × 1</td>
</tr>
<tr>
<td>Immobilizer system indicator light</td>
<td>LED</td>
</tr>
</tbody>
</table>

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

### Starter motor
- **Model/manufacturer**: SM-13/MITSUBA
- **Power output**: 0.65 kW
- **Armature coil resistance**: 0.0020–0.0030 Ω
- **Brush overall length**: 12.5 mm (0.49 in)
- **Limit**: 5.00 mm (0.20 in)
- **Brush spring force**: 7.65–10.01 N (27.54–36.03 oz) (780–1021 gf)
- **Commutator diameter**: 28.0 mm (1.10 in)
- **Limit**: 27.0 mm (1.06 in)
- **Mica undercut (depth)**: 0.70 mm (0.03 in)

### Starter relay
- **Model/manufacturer**: MS5E-691/JIDECO
- **Amperage**: 180.0 A
- **Coil resistance**: 4.18–4.62 Ω

### Horn
- **Horn type**: Plane
- **Quantity**: 2 pcs
- **Model/manufacturer**: YF-12/NIKKO
- **Maximum amperage**: 3.0 A
- **Coil resistance**: 1.15–1.25 Ω
- **Performance**: 105–113 dB/2m

### Turn signal/hazard relay
- **Relay type**: Full transistor
- **Model/manufacturer**: FE246BS/DENSO
- **Built-in, self-canceling device**: No
- **Turn signal blinking frequency**: 75.0–95.0 cycles/min

### Oil level gauge
- **Model/manufacturer**: 5LV/DENSO

### Fuel sender unit
- **Model/manufacturer**: 5UX/DENSO
- **Sender unit resistance (full)**: 19.0–21.0 Ω
- **Sender unit resistance (empty)**: 139.0–141.0 Ω

### Starting circuit cut-off relay
- **Model/manufacturer**: G8R-30Y-V3/OMRON
- **Coil resistance**: 162.0–198.0 Ω
- **Diode**: Yes

### Fuses
- **Main fuse**: 50.0 A
- **Headlight fuse**: 15.0 A
- **Taillight fuse**: 7.5 A
- **Signaling system fuse**: 7.5 A
- **Ignition fuse**: 15.0 A
<table>
<thead>
<tr>
<th>Description</th>
<th>Ampere</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel injection system fuse</td>
<td>15.0 A</td>
</tr>
<tr>
<td>Backup fuse</td>
<td>7.5 A</td>
</tr>
<tr>
<td>Spare fuse</td>
<td>15.0 A</td>
</tr>
<tr>
<td>Spare fuse</td>
<td>7.5 A</td>
</tr>
</tbody>
</table>
GENERAL TIGHTENING TORQUE SPECIFICATIONS

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

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

Item | Thread size | Q'nty | Tightening torque | Remarks |
---|-------------|-------|-------------------|---------|
Camshaft cap bolt | M6 | 18 | 12 Nm (1.2 m•kg, 8.7 ft•lb) |         |
Timing chain insertion stud bolt (chamber front) | M6 | 2 | 5 Nm (0.5 m•kg, 3.6 ft•lb) |         |
Timing chain insertion stud bolt (chamber rear) | M6 | 2 | 5 Nm (0.5 m•kg, 3.6 ft•lb) |         |
Exhaust pipe stud bolt | M8 | 8 | 15 Nm (1.5 m•kg, 11 ft•lb) |         |
Oil passage plug | M6 | 1 | 7 Nm (0.7 m•kg, 5.1 ft•lb) |         |
Spark plug | M12 | 4 | 18 Nm (1.8 m•kg, 13 ft•lb) |         |
Cylinder head nut | M10 | 12 | 35 Nm (3.5 m•kg, 25 ft•lb) |         |
Cylinder head cover bolt | M6 | 8 | 10 Nm (1.0 m•kg, 7.2 ft•lb) |         |
Timing chain stud bolt (cylinder) | M8 | 1 | 8 Nm (0.8 m•kg, 5.8 ft•lb) |         |
Connecting rod nut | M8 | 8 | 36 Nm (3.6 m•kg, 26 ft•lb) |         |
Camshaft sprocket bolt | M7 | 4 | 20 Nm (2.0 m•kg, 15 ft•lb) |         |
Timing chain tensioner assembly bolt | M6 | 2 | 10 Nm (1.0 m•kg, 7.2 ft•lb) |         |
Timing chain tensioner cap bolt | M11 | 1 | 20 Nm (2.0 m•kg, 15 ft•lb) |         |
Timing chain guide tap bolt | M10 | 1 | 10 Nm (1.0 m•kg, 7.2 ft•lb) |         |
## TIGHTENING TORQUE

<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>Timing chain guide stopper 2 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>OIL pump assembly screw</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m•kg, 5.1 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Oil pump bolt</td>
<td>M6</td>
<td>3</td>
<td>10 Nm (1.0 m•kg, 7.2 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Oil strainer housing 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 filter bolt</td>
<td>M20</td>
<td>1</td>
<td>15 Nm (1.5 m•kg, 11 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Oil pan bolt</td>
<td>M6</td>
<td>10</td>
<td>10 Nm (1.0 m•kg, 7.2 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Oil pan bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m•kg, 7.2 ft•lb)</td>
<td>With copper washer</td>
</tr>
<tr>
<td>Oil drain bolt</td>
<td>M14</td>
<td>1</td>
<td>43 Nm (4.3 m•kg, 31 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Oil passage plug</td>
<td>M16</td>
<td>1</td>
<td>8 Nm (0.8 m•kg, 5.8 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Oil filter drain screw</td>
<td>M5</td>
<td>1</td>
<td>7 Nm (0.7 m•kg, 5.1 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Oil pipe bolt (oil pan side)</td>
<td>M6</td>
<td>4</td>
<td>10 Nm (1.0 m•kg, 7.2 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Oil pipe bolt cooler (oil side)</td>
<td>M6</td>
<td>4</td>
<td>10 Nm (1.0 m•kg, 7.2 ft•lb)</td>
<td>With washer</td>
</tr>
<tr>
<td>Oil cooler 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 hose clamp 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>Oil cooler cover bolt</td>
<td>M6</td>
<td>4</td>
<td>8 Nm (0.8 m•kg, 5.8 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Oil pipe stay nut</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m•kg, 7.2 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Throttle body joint 1, 2 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>Air filter case bolt</td>
<td>M6</td>
<td>3</td>
<td>7 Nm (0.7 m•kg, 5.1 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Throttle body joint clamp screw</td>
<td>M4</td>
<td>8</td>
<td>3 Nm (0.3 m•kg, 2.2 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Air filter case joint clamp screw</td>
<td>M4</td>
<td>4</td>
<td>3 Nm (0.3 m•kg, 2.2 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Engine temperature sensor</td>
<td>M14</td>
<td>1</td>
<td>17 Nm (1.7 m•kg, 12 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Exhaust pipe nut</td>
<td>M8</td>
<td>8</td>
<td>25 Nm (2.5 m•kg, 18 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Muffler bolt</td>
<td>M10</td>
<td>2</td>
<td>33 Nm (3.3 m•kg, 24 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Exhaust pipe bolt</td>
<td>M8</td>
<td>1</td>
<td>20 Nm (2.0 m•kg, 15 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>EXUP valve protector 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>Muffler joint bolt</td>
<td>M8</td>
<td>1</td>
<td>20 Nm (2.0 m•kg, 15 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>EXUP cable adjusting nut</td>
<td>M6</td>
<td>2</td>
<td>6 Nm (0.6 m•kg, 4.3 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Servo motor bolt</td>
<td>M6</td>
<td>2</td>
<td>6 Nm (0.6 m•kg, 4.3 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Servo motor cover screw</td>
<td>M5</td>
<td>—</td>
<td>2 Nm (0.2 m•kg, 1.4 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Air induction system pipe joint clamp screw</td>
<td>—</td>
<td>4</td>
<td>4 Nm (0.4 m•kg, 2.9 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Air cut-off valve 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>Bearing cover plate screw</td>
<td>M6</td>
<td>3</td>
<td>12 Nm (1.2 m•kg, 8.7 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Timing plate cover bolt</td>
<td>M6</td>
<td>4</td>
<td>7 Nm (0.7 m•kg, 5.1 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>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>Cover 2 screw</td>
<td>M5</td>
<td>2</td>
<td>3 Nm (0.3 m•kg, 2.2 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Cover 1 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>Clutch 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>Cover screw</td>
<td>M5</td>
<td>2</td>
<td>4 Nm (0.4 m•kg, 2.9 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Crankcase bolt</td>
<td>M6</td>
<td>14</td>
<td>12 Nm (1.2 m•kg, 8.7 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Crankcase bolt</td>
<td>M8</td>
<td>17</td>
<td>24 Nm (2.4 m•kg, 17 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Crankcase bolt</td>
<td>M12</td>
<td>5</td>
<td>35 Nm (3.5 m•kg, 25 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Main gallery plug</td>
<td>M20</td>
<td>3</td>
<td>12 Nm (1.2 m•kg, 8.7 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Oil guide plate bolt</td>
<td>M5</td>
<td>3</td>
<td>4 Nm (0.4 m•kg, 2.9 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Clamp 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>Stopper plate bolt</td>
<td>M6</td>
<td>1</td>
<td>10 Nm (1.0 m•kg, 7.2 ft•lb)</td>
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<tr>
<td>Bearing housing 1 screw</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>HY-VO chain upper guide bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m•kg, 7.2 ft•lb)</td>
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</tr>
<tr>
<td>Clutch boss nut</td>
<td>M20</td>
<td>1</td>
<td>70 Nm (7.0 m•kg, 51 ft•lb)</td>
<td>Lock washer use</td>
</tr>
<tr>
<td>Pressure plate bolt</td>
<td>M6</td>
<td>6</td>
<td>8 Nm (0.8 m•kg, 5.8 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Push lever complete 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>
<tr>
<td>Bleed screw</td>
<td>M8</td>
<td>1</td>
<td>6 Nm (0.6 m•kg, 4.3 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Drive sprocket nut</td>
<td>M22</td>
<td>1</td>
<td>85 Nm (8.5 m•kg, 62 ft•lb)</td>
<td>Lock washer use</td>
</tr>
<tr>
<td>Stopper screw</td>
<td>M8</td>
<td>1</td>
<td>22 Nm (2.2 m•kg, 16 ft•lb)</td>
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<tr>
<td>Stopper plate 1 bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m•kg, 7.2 ft•lb)</td>
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<tr>
<td>Stopper plate bolt</td>
<td>M6</td>
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<tr>
<td>Side plate 2 screw</td>
<td>M5</td>
<td>1</td>
<td>4 Nm (0.4 m•kg, 2.9 ft•lb)</td>
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<tr>
<td>Shift arm 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>Shift rod nut</td>
<td>M6</td>
<td>1</td>
<td>8 Nm (0.8 m•kg, 5.8 ft•lb)</td>
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</tr>
<tr>
<td>Generator bolt</td>
<td>M8</td>
<td>2</td>
<td>25 Nm (2.5 m•kg, 18 ft•lb)</td>
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<tr>
<td>Oil level sensor bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m•kg, 7.2 ft•lb)</td>
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<tr>
<td>Timing plate bolt</td>
<td>M10</td>
<td>1</td>
<td>45 Nm (4.5 m•kg, 33 ft•lb)</td>
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</tr>
<tr>
<td>Neutral switch screw</td>
<td>M5</td>
<td>3</td>
<td>4 Nm (0.4 m•kg, 2.9 ft•lb)</td>
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### TIGHTENING TORQUE

<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>Speed sensor screw</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>Fuel rail screw</td>
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<td>4</td>
<td>5 Nm (0.5 m•kg, 3.6 ft•lb)</td>
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<tr>
<td>Pressure regulator</td>
<td>M5</td>
<td>1</td>
<td>4 Nm (0.4 m•kg, 2.9 ft•lb)</td>
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**CHASSIS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Thread size</th>
<th>Q’ty</th>
<th>Tightening torque</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>Upper bracket pinch bolt</td>
<td>M8</td>
<td>2</td>
<td>30 Nm (3.0 m•kg, 22 ft•lb)</td>
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</tr>
<tr>
<td>Steering stem nut</td>
<td>M22</td>
<td>1</td>
<td>110 Nm (11.0 m•kg, 80 ft•lb)</td>
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<tr>
<td>Handlebar lower holder nut</td>
<td>M10</td>
<td>2</td>
<td>40 Nm (4.0 m•kg, 29 ft•lb)</td>
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</tr>
<tr>
<td>Handlebar upper holder clamp bolt</td>
<td>M8</td>
<td>4</td>
<td>23 Nm (2.3 m•kg, 17 ft•lb)</td>
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<tr>
<td>Lower bracket pinch bolt</td>
<td>M8</td>
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<tr>
<td>Lower ring nut</td>
<td>M25</td>
<td>1</td>
<td>—</td>
<td>See NOTE</td>
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<tr>
<td>Front brake master cylinder holder</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>Master cylinder cap screw</td>
<td>M4</td>
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<td>2 Nm (0.2 m•kg, 1.4 ft•lb)</td>
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<tr>
<td>Front brake hose union bolt</td>
<td>M10</td>
<td>2</td>
<td>30 Nm (3.0 m•kg, 22 ft•lb)</td>
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</tr>
<tr>
<td>Meter 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>Headlight stay lower bolt</td>
<td>M6</td>
<td>2</td>
<td>10 Nm (1.0 m•kg, 7.2 ft•lb)</td>
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<tr>
<td>Handlebar and grip end</td>
<td>M16</td>
<td>2</td>
<td>26 Nm (2.6 m•kg, 19 ft•lb)</td>
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<tr>
<td>Front flasher nut</td>
<td>M12</td>
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<td>7 Nm (0.7 m•kg, 5.1 ft•lb)</td>
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<tr>
<td>Front 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>Headlight stay upper cover 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>Clutch hose union bolt</td>
<td>M10</td>
<td>2</td>
<td>30 Nm (3.0 m•kg, 22 ft•lb)</td>
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<tr>
<td>Throttle cable and throttle body bolt</td>
<td>M6</td>
<td>2</td>
<td>4 Nm (0.4 m•kg, 2.9 ft•lb)</td>
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<tr>
<td>Temperature sensor and headlight stay bolt</td>
<td>M5</td>
<td>1</td>
<td>11 Nm (1.1 m•kg, 8.0 ft•lb)</td>
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<tr>
<td>Engine bracket bolt (front)</td>
<td>M8</td>
<td>4</td>
<td>30 Nm (3.0 m•kg, 22 ft•lb)</td>
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<tr>
<td>Engine mounting nut (front)</td>
<td>M10</td>
<td>1</td>
<td>64 Nm (6.4 m•kg, 46 ft•lb)</td>
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<tr>
<td>Engine mounting nut (rear upper)</td>
<td>M10</td>
<td>1</td>
<td>55 Nm (5.5 m•kg, 40 ft•lb)</td>
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<tr>
<td>Engine bracket bolt (rear upper)</td>
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<td>48 Nm (4.8 m•kg, 35 ft•lb)</td>
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<tr>
<td>Engine bracket bolt (rear upper)</td>
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<td>88 Nm (8.8 m•kg, 64 ft•lb)</td>
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<tr>
<td>Engine mounting nut (rear lower)</td>
<td>M10</td>
<td>2</td>
<td>64 Nm (6.4 m•kg, 46 ft•lb)</td>
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<tr>
<td>Downtube bolt</td>
<td>M8</td>
<td>4</td>
<td>26 Nm (2.6 m•kg, 19 ft•lb)</td>
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<tr>
<td>Ignition coil 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>Pivot shaft nut</td>
<td>M18</td>
<td>1</td>
<td>125 Nm (12.5 m•kg, 90 ft•lb)</td>
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<tr>
<td>Front fork cap bolt</td>
<td>M40</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>
</tr>
<tr>
<td>-------------------------------------------</td>
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<td>--------------------------------------</td>
<td>---------</td>
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<tr>
<td>Damper rod assembly</td>
<td>M10</td>
<td>2</td>
<td>23 Nm (2.3 m•kg, 17 ft•lb)</td>
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</tr>
<tr>
<td>Rear shock absorber lower bolt</td>
<td>M8</td>
<td>2</td>
<td>23 Nm (2.3 m•kg, 17 ft•lb)</td>
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<tr>
<td>Rear shock absorber upper bolt</td>
<td>M10</td>
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<td>30 Nm (3.0 m•kg, 22 ft•lb)</td>
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</tr>
<tr>
<td>Seal guard bolt</td>
<td>M6</td>
<td>1</td>
<td>7 Nm (0.7 m•kg, 5.1 ft•lb)</td>
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<tr>
<td>Chain case 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>Fuel tank rear bolt</td>
<td>M8</td>
<td>1</td>
<td>19 Nm (1.9 m•kg, 14 ft•lb)</td>
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<tr>
<td>Fuel tank cap bolt</td>
<td>M5</td>
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<td>6 Nm (0.6 m•kg, 4.3 ft•lb)</td>
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<tr>
<td>Fuel pump bolt</td>
<td>M5</td>
<td>6</td>
<td>4 Nm (0.4 m•kg, 2.9 ft•lb)</td>
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<tr>
<td>Seat lock bolt</td>
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<td>2</td>
<td>7 Nm (0.7 m•kg, 5.1 ft•lb)</td>
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<tr>
<td>Side cover screw</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m•kg, 5.1 ft•lb)</td>
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</tr>
<tr>
<td>Taillight cover screw</td>
<td>M5</td>
<td>2</td>
<td>4 Nm (0.4 m•kg, 2.9 ft•lb)</td>
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</tr>
<tr>
<td>Rear fender and frame (front/rear)</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>Rear fender cover and taillight cover</td>
<td>M5</td>
<td>2</td>
<td>2 Nm (0.2 m•kg, 1.4 ft•lb)</td>
<td></td>
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<tr>
<td>Rear fender cover and frame</td>
<td>M6</td>
<td>2</td>
<td>7 Nm (0.7 m•kg, 5.1 ft•lb)</td>
<td></td>
</tr>
<tr>
<td>Grab bar</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>Fuse box bolt</td>
<td>M6</td>
<td>2</td>
<td>4 Nm (0.4 m•kg, 2.9 ft•lb)</td>
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</tr>
<tr>
<td>Rollover valve bracket and frame</td>
<td>M6</td>
<td>1</td>
<td>7 Nm (0.7 m•kg, 5.1 ft•lb)</td>
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<tr>
<td>Rear flasher and fender</td>
<td>M12</td>
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<td>4 Nm (0.4 m•kg, 2.9 ft•lb)</td>
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<tr>
<td>Side cover hook screw</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>Helmet hanger bolt</td>
<td>M6</td>
<td>2</td>
<td>13 Nm (1.3 m•kg, 9.4 ft•lb)</td>
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<tr>
<td>Taillight bracket and frame</td>
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<td>4</td>
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<tr>
<td>Taillight bracket and stay</td>
<td>M5</td>
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<td>8 Nm (0.8 m•kg, 5.8 ft•lb)</td>
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<td>Taillight cover and stay</td>
<td>M5</td>
<td>2</td>
<td>2 Nm (0.2 m•kg, 1.4 ft•lb)</td>
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<tr>
<td>EXUP bracket and frame</td>
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<td>10 Nm (1.0 m•kg, 7.2 ft•lb)</td>
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<tr>
<td>Lean angle sensor and rear fender</td>
<td>M4</td>
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<tr>
<td>Sidestand bolt</td>
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<tr>
<td>Sidestand nut</td>
<td>M10</td>
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<tr>
<td>Sidestand switch bolt</td>
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<td>4 Nm (0.4 m•kg, 2.9 ft•lb)</td>
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<tr>
<td>Bracket 4, 5 bolt</td>
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<td>28 Nm (2.8 m•kg, 20 ft•lb)</td>
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<tr>
<td>Bracket 2, 3 bolt</td>
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<td>2</td>
<td>30 Nm (3.0 m•kg, 22 ft•lb)</td>
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<tr>
<td>Bracket 2, 3 footrest</td>
<td>M10</td>
<td>4</td>
<td>55 Nm (5.5 m•kg, 40 ft•lb)</td>
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<tr>
<td>Rear brake reservoir tank and frame</td>
<td>M6</td>
<td>1</td>
<td>5 Nm (0.5 m•kg, 3.6 ft•lb)</td>
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<tr>
<td>Rear master cylinder and bracket</td>
<td>M8</td>
<td>2</td>
<td>23 Nm (2.3 m•kg, 17 ft•lb)</td>
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<tr>
<td>Center stand bolt and nut</td>
<td>M10</td>
<td>4/4</td>
<td>56 Nm (5.6 m•kg, 41 ft•lb)</td>
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<tr>
<td>Front wheel axle</td>
<td>M18</td>
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<td>72 Nm (7.2 m•kg, 52 ft•lb)</td>
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<tr>
<td>Front wheel axle pinch bolt</td>
<td>M8</td>
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<td>20 Nm (2.0 m•kg, 15 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>
</tr>
<tr>
<td>-----------------------------</td>
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<tr>
<td>Front brake caliper bolt</td>
<td>M10</td>
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<tr>
<td>Front brake disc bolt</td>
<td>M8</td>
<td>12</td>
<td>18 Nm (1.8 m•kg, 13 ft•lb)</td>
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<tr>
<td>Front caliper bleed screw</td>
<td>M8</td>
<td>2</td>
<td>6 Nm (0.6 m•kg, 4.3 ft•lb)</td>
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<tr>
<td>Front brake hose union bolt</td>
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<td>30 Nm (3.0 m•kg, 22 ft•lb)</td>
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<tr>
<td>Tension bar bolt and nut</td>
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<td>23 Nm (2.3 m•kg, 17 ft•lb)</td>
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<tr>
<td>Rear sprocket nut</td>
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<td>69 Nm (6.9 m•kg, 50 ft•lb)</td>
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<td>Chain puller lock nut</td>
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<td>16 Nm (1.6 m•kg, 12 ft•lb)</td>
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<tr>
<td>Rear caliper and caliper bracket</td>
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<td>Rear wheel axle nut</td>
<td>M24</td>
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<td>Rear brake hose union bolt</td>
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<td>Rear brake disc bolt</td>
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<td>23 Nm (2.3 m•kg, 17 ft•lb)</td>
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<td>Rear master cylinder lock nut</td>
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<td>2</td>
<td>18 Nm (1.8 m•kg, 13 ft•lb)</td>
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</tbody>
</table>

**NOTE:**
First tighten to 52 Nm (5.2 m•kg, 38 ft•lb), and after fully loosening, tighten to 18 Nm (1.8 m•kg, 13 ft•lb).
<table>
<thead>
<tr>
<th>Lubrication point</th>
<th>Lubricant</th>
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</thead>
<tbody>
<tr>
<td>Oil seal lips</td>
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<td>All O-ring</td>
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<tr>
<td>Bearings</td>
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<tr>
<td>Crankshaft big end</td>
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<td>Crankshaft journals</td>
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<tr>
<td>Con rod bolt</td>
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<tr>
<td>Piston surfaces</td>
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<tr>
<td>Piston pins</td>
<td></td>
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<tr>
<td>Valve stems (intake and exhaust)</td>
<td></td>
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<tr>
<td>Valve stem ends (intake and exhaust)</td>
<td></td>
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<tr>
<td>Valve lifter surfaces</td>
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</tr>
<tr>
<td>Camshaft lobes and camshaft journals</td>
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<tr>
<td>Oil pump rotors (inner and outer) and oil pump shaft</td>
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<tr>
<td>Idle gear 1 inner surface</td>
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<tr>
<td>Starter clutch assembly</td>
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<tr>
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<tr>
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<tr>
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<tr>
<td>Ball (for clutch)</td>
<td></td>
</tr>
<tr>
<td>Transmission gears (wheel and pinion) and coller</td>
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<tr>
<td>Shift cam bearing</td>
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<tr>
<td>Shift fork bar</td>
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<tr>
<td>Shift shaft assembly</td>
<td></td>
</tr>
<tr>
<td>Ball left, right</td>
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<tr>
<td>Shift boss inner diameter (change pedal)</td>
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# LUBRICATION POINTS AND LUBRICANT TYPES

<table>
<thead>
<tr>
<th>Lubrication point</th>
<th>Lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Push rod</td>
<td>![Lubricant Icon]</td>
</tr>
<tr>
<td>Crankcase mating surface</td>
<td>Yamaha bond No. 1215 (Three Bond No. 1215®)</td>
</tr>
<tr>
<td>Cylinder head cover gasket</td>
<td>Yamaha bond No. 1215 (Three Bond No. 1215®)</td>
</tr>
<tr>
<td>Cylinder head plug</td>
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</tr>
<tr>
<td>Breather grommet</td>
<td>Yamaha bond No. 1215 (Three Bond No. 1215®)</td>
</tr>
<tr>
<td>Hexagonal bolt with washer (oil guide plate)</td>
<td>Yamaha bond No. 1215 (Three Bond No. 1215®)</td>
</tr>
<tr>
<td>Crossless hexagonal screw (crankshaft cover 1 and cover 2)</td>
<td>Yamaha bond No. 1215 (Three Bond No. 1215®)</td>
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<tr>
<td>Hexagonal socket head bolt (clamp)</td>
<td>Yamaha bond No. 1215 (Three Bond No. 1215®)</td>
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<td>Steering bearings and oil seal lip</td>
<td>![Lubricant Icon]</td>
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<tr>
<td>Front wheel oil seal lip (left/right)</td>
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<td>Rear wheel oil seal lip (left/right)</td>
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<tr>
<td>Clutch hub and mating section</td>
<td>![Lubricant Icon]</td>
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<tr>
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</tr>
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<tr>
<td>Rear footrest bolt shaft and ball</td>
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</tr>
<tr>
<td>Center stand, sidestand and bracket metal-to-metal moving parts and bolt shaft</td>
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</tr>
<tr>
<td>Throttle grip (guide tube) and throttle cable end</td>
<td>![Lubricant Icon]</td>
</tr>
<tr>
<td>Baggage hook (wire) pivoting point</td>
<td>![Lubricant Icon]</td>
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<tr>
<td>Pivot shaft</td>
<td>![Lubricant Icon]</td>
</tr>
<tr>
<td>Lubrication point</td>
<td>Lubricant</td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Swingarm head pipe bearing</td>
<td>![Image]</td>
</tr>
<tr>
<td>Swingarm head pipe left/right thrust cover oil seal lip</td>
<td>![Image]</td>
</tr>
<tr>
<td>Engine bracket bearing</td>
<td>![Image]</td>
</tr>
<tr>
<td>Crankcase rear end left side bearing</td>
<td>![Image]</td>
</tr>
</tbody>
</table>
1. Relief valve
2. Bypass valve
3. Oil filter element
4. Oil pump
5. Camshaft (intake)
6. Camshaft (exhaust)
7. Oil strainer housing
8. Oil strainer
LUBRICATION DIAGRAMS

1. Drive axle
2. Push rod
3. Main axle
4. Camshaft
5. Crankshaft
1. Nozzle
2. Bypass valve
3. Oil filter element
4. Relief valve
CABLE ROUTING

1. Clutch hose
2. Gusset
3. Protector
4. Tension pipe 1
5. High tension cord #2
6. High tension cord #1
7. Bracket
8. Intake air pressure sensor
9. Throttle position sensor lead cover
10. Side cover
11. Air filter case
12. Lean angle sensor
13. Main
14. Fuse box
15. O2 sensor coupler
16. EXUP coupler
17. Throttle body (12P) coupler
18. Air filter drain cap
19. Starter motor
20. Speed sensor lead
21. Generator
22. Timing plate cover
23. Oil filter cover
24. Sidestand switch
25. Side stand switch lead
26. Horn lead
27. Ignition coil #2 and #3 leads
28. Atmospheric temperature sensor
29. Ignition coil
30. Wire harness
31. Protector
32. Plastic rivet
33. Throttle cable
34. Brake hoses 1
35. Air induction system assembly

A. Wire harness should pass through gusset cable holder.
B. Fasten the lead branching from the main harness to the inside of tension pipe 1 with a band. The band end should face downwards.
C. Air induction system assembly bottom end
D. Fasten high tension cords #1 and #2 at the top and #3 and #4 at the bottom with bands. The position is near the air induction system assembly front bottom edge and so that it does not protrude below the bottom edge.
E. Clamp high tension cord #1 and high tension cord #2 with a clamp. Clamp position is over the #2 head cover mounting bolt.
F. To sub-lead
G. To intake manifold
H. Insert projection on the frame to the intake air pressure sensor bracket hole, then fasten with a band. Cutting face should be downward. Set the tab in the sheet metal concavity.
I. After connecting the throttle sensor lead coupler, cover the throttle sensor coupler with coupler cover.
J. Front end of side cover.

K. Apply protective film to the frame side. (Left side only)
L. Fasten the seat lock cable to the seat rail with a band. Face the band clasp downwards and the band end along the top of the fender side.
M. Fasten the O2 sensor lead, EXUP sensor lead and throttle body lead together with the leads from the fuse box. Ends should face inwards, following the rear fender side surface.
N. Flatten the EXUP lead and O2 sensor lead against the engine bracket front side with the link, and pass through to the bottom of the engine bracket bolt.
O. Pass the speed sensor lead along the side stand switch lead and through to the right side of the vehicle.
P. The clutch hose clasp should be fitted in parallel with the cover.
Q. After fastening the side stand switch lead with a clamp, pass between the timing plate cover, oil filter cover, generator and start motor, and through to the right side of the vehicle in the same way as the engine lead.
R. Fasten the clutch hose with a clamp.
S. Fasten the clutch pipe with a clamp. Insert the band end to the inside and cut.
T. Fasten the clutch hose with the grommet gusset cable holder.
U. Pass the horn lead between the clutch hose and frame, bring out to the front and connect to the horn.
V. Connect the lead with black couplers to the ignition coil #1 and #4 sides.
W. Pass a clamp through the hole at the bottom of the gusset and fasten the clutch hose. The band end should face inside the vehicle.
X. Route the main harness through the inner side of the clutch hose and into the hole at the bottom of the headlight.
Y. The air induction system lead should be routed around the rear of the air induction unit and connected to the wire harness coupler.
Z. Route the EXUP lead and O2 sensor lead under the air filter hose.
AA. Fasten the seat lock cable to the frame via protective film. Place the bundle to the inner side and band end to the inner side towards the front.
AB. The brake pipe should touch the positioning stopper.
CABLE ROUTING

1. Reservoir tank
2. Speed sensor lead
3. Starter motor cable
4. Negative battery lead
5. Generator coupler
6. Rear brake switch coupler
7. Neutral lead
8. Crankshaft position sensor lead
9. Sidestand switch lead
10. Throttle body lead (6P coupler)
11. Fuel tank fitting
12. Protector
13. Throttle cable
14. Ignition coil #1/#4 leads
15. Horn lead
16. High tension cord #3
17. High tension cord #4
18. Engine ground lead
19. EXUP lead
20. Rear brake switch
21. Air filter
22. Flasher relay
23. Headlight relay
24. Starting circuit cut-off relay
25. Starter relay
26. Seat rail
27. Standing handle
28. Cable guide
29. Fuel tank drain hose
30. Fuel tank breather hose
31. Frame ground lead
32. Brake hose 2
33. Brake hoses 1
34. Brake hoses 5

A. The negative battery lead, speed sensor lead and throttle body lead (6P coupler) should be routed to inside of the seat rail.
B. The starter motor cable, negative battery lead, speed sensor lead and throttle body lead (6P coupler) should be routed to inside of the seat rail. The band end should face the inside.
C. Fasten the starter motor cable, negative battery lead, generator lead, neutral lead, sidestand switch lead, crankshaft position sensor lead, rear brake switch lead, throttle body sub-harness lead (9 leads) with a band close beside the air intake mounting screw. The band end should be cut facing towards the front of the vehicle.
D. Fasten the throttle cable to the tension pipe with a band on the tank fitting. The band end should face downwards.
E. Pass a clamp through the hole at the top of the gusset and fasten the 2 cables. The band end should face inside the vehicle.
F. Clamp high tension cord #3 and high tension cord #4 with a clamp. Clamp position is over the #3 head cover mounting bolt.
G. Leads and hoses should not be entangled. Leads and hoses should be arranged in an orderly manner, as shown in the illustration.
H. To O₂ sensor
I. Route the fuel tank drain hose and fuel tank breather hose (total of 2 hoses) through the engine cable guide.
J. Fasten together with a band, the generator lead, pickup lead, side stand switch lead, starter motor cable, speed sensor lead, EXUP lead, engine temperature sensor lead, sub-throttle motor lead, ISC lead, starter motor lead and O₂ sensor lead. The band end should face inside. After bundling EXUP and O₂ sensor leads, route to the rear side of the breather hose.
K. Brake hose 5 should be routed through the holder.
L. Pass the plug through the clamp.
M. The band end should face the frame and follow the air filter.
N. The fasten should be to the outside and the ends should be cut.
O. Align the protector with the 2 shape on the right side.
P. The brake pipe should touch the positioning stopper.
Q. The sub-throttle motor lead should be distributed further inside than other leads, and should not be exposed to the outside.
CABLE ROUTING

1. Throttle cable
2. Ignition coil #1, #4
3. Horn (right side)
4. Neutral switch coupler
5. Pickup coupler
6. Sidestand switch coupler
7. Fuel sender coupler
8. Fuel pump coupler
9. Throttle body (6P) coupler
10. Flasher relay
11. Reservoir tank
12. Headlight relay
13. Starting circuit cut-off relay
14. Starter motor cable
15. Starter relay
16. Seat rail
17. ECU
18. Rear fender rib
19. Rear flasher right
20. Taillight bracket
21. Rear flasher left
22. Seat lock cable
23. Seat lock
24. Positive battery lead
25. Lean angle sensor
26. Battery
27. Battery band
28. Fuse box
29. Throttle position sensor lead
30. Throttle position sensor
31. Horn (left side)
32. Ignition coil #2, #3
33. Tail/brake light coupler
34. Rear fender rib
35. Taillight lead
36. Wire harness
37. Rear fender
38. Rear flasher left lead
39. Rear flasher right lead
40. Starter relay lead
41. Protector
42. Wire harness protector

A. Horn (H mark sticker) should be attached to the right.
B. Install high tension cords #1–#4 without mistaking the numbers.
C. Fasten the throttle body (6P) coupler lead to the cross tube of the frame with a band.
D. The ground lead should be tightened together with air filter installation.
E. Fasten the positive battery leads (x 2) to the wire harness with the battery band.
F. The wire harness, taillight lead, and rear flasher leads left and right should be set between the tail light bracket and rear fender rib.
G. The seat lock cable should not protrude from the bracket.
H. Fasten the wire harness clamp to the rear fender.
I. Route the sub harness past the front side of the starting circuit cutoff relay.
J. Fasten the wire harness to the seat rail immediately to the back of the seat rail side cover mounting bracket. Fasten forward of the EXUP lead and O2 sensor lead branch point. Band end should face downward to the inside of the back stay.
K. Fit the wire harness plug clamp to the T stud.
L. High tension cords in the order #1–#4 from the left.
M. Fasten the wire harness and starter cable on the harness positioning tape to the tank rail with a band. The band end should face downwards. The wire harness should not be entangled with the T stud clamp.
N. Fasten the taillight lead and license plate light lead to the taillight bracket with a clamp.
O. To taillight
P. The wire harness, taillight lead and rear flasher leads left/right should not protrude above rear fender rib height.
Q. To license plate light
R. Route the wire harness between the mounting position of the rear fender to the frame and the rib of the storage space.
S. Fasten the protector and wire harness protector to the rear fender with rivets.
T. Route the left/right rear flasher through the holes in the rear fender.
U. The starter motor cable should be fitted pulling it at about 45 degrees towards the outside.
V. The positive battery lead should be fitted with the crimping side facing downward.
W. Set the connector cover between frame cross members with its opening facing the inside of the vehicle. The fasten should be on the inside with the ends following the air filter.
X. Fasten the throttle body lead to the seat rail with a band. The fasten with a band should face downwards with the ends following the air filter surface.
Y. Install the positive battery lead so that the wiring protrudes facing downward.
Z. The wire harness, taillight lead, left rear flasher light lead and right generator coupler should be stowed in the wire harness protector.
AA. The protector should be installed at the front of the taillight bracket.
AB. After including all leads, bind the wire harness protector with a Velcro strip (hooks facing upwards).
CABLE ROUTING

1. Meter leads
2. Handle crown
3. Left handlebar switch lead
4. Clutch hose
5. Left front flasher lead
6. Immobilizer unit lead
7. Left main switch lead
8. Atmospheric temperature sensor lead
9. Wire harness
10. Right front flasher lead
11. Brake hose 2
12. Brake hoses 1
13. Right handlebar switch lead
14. Immobilizer unit coupler

A. The throttle cable should be routed through the headlight stay bracket guide.
B. Insert the meter lead, left handlebar switch lead and the right handlebar switch lead in the top hole of the headlight.
C. Clamp the left handlebar switch lead and clutch hose below the handle crown with a band. The left handlebar switch lead should be routed to the inner side of the clutch hose.
D. The front flasher lead should be routed to the front of the headlight stay. Right and left caps should be installed facing the rear, and securely fastened.
E. Insert the left front flasher lead, main switch lead, immobilizer unit lead and wire harness into the left hole in the bottom of the headlight.
F. Insert the right front flasher lead in the right hole at the bottom of the headlight.
G. Clamp the right handlebar switch lead and brake hose 2 with a band to the side of the cable guide.
H. The band end should clamped facing upwards.
I. The band end should clamped facing inside.
J. Clamp the main switch lead, immobilizer unit lead, left handlebar switch lead, right handlebar switch lead, left front flasher lead and meter lead.
K. Clamp the right front flasher lead and wire harness atmospheric temperature sensor lead.
L. The wire harness should be aligned with the positioning tape and clamped.
M. Fit the brake hose 1 to the painted section on the master cylinder side. Put brake hose 1 against the master cylinder hose stopper and tighten brake hose 2 at the same angle.
N. To the top hole.
O. To the right hole at the bottom.
P. To the left hole at the bottom.
1. Sub-wire harness
2. Vacuum hose
3. Fuel injector coupler
4. Fuel hoses
5. Throttle body (12P) coupler
6. Wire harness
7. Intake air pressure sensor
8. Sub-throttle motor lead
9. Engine temperature sensor lead
10. ISC motor lead
11. Throttle position sensor lead
12. Starter motor lead
13. Crankshaft position sensor lead
14. Generator lead

A. The sub-wire harness to #3 should be routed under the vacuum hose.
B. Fit the white mark to #3.
C. Fit the white mark to #1.
D. The sub-wire harness should be routed over the suction pressure sensor.
E. The sub-wire harness should be routed over the fuel hose.
F. Leads and hoses should be routed so as not to get entangled.
G. Should be routed under the protector.
H. Should be routed to the right side of the vehicle.
1. Vacuum hose 1
2. Vacuum hose 2
3. Fuel hose 1
4. Fuel hose 2
5. Engine temperature sensor
6. ISC motor
7. Sub-throttle position sensor
8. Sub-throttle motor
9. Joint
10. Plug
11. Intake air pressure sensor
12. Clamp
13. Right throttle body side cover
14. Grommet
15. Breather assembly
16. Left throttle body side cover
17. Clamp
18. Air filter case
19. Clip
20. ISC hose
21. ISC motor
22. Throttle bodies
23. Intake manifold

A. Vacuum hose 1 should be routed under the connector.
B. Fuel hose 1 should be routed over fuel hose 2.
C. Should be routed over right fuel rail collar.
D. Install vacuum hose 1 in this position.
E. To suction pressure sensor.
F. Install hose 1, 2 and 3 clamps from the left side of the vehicle.
G. Install #4 hose clamp from the right side of the vehicle.
H. After fitting the clamp in the breather assembly and frame hole, leave the remainder along the frame, without cutting.
1. Breather assembly
2. Fuel return hose
3. Breather hose 1
4. Clip
5. Fuel hoses
6. Pressure regulator
7. Breather hose 2
8. Vacuum hose
9. Air induction system hose

A. Direct the claw of the clip upwards on the left of the vehicle.
B. Fit the vacuum hose to the suction pressure sensor.
C. Fit with the white paint facing upwards.
D. Direct the claw of the clip towards the rear of the vehicle.
1. Fuel pump Comp.
2. Clamp
3. Pipe 2
4. Pipe 4
5. Rollover valve
6. Fuel hoses
7. Pipe 5
8. Clamp
9. Pipe 3
10. Plug
11. Fuel hose 2
12. Fuel hose 1
13. Frame
14. Down tube
15. Clip
16. Clamp
17. Clamp
18. O₂ sensor lead
19. EXUP motor lead

A. Press the clamp tab against the frame and install facing the front of the vehicle.
B. Install the clip tab in the direction shown in the illustration.
C. To fuel tank.
D. Route pipe 5 between joints #3 and #4.
E. Route pipe 5 to the left side of the leads.
F. Set painted section of pipe 3 within this range.
G. Align the painted section of pipe 3 with the front of seal 2, and install.
H. Pipe 5 should be routed under the EXUP motor lead and O₂ sensor lead.
I. Route pipe 3 to the left side together with pipe 5 to the wire guide.
J. Insert pipe 3 to the end.
K. The bolt should be inserted until the clamp touches the nut.
L. Pipe 5 should be routed between clamp and frame.
M. The tab of the clip faces the rear of the vehicle.
N. When installing the pump, align the cut end on the damper with the projection on the pump.
O. The tab of the clip faces the rear of the vehicle.
P. Install pipe 5 with the white paint facing the rear of the vehicle.
Q. The tab of the clip faces the front of the vehicle.
R. Fit pipe 2 to the right side tube.
S. Install pipe 4 with the yellow paint facing upwards.
T. Route pipe 3 between seal 2 ribs. Note that if pipe 3 is not sandwiched between seal 2 rib and air filter case, this is permissible, even if it is out of the rib.
U. Route pipe 3 in front of seal 2 lug.
V. Install pipe 4 with the yellow paint facing the left side of the vehicle.
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PERIODIC MAINTENANCE

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

GENERAL MAINTENANCE AND LUBRICATION CHART

NOTE:
- The annual checks must be performed every year, except if a kilometer-based maintenance is performed instead.
- From 50000 km, repeat the maintenance intervals starting from 10000 km.
- Items marked with an asterisk should be performed by a Yamaha dealer as they require special tools, data and technical skills.

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<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
<th>CHECK OR MAINTENANCE JOB</th>
<th>ODOMETER READING (× 1000 km)</th>
<th>ANNUAL CHECK</th>
</tr>
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<td></td>
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<td></td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>Fuel line</td>
<td>• Check fuel hoses for cracks or damage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>Spark plugs</td>
<td>• Check condition.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Clean and regap.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Valves</td>
<td>• Check valve clearance.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adjust.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Every 20000 km</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Air filter element</td>
<td>• Replace.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Clutch</td>
<td>• Check operation, fluid level and vehicle for fluid leakage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>6</td>
<td>Front brake</td>
<td>• Check operation, fluid level and vehicle for fluid leakage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace brake pads.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Whenever worn to the limit</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>7</td>
<td>Rear brake</td>
<td>• Check operation, fluid level and vehicle for fluid leakage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace brake pads.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Whenever worn to the limit</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>8</td>
<td>Brake hoses</td>
<td>• Check for cracks or damage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Every 4 years</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Wheels</td>
<td>• Check runout and for damage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>10</td>
<td>Tires</td>
<td>• Check tread depth and for damage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check air pressure.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Correct if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>11</td>
<td>Wheel bearings</td>
<td>• Check bearing for looseness or damage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>12</td>
<td>Swingarm</td>
<td>• Check operation and for excessive play.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lubricate with lithium-soap-based grease.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Every 50000 km</td>
<td></td>
</tr>
<tr>
<td>NO.</td>
<td>ITEM</td>
<td>CHECK OR MAINTENANCE JOB</td>
<td>ODOMETER READING (&lt; 1000 km)</td>
<td>ANNUAL CHECK</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>-----------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>13</td>
<td>Drive chain</td>
<td>- Check chain slack, alignment and condition.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Adjust and lubricate chain with a special O-ring chain lubricant thoroughly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Every 1000 km and after washing the vehicle or riding in the rain</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Steering bearings</td>
<td>- Check bearing play and steering for roughness.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Lubricate with lithium-soap-based grease.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Every 20000 km</td>
<td></td>
</tr>
<tr>
<td>15</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>16</td>
<td>Brake and clutch lever pivot shafts</td>
<td>- Lubricate with lithium-soap-based grease.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>17</td>
<td>Brake and shift pedal pivot shafts</td>
<td>- Lubricate with lithium-soap-based grease.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>18</td>
<td>Sidestand, center-stand</td>
<td>- Check operation.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Lubricate.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>19</td>
<td>Sidestand switch</td>
<td>- Check operation.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>20</td>
<td>Front fork</td>
<td>- Check operation and for oil leakage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>21</td>
<td>Shock absorber assemblies</td>
<td>- Check operation and shock absorbers for oil leakage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>22</td>
<td>Fuel injection system</td>
<td>- Adjust synchronization.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>23</td>
<td>Engine oil</td>
<td>- Change.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Check oil level and vehicle for oil leakage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>24</td>
<td>Engine oil filter element</td>
<td>- Replace.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>25</td>
<td>Front and rear brake switches</td>
<td>- Check operation.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>26</td>
<td>Moving parts and cables</td>
<td>- Lubricate.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>27</td>
<td>Throttle grip housing and cable</td>
<td>- Check operation and free play.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Adjust the throttle cable free play if necessary.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Lubricate the throttle grip housing and cable.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>28</td>
<td>Air induction system</td>
<td>- Check the air cut-off valve, reed valve, and hose for damage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Replace any damaged parts if necessary.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>29</td>
<td>Muffler and exhaust pipe</td>
<td>- Check the screw clamp for looseness.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>30</td>
<td>Lights, signals and switches</td>
<td>- Check operation.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Adjust headlight beam.</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
NOTE:

- **Air filter**
  - This model’s air filter is equipped with a disposable oil-coated paper element, which must not be cleaned with compressed air to avoid damaging it.
  - The air filter element needs to be replaced more frequently when riding in unusually wet or dusty areas.

- **Hydraulic brake and clutch service**
  - Regularly check and, if necessary, correct the brake fluid and clutch fluid levels.
  - Every two years replace the internal components of the brake master cylinders and calipers as well as clutch master and release cylinders, and change the brake and clutch fluids.
  - Replace the brake and clutch hoses every four years and if cracked or damaged.
ADJUSTING THE VALVE CLEARANCE
The following procedure applies to all of the valves.

NOTE:
- 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:
   - Oil cooler “1”
   - Air scoop “2”
     Refer to “ENGINE REMOVAL” on page 5-1.
   - Air induction system
     Refer to “AIR INDUCTION SYSTEM” on page 6-13.
   - Spark plug “3”
   - Cylinder head cover “4”
   - Timing plate cover “5”
     Refer to “CAMSHAFTS” on page 5-5.

2. 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>0.11–0.15 mm (0.0043–0.0059 in)</td>
</tr>
<tr>
<td>Exhaust</td>
</tr>
<tr>
<td>0.16–0.20 mm (0.0063–0.0079 in)</td>
</tr>
</tbody>
</table>

   a. Turn the crankshaft clockwise.
   b. When the piston is at TDC on the compression stroke, align the mark “a” on the pickup coil rotor with the mark “b” on the crankcase cover. (TDC)

   NOTE:
   TDC on the compression stroke can be found when the camshaft lobes are turned away from each other.

   c. Measure the valve clearance with a thickness gauge “1”.
NOTE:

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

Valve clearance measuring sequence
Cylinder #1 → #2 → #4 → #3

3. Adjust:
   - Valve clearance

   a. Align the intake and exhaust valve lifter slots with each other.
   b. Install the tappet adjusting tool “1” between the camshaft and the valve lifter “2”.

Tappet adjusting tool
90890-04110
Valve adjustment tool
YM-33966

NOTE:
Make sure the tappet adjusting tool touches only the valve lifter “2”, not the valve pad “3”.

A. Front

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

<table>
<thead>
<tr>
<th>Cylinder</th>
<th>180°</th>
<th>360°</th>
<th>540°</th>
<th>720°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinder #2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cylinder #4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cylinder #3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) Degrees that the crankshaft is turned counterclockwise
(b) Cylinder
(c) Combustion cycle

c. Slowly turn the tappet adjusting tool so that the valve pad can be removed.
d. Remove the valve pad “4” from the valve lifter. For reassembly purposes, take note of the valve pad position and its number.

e. Select the proper valve pad from the following table.

<table>
<thead>
<tr>
<th>Valve pad thickness range</th>
<th>No. 200–320</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available valve pads</td>
<td>2.00–3.20 mm (0.079–0.126 in)</td>
</tr>
<tr>
<td>Available valve pads</td>
<td>25 thicknesses in 0.05 mm (0.002 in) increments</td>
</tr>
</tbody>
</table>

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

Since valve pads of various sizes are originally installed, the valve pad number must be rounded in order to reach the closest equivalent to the original.

f. Round off the original valve pad number according to the following table.

<table>
<thead>
<tr>
<th>Last digit</th>
<th>Available valve pads</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 or 2</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>

EXAMPLE:
When the valve pad installed was 248 (thickness 2.48 mm)
Applied number = 250

NOTE: The new valve pad number is only an approximation. The valve clearance must be measured again and the above steps should be repeated if the measurement is still incorrect.

h. Install a new valve pad with the numbered surface facing downward.

i. Remove the tappet adjusting tool.

j. Measure the valve clearance again.

k. If the valve clearance is still out of specification, repeat all of the valve clearance adjustment steps until the specified clearance is obtained.

4. Install:
- Timing plate cover
- CYLINDER HEAD COVERS
  Refer to “CAMSHAFTS” on page 5-5.
- Spark plug
- Air induction system
  Refer to “AIR INDUCTION SYSTEM” on page 6-13.
- Air scoop
- OIL COOLER
  Refer to “ENGINE REMOVAL” on page 5-1.

SYNCHRONIZING THE THROTTLE BODIES

NOTE: Prior to synchronizing the throttle bodies, the valve clearance and engine idling speed should be properly adjusted and ignition timing should be checked.
1. Stand the vehicle on a level surface.
   
   **NOTE:**
   Place the vehicle on the center stand.

2. Remove:
   - FUEL TANK
     Refer to “FUEL TANK” on page 6-1.
   - Vacuum hose “1”

3. Install:
   - Vacuum gauge “1” (to vacuum hose in illustration)
   - Digital tachometer (to high tension cord)

4. Install the fuel tank.
   
   **NOTE:**
   Do not install the bolt at the rear of the fuel tank.

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

6. Check:
   - Standard idling speed
     Refer to “CHECKING THE ENGINE IDLING SPEED” on page 3-9.

7. Adjust:
   - SYNCHRONIZING THE THROTTLE BODIES
     
     **a.** Take throttle body #3 as standard, and turn adjusting screw “1” so that throttle bodies #1 and #2 are adjusted to the same value.

**NOTE:**
- After each step, rev the engine two or three times, each time for less than a second, and check the throttle bodies.
- When the adjusting screw has been removed, turn the screw is fully, and then turn it out 3/4 turn.
  
  Then, synchronize the throttle bodies.

**CAUTION:**
Do not use the throttle valve adjusting screws to adjust the throttle body synchronization.

8. Check:
   - Standard idling speed
     Pressure difference should be within the specified range.

9. Stop the engine and remove the fuel tank and measuring equipment.

10. Adjust:
    - Throttle cable free play
Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-9.

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

11. Install:
- FUEL TANK
  Refer to “FUEL TANK” on page 6-1.

**ADJUSTING THE EXHAUST GAS VOLUME**

**NOTE:**
Be sure to set the CO density level to standard, and then adjust the exhaust gas volume.

1. Turn the main switch to “OFF” and set the engine stop switch to “ON”.
2. 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.

**NOTE:**
- All displays on the meter disappear except the clock and trip meter displays.
- “dIAG” appears on the clock LCD.

3. Press the “SELECT” button to select the CO adjustment mode “CO”.

4. After selecting “CO”, press the SELECT and RESET buttons simultaneously for at least 2 seconds.
5. Press the “SELECT” and “RESET” buttons to select a cylinder.

6. After selecting the cylinder, simultaneously press the “SELECT” and “RESET” buttons for 2 seconds or more to execute the selection.

7. Change the CO adjustment volume by pressing the “SELECT” and “RESET” buttons.

**NOTE:**
The CO adjustment volume appears on the trip meter LCD.
- To decrease the CO adjustment volume, press the RESET button.
- To increase the CO adjustment volume, press the SELECT button.

8. Release the switch to execute the selection.
9. Simultaneously press the “SELECT” and “RESET” buttons to return to the cylinder selection (step 5).
10. Turn the main switch to “OFF” to cancel the mode.
CHECKING THE ENGINE IDLING SPEED

NOTE: ____________________________

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

1. Start the engine and let it warm up until it reaches specified oil temperature.
2. Use a temperature probe tester “1” and contact it to the drain bolt thread.

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

4. Check:
   - Engine idling speed

   **Engine idling speed**
   970–1170 r/min

   **NOTE:** ____________________________

   Idling speed is not adjustable.

ADJUSTING THE THROTTLE CABLE FREE PLAY

NOTE: ____________________________

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

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

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

2. Adjust:
   - Throttle cable free play

   **NOTE:** ____________________________

   Pull the cable to the acceleration side to accelerate.

   Throttle body side
   a. Loosen the locknut “1” on the decelerator cable.
   b. Turn the adjusting nut “2” in direction “a” or “b” to take up any slack on the decelerator cable.
   c. Loosen the locknut “3” on the accelerator cable.
   d. Turn the adjusting nut “4” in direction “a” or “b” until the specified throttle cable free play is obtained.

   **Direction “a”**
   Throttle cable free play is increased.
   **Direction “b”**
   Throttle cable free play is decreased.

   e. Tighten the locknuts “1”, “3”.

   **NOTE:** ____________________________

   If the specified throttle cable free play cannot be obtained on the throttle body side of the cable, use the adjusting nut on the handlebar side.
HANDLEBAR SIDE

a. Loosen the locknut “1”.
b. Turn the adjusting nut “2” in direction “a” or “b” until the specified throttle cable free play is obtained.
c. Tighten the locknut “1”.

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

**CHECKING THE SPARK PLUGS**
The following procedure applies to all of the spark plugs.

1. Disconnect:
   - Spark plug cap
2. Remove:
   - Spark plug

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

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

### Manufacturer/model
NGK/DPR8EA-9

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

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

6. Measure:
   - Spark plug gap “a”
     - Out of specification → Regap.

7. Install:
   - Spark plug

**NOTE:**
Before installing the spark plug, clean the spark plug and gasket surface.
8. Connect:
- Spark plug
- Spark plug cap

**CHECKING THE IGNITION TIMING**

**NOTE:**
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:
- Timing plate cover
2. Connect:
- Timing light “1”
- Digital tachometer (to cylinder #1 high tension cord)

---

**Timing light**
90890-03141

**Inductive clamp timing light**
YU-03141

**Digital tachometer**
90890-06760
YU-39951-B

---

3. Check:
- Ignition timing

---

- Timing light 90890-03141
- Inductive clamp timing light YU-03141
- Digital tachometer 90890-06760 YU-39951-B

---

3. Check:
- Ignition timing

4. Remove:
- Timing light
- Digital tachometer
5. Install:
- Timing plate cover

**MEASURING THE COMPRESSION PRESSURE**

The following procedure applies to all of the cylinders.

**NOTE:**
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. Disconnect:
- Spark plug cap
4. Remove:
- Spark plug

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

5. Install:
- Compression gauge “1”
- Adapter “2”
6. Measure:

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

7. Install:

- Spark plug

8. Connect:

- Spark plug cap

---

**WARNING**

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

---

**NOTE:**

- Make sure there is no compression leakage from the connecting section of the compression gauge.
- The difference in compression pressure between cylinders should not exceed 100 kPa (1 kg/cm², 14 psi).
CAUTION:
- Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives or use engine oils with a grade of CD or higher and do not use oils labeled “ENERGY CONSERVING II”.
- Do not allow foreign materials to enter the crankcase.

4. Start the engine, warm it up for several minutes, and then turn it off.
5. Check the engine oil level again.

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

CHANGING THE ENGINE OIL
1. Start the engine, warm it up for several minutes, and then turn it off.
2. Place a container under the engine oil drain bolt.
3. Remove:
   - Engine oil drain bolt “1” (along with the gasket)
   - Engine oil filler cap “2”
   - O-rings “3”

4. Drain:
   - Engine oil (completely from the crankcase)
5. If the oil filter element is also to be replaced, perform the following procedure.
   a. Remove the clutch push lever complete “1” and oil filter drain screw “2”.
   b. Remove the union bolt “5”, oil filter element cover “3” and oil filter element “4”.
   c. Replace O-ring “6” with a new one.
d. Install the new oil filter element, oil filter element cover and union bolt.

**NOTE:**
- Align the projection on the oil filter case with the slot in the crankcase, and install.
- Make sure the side stand switch lead does not get entangled.

![Oil filter element cover bolt](image)

- Oil filter element cover bolt
  - 15 Nm (1.5 m•kg, 11 ft•lb)

e. Install the oil filter drain screw and clutch push lever complete.

![Oil filter drain screw](image)

- Oil filter drain screw
  - 7 Nm (0.7 m•kg, 5.1 ft•lb)
  - Clutch push lever Comp.
  - 10 Nm (1.0 m•kg, 7.2 ft•lb)

6. Install:
- Engine oil drain bolt (along with the gasket)
- Oil filter element drain bolt (along with the gasket)

![Engine oil drain bolt](image)

- Engine oil drain bolt
  - 43 Nm (4.3 m•kg, 31 ft•lb)

7. Add the recommended engine oil to the proper level.
- Crankcase

![Engine oil quantity](image)

- Engine oil quantity
  - Total amount
    - 4.20 L (4.44 US qt) (3.70 Imp.qt)
    - Without oil filter element replacement
    - 2.80 L (2.96 US qt) (2.46 Imp.qt)
    - With oil filter element replacement
    - 3.15 L (3.33 US qt) (2.77 Imp.qt)

8. Install:
- O-ring
- Engine oil filter cap

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

10. Check:
- Engine (for engine oil leaks)

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

**MEASURING THE ENGINE OIL PRESSURE**

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

2. Install a pocket tester with temperature probe in the oil drain bolt “1”.

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

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

![Oil temperature](image)

- Oil temperature
  - 85.0–95.0 °C (185.00–203.00 °F)

4. Remove:
- Main gallery bolt“1”

**WARNING:**
The engine, muffler and engine oil are extremely hot.
5. Install:
   - Oil pressure gauge “1”
   - Adapter “2”

6. Measure:
   - Engine oil pressure
     (at the following conditions)

   **Pressure gauge**
   90890-03153
   Oil pressure adapter B
   90890-03124

7. Remove:
   - Pressure gauge
   - Oil pressure adapter

8. Install:
   - Main gallery bolt

   **Main gallery bolt**
   12 Nm (1.2 m•kg, 8.7 ft•lb)

---

**ADJUSTING THE CLUTCH LEVER**

1. Adjust:
   - Clutch lever position
     (distance “a” from the handlebar grip to the clutch lever)

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

   **NOTE:**
   Be sure to align the setting on the adjusting dial with the arrow mark “2” on the clutch lever holder.

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

---

**CHECKING THE CLUTCH FLUID LEVEL**

1. Stand the vehicle on a level surface.
NOTE:
Place the vehicle on a suitable stand.

2. Check:
- Clutch fluid level

Below the minimum level mark “a” → Add the recommended clutch fluid to the proper level.

Specified clutch fluid
DOT 4

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

CAUTION:
Clutch fluid may damage painted surfaces or plastic parts. Therefore, always clean up any split clutch fluid immediately.

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

BLEEDING THE HYDRAULIC CLUTCH SYSTEM

WARNING
Bleed the hydraulic clutch system whenever:
- the system was disassembled,
- a clutch hose was loosened or removed,
- the clutch fluid level is very low,
- clutch operation is faulty.

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

1. Remove:
- Crankcase cover (left)

Refer to “ENGINE REMOVAL” on page 5-1.

2. Bleed:
- Hydraulic clutch system

a. Add the recommended clutch fluid to the proper level.

b. Install the clutch master cylinder reservoir diaphragm.

c. Connect a clear plastic hose “1” tightly to the bleed screw “2”, and place an oil pan under the vinyl hose end on one side.

d. Place the other end of the hose into a container.

e. Slowly squeeze the clutch lever several times.

f. Fully squeeze the clutch lever without releasing it.

g. Loosen the bleed screw. This will release the tension and cause the clutch lever to contact the handlebar grip.
h. Tighten the bleed screw and then release the clutch lever.
i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the clutch fluid in the plastic hose.
j. Tighten the bleed screw to specification.

**Bleed screw**

6 Nm (0.6 m•kg, 4.3 ft•lb)

k. Add the recommended clutch fluid to the proper level. Refer to “CHECKING THE CLUTCH FLUID LEVEL” on page 3-15.

---

**WARNING**

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

EEEK EK KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK KK

---

3. Install:
- Crankcase cover (left)
  Refer to “ENGINE REMOVAL” on page 5-1.

---

REPLACING THE AIR FILTER ELEMENT

1. Remove:
- Side cover (right)
  Refer to “GENERAL CHASSIS” on page 4-1.
- Air filter case cover “1”
- Air filter element

2. Check:
- Air filter element
  Damage → Replace.

**NOTE:**
- Replace the air filter element every 40000 km (24000 mi) of operation.
- The air filter needs more frequent service if you are riding in unusually wet or dusty areas.

3. Install:
- Air filter element “1”
- Air filter case cover

---

**Side cover (right)**

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

---

**CAUTION:**

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

**NOTE:**

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

---

CHECKING THE THROTTLE BODY JOINT

The following procedure applies to all of the throttle body joints and intake manifolds.

1. Check:
- Air filter case joints “1”
- Throttle body joints “2”
- Intake manifold “3”
  Cracks/damage → Replace.

---

CHECKING THE FUEL LINE

1. Remove:
- Fuel tank
  Refer to “FUEL TANK” on page 6-1.

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

**CAUTION:**
Make sure the fuel tank breather hose is routed correctly.

3. Install:
- Fuel tank
  Refer to “FUEL TANK” on page 6-1.

**EAS21070**
**CHECKING THE CRANKCASE BREATHER HOSE**

1. Remove:
- Fuel tank
  Refer to “FUEL TANK” on page 6-1.

2. Check:
- Breather assembly “1”
- Crankcase breather hose “2”
  Cracks/damage → Replace.
  Loose connection → Connect properly.

**CAUTION:**
Make sure the crankcase breather hose is routed correctly.

3. Install:
- Fuel tank
  Refer to “FUEL TANK” on page 6-1.

**EAS21080**
**CHECKING THE EXHAUST SYSTEM**
The following procedure applies to all of the exhaust pipes and gaskets.

- Exhaust pipe
- Muffler
  Cracks/damage → Replace.
- Gasket
  Exhaust gas leaks → Replace.

1. Check:
- Exhaust pipe
- Muffler
  Cracks/damage → Replace.
- Gasket
  Exhaust gas leaks → Replace.

2. Check:
- Tightening torque
  - Exhaust pipe nut “1”
    25 Nm (2.5 m•kg, 18 ft•lb)
  - Exhaust pipe bolt “2”
    20 Nm (2.0 m•kg, 15 ft•lb)
  - Muffler joint bolt “3”
    20 Nm (2.0 m•kg, 15 ft•lb)
  - Muffler bolt “4”
    33 Nm (3.3 m•kg, 24 ft•lb)
ADJUSTING THE EXUP CABLES

1. Remove:
   - EXUP valve pulley cover “1”

2. Check:
   - EXUP system operation

   NOTE:
   Check operation by self-diagnostics diagnosis mode No."53".
   Refer to “FUEL INJECTION SYSTEM” on page 7-25.

3. Check:
   - EXUP cable free play (at the EXUP valve pulley) “a”

   ✔ Maximum EXUP cable free play
      (at the EXUP valve pulley)
      Within 1.5 mm (0.06 in)

4. Adjust:
   - EXUP cable free play

5. Install:
   - EXUP valve pulley cover

---

EXUP valve pulley cover

a. Turn the main switch to “ON”.
b. Check the EXUP pulley position.
c. Remove right side cover
d. Loosen both locknuts “1”.
e. Turn both adjusting bolts “2” to adjust free play in EXUP cable.

Direction “a”
Increase EXUP cable free play
Direction “b”
Decrease EXUP cable free play

f. Install the right side cover
ADJUSTING THE FRONT BRAKE

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

   **NOTE:**
   • While pushing the clutch lever forward, turn the adjusting dial “1” until the clutch lever is in the desired position.
   • Be sure to align the setting on the adjusting dial with the arrow mark “2” on the brake lever holder.

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

   ![Diagram of brake lever with marks](image)

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

   **CAUTION:**
   After adjusting the brake lever position, make sure there is no brake drag.

ADJUSTING THE REAR BRAKE

1. Check:
   • Brake pedal position
     (distance “a” from the top of the rider footrest to the top of the brake pedal)
   Out of specification → Adjust.

   ![Diagram of brake pedal with marks](image)

   **WARNING**
   A soft or spongy feeling in the brake pedal can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system.

   **Locknut**
   18 Nm (1.8 m·kg, 13 ft·lb)

   ![Diagram of locknut and brake pedal](image)
system. Air in the brake system will considerably reduce braking performance and could result in loss of control and possibly an accident. Therefore, check and, if necessary, bleed the brake system.

CAUTION:
After adjusting the brake pedal position, make sure there is no brake drag.

3. Adjust:
- Rear brake light switch
  Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH” on page 3-22.

CHECKING THE BRAKE FLUID LEVEL
1. Stand the vehicle on a level surface.
NOTE:
- Place the vehicle on a center stand.
- Make sure the vehicle is upright.

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

---

Recommended fluid
DOT 4

A. Front brake
B. Rear brake

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 reac-

---

CHECKING THE FRONT BRAKE PAD
The following procedure applies to all of the brake pads.
1. Operate the brake.
2. Check:
- Front brake pad
  Wear indicators “a” almost touch the brake disc. Replace the brake pads as a set. Refer to “FRONT BRAKE” on page 4-14.

CHECKING THE REAR BRAKE PADS
The following procedure applies to all of the brake pads.
1. Operate the brake.
2. Check:
- Rear brake pad
  Wear indicators “a” almost touch the brake disc. Replace the brake pads as a set. Refer to “REAR BRAKE” on page 4-27.
CHECKING THE FRONT BRAKE HOSES

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

1. Check:
   - Brake hose“1”
     Cracks/damage/wear → Replace.

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

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

4. Check:
   - Brake hose
     Brake fluid leakage → Replace the damaged hose.
     Refer to “FRONT BRAKE” on page 4-14.

CHECKING THE REAR BRAKE HOSE

1. Check:
   - Brake hose“1”
     Cracks/damage/wear → Replace.

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

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

4. Check:
   - Brake hose
     Brake fluid leakage → Replace the damaged hose.
     Refer to “REAR BRAKE” on page 4-27.

ADJUSTING THE REAR BRAKE LIGHT SWITCH

NOTE:
The rear brake light switch is operated by movement of the brake pedal. The rear brake light switch is properly adjusted when the brake light comes on just before the braking effect starts.

1. Check:
   - Rear brake light operation timing
     Incorrect → Adjust.

2. Adjust:
   - Rear brake light operation timing

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

   Direction “a”
   Brake light comes on sooner.
   Direction “b”
   Brake light comes on later.
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.

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

1. Bleed:
   - Hydraulic brake system

   a. Fill the brake fluid reservoir to the proper level with the recommended brake fluid.
   b. Install the diaphragm (brake master cylinder reservoir or brake fluid reservoir). (Brake master cylinder reservoir or brake fluid reservoir)
   c. Connect a clear plastic hose “1” tightly to the bleed screw “2”, and place an oil pan under the vinyl hose end on one side.
   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.

   **NOTE:**
   Loosening the bleed screw will release the pressure and cause the brake lever to contact 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.
   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.
ADJUSTING THE SHIFT PEDAL

NOTE:
The shift pedal position is determined by the installed shift rod length “a”.

1. Measure:
   • Installed shift rod angle “a”
     Incorrect → Adjust.

   Installed shift rod angle
   90°

2. Adjust:
   • Installed shift rod angle

a. Loosen both locknuts “1”.
b. Turn the shift rod “2” in direction “a” or “b” to obtain the correct shift pedal position.

Direction “a”
Shift pedal is raised.
Direction “b”
Shift pedal is lowered.

c. Tighten both locknuts.
d. Make sure the installed shift rod angle is within specification.

ADJUSTING THE DRIVE CHAIN SLACK

NOTE:
The drive chain slack must be checked at the tightest point on the chain.

CAUTION:
A drive chain that is too tight will overload the engine and other vital parts, and one that is too loose can skip and damage the swing-arm or cause an accident. Therefore, keep the drive chain slack within the specified limits.

1. Stand the vehicle on a level surface.

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

NOTE:
Both wheels should be on the ground without a rider on the vehicle.

2. Move the rear wheel several times and find the tightest position of drive chain.

3. Check:
   • Drive chain slack “a”
     Out of specification → Adjust.

   Drive chain slack
   20–30 mm

4. Loosen:
   • Wheel axle nut “1”

5. Adjust:
   • Drive chain slack

a. Loosen both locknuts “2”.
b. Turn both adjusting nuts “3” in direction “a” or “b” until the specified drive chain slack is obtained.
NOTE:
- To maintain the proper wheel alignment, adjust both sides evenly.
- Push the rear wheel forward to make sure there is no clearance between the swingarm end plates and the ends of the swingarm.

C. Tighten the locknut to specification.

<table>
<thead>
<tr>
<th>Locknut</th>
<th>16 Nm (1.6 m•kg, 12 ft•lb)</th>
</tr>
</thead>
</table>

D. Tighten the wheel axle nut to specification.

<table>
<thead>
<tr>
<th>Wheel axle nut</th>
<th>150 Nm (15.0 m•kg, 109 ft•lb)</th>
</tr>
</thead>
</table>

CHECKING AND ADJUSTING THE STEERING HEAD

1. Stand the vehicle on a level surface.

**WARNING**

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

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

2. Check:
- Steering head
  Grasp the bottom of the front fork legs and gently rock the front fork.
  Binding/looseness → Adjust the steering head.

3. Remove:
- Handlebar
  Refer to “HANDLEBAR” on page 4-38.
- Upper bracket
  Refer to “STEERING HEAD” on page 4-50.

4. Adjust:
- Steering head

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

Recommended lubricant: Engine oil or chain lubricant suitable for O-ring chains

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

LUBRICATING THE DRIVE CHAIN

The drive chain consists of many interacting parts. If the drive chain is not maintained properly, it will wear out quickly. Therefore, the drive chain should be serviced, especially when the vehicle is used in dusty areas.

This vehicle has a drive chain with small rubber O-rings between each side plate. Steam cleaning, high-pressure washing, certain solvents, and the use of a coarse brush can damage these O-rings. Use only kerosene to clean the drive chain. Wipe the drive chain dry and thoroughly lubricate it with chain lubricant that is suitable for O-ring chains.
NOTE:
Set the torque wrench at a right angle to the steering nut wrench.

Steering nut wrench
90890-01403
Spanner wrench
YU-33975

Lower ring nut (initial tightening torque)
52 Nm (5.2 m•kg, 38 ft•lb)

WARNING
Do not overtighten the lower ring nut.

Lower ring nut (final tightening torque)
18 Nm (1.8 m•kg, 13 ft•lb)

c. Loosen the lower ring nut “4” completely, then tighten it to specification.
d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.
   Refer to “STEERING HEAD” on page 4-50.

5. Install:
   • Upper bracket
     Refer to “STEERING HEAD” on page 4-50.
   • Handlebar
     Refer to “HANDLEBAR” on page 4-38.

CHECKING THE FRONT FORK
1. Stand the vehicle on a level surface.

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

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

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

4. Check:
   • Front fork operation
     Push down hard on the handlebar several times and check if the front fork rebounds smoothly.
     Rough movement → Repair.
     Refer to “FRONT FORK” on page 4-41.

e. Install the rubber washer “3”.
f. Install the upper ring nut “2”.
g. Finger tighten the upper ring nut “2”, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.
h. Install the lock washer “1”.

NOTE:
Make sure the lock washer “1” tabs “a” sit correctly in the ring nut slots “b”.

EWA13120

EWA13130
ADJUSTING THE FRONT FORKS
The following procedure applies to both of the front fork legs.

**WARNING**
- Always adjust both front fork legs evenly. Uneven adjustment can result in poor handling and loss of stability.
- Securely support the motorcycle so that there is no danger of it falling over.

**Spring preload**

**CAUTION:**
- Grooves are provided to indicate the adjustment position.
- Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   - Spring preload

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

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

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

**Rebound damping**

**CAUTION:**
- Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   - Rebound damping

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

**Direction “a”**
Rebound damping is increased (suspension is harder).

**Direction “b”**
Rebound damping is decreased (suspension is softer).

**Spring preload**

- Minimum (soft): 8
- Standard: 5
- Maximum (hard): 1

**Rebound damping**

- Maximum (hard):
  - 1 click(s) out*  
  - Standard: 5 click(s) out*
  - Minimum (soft):
  - 10 click(s) out*

*With the adjusting screw fully turned in
Compression damping

CAUTION:
Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   - Compression damping

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

Direction “a”
Compression damping is increased (suspension is harder).
Direction “b”
Compression damping is decreased (suspension is softer).

Spring preload

CAUTION:
Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   - Spring preload

a. Loosen the lock screw “1” by 1/2 turn.
b. Insert a screwdriver into the hole in the spring seat.
c. Turn the spring seat “2” in direction “a” or “b”.

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

ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

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

WARNING
- Securely support the motorcycle so that there is no danger of it falling over.
- Always adjust both rear shock absorber assemblies evenly. Uneven adjustment can result in poor handling and loss of stability.
d. Tighten the bleed screw.

<table>
<thead>
<tr>
<th>Lock screw</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1Nm (0.01 m•kg, 0.07 ft•lb)</td>
</tr>
</tbody>
</table>

**CAUTION:**
- Do not strike to insert with unreasonable force a flat head screwdriver in the spring seat adjustment hole.
- The spring seat is made of plastic and can be easily damaged.
- Do not over-tighten the lock screw.
- The lock screw is made of plastic. Take care, therefore, to avoid damaging the head.

---

**Rebound damping**

**CAUTION:**
Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   - Rebound damping

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

   **Direction “a”**
   Rebound damping is increased (suspension is harder).
   Direction “b”
   Rebound damping is decreased (suspension is softer).

---

**Compression damping**

**CAUTION:**
Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   - Compression damping

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

   **Direction “a”**
   Compression damping is increased (suspension is harder).
   Direction “b”
   Compression damping is decreased (suspension is softer).

---

**Rebound damping**
Minimum (soft) 36 click(s) out*
Standard 10 click(s) out*
Maximum (hard) 1 click(s) out*
*With the adjusting knob fully turned in

---

**Compression damping**
Minimum (soft) 20 click(s) out*
Standard 16 click(s) out*
Maximum (hard) 1 click(s) out*
*With the adjusting knob fully turned in
CHECKING THE TIRES
The following procedure applies to both of the tires.

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

   WARNING
   • The tire pressure should only be checked and regulated when the tire temperature equals the ambient air temperature.
   • The tire pressure and the suspension must be adjusted according to the total weight (including cargo, rider, passenger and accessories) and the anticipated riding speed.
   • Operation of an overloaded vehicle could cause tire damage, an accident or an injury. NEVER OVERLOAD THE VEHICLE.

   ![Tire Pressure Measurement](#)

   Tire air pressure (measured on cold tires)

   Loading condition
   0–90 kg (0–198 lb)
   Front
   250 kPa (36 psi) (2.50 kgf/cm²) (2.50 bar)
   Rear
   250 kPa (36 psi) (2.50 kgf/cm²) (2.50 bar)

   Loading condition
   90–205 kg (198–452 lb)
   Front
   250 kPa (36 psi) (2.50 kgf/cm²) (2.50 bar)
   Rear
   290 kPa (42 psi) (2.90 kgf/cm²) (2.90 bar)

   High-speed riding
   Front
   250 kPa (36 psi) (2.50 kgf/cm²) (2.50 bar)
   Rear
   290 kPa (42 psi) (2.90 kgf/cm²) (2.90 bar)

   Maximum load
   205 kg (452 lb)

   * Total weight of rider, passenger, cargo and accessories

   ![Tire Pressure Measurement](#)

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

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

   ![Tire Tread Depth](#)

   1. Tire tread depth
   2. Sidewall
   3. Wear indicator
**WARNING**

- Do not use a tubeless tire on a wheel designed only for tube tires to avoid tire failure and personal injury from sudden deflation.
- When using a tube tire, be sure to install the correct tube.
- Always replace a new tube tire and a new tube as a set.
- To avoid pinching the tube, make sure the wheel rim band and tube are centered in the wheel groove.
- Patching a punctured tube is not recommended. If it is absolutely necessary to do so, use great care and replace the tube as soon as possible with a good quality replacement.

### Front tire
- Size: 120/70 ZR17M/C (58W)
- Manufacturer/model: DUNLOP/D252 F L

### Rear tire
- Size: 180/55 ZR17M/C (73W)
- Manufacturer/model: DUNLOP/D252 L

**WARNING**

New tires have a relatively low grip on the road surface until they have been slightly worn. Failure to do so could lead to an accident with possible injury to the rider or damage to the motorcycle.

**NOTE:**

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

<table>
<thead>
<tr>
<th>Tube wheel</th>
<th>Tube tire only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubeless wheel</td>
<td>Tube or tubeless tire</td>
</tr>
</tbody>
</table>

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

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

**WARNING**
Never attempt to make any repairs to the wheel.

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

CHECKING AND LUBRICATING THE CABLES
The following procedure applies to all of the inner and outer cables.

**WARNING**
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.

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

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

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

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

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

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

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

LUBRICATING THE CENTER STAND
Lubricate the pivoting point and metal-to-metal moving parts of the mainstand.

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

LUBRICATING THE REAR SUSPENSION
Lubricate the pivoting point and metal-to-metal moving parts of the rear suspension.

**Recommended lubricant**
Molybdenum disulfide grease
ELECTRICAL SYSTEM

CHECKING AND CHARGING THE BATTERY
Refer to "ELECTRICAL COMPONENTS" on page 7-79.

CHECKING THE FUSES
Refer to "ELECTRICAL COMPONENTS" on page 7-79.

REPLACING THE HEADLIGHT BULB
1. Disconnect:
   - Headlight unit “1”

2. Remove:
   - Headlight bulb holder cover “1”
   - Ground lead “2”
   - Headlight cover “3”

3. Remove:
   - Headlight bulb holder “1”
   - Headlight bulb “2”

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

4. Install:
   - Headlight bulb
   - Headlight unit

   New
   Secure the new headlight bulb with the headlight holder.

CAUTION:
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 holder
   - Headlight coupler
   - Ground lead
   - Headlight bulb holder cover
   - Headlight unit

ADJUSTING THE HEADLIGHT BEAM
1. Adjust:
   - Headlight beam (vertically)

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

   Direction “a”
   Headlight beam is raised.
   Direction “b”
   Headlight beam is lowered.
2. Adjust:
   - Headlight beam (horizontally)

   a. Turn the adjusting screw “2” in direction “a” or “b”.

   Direction “a”
   Headlight beam moves to the right.
   Direction “b”
   Headlight beam moves to the left.
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<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Side cover (left/right)</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Grab bar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rear fender cover</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>
Removing the front wheel and brake discs

**NOTE:**
Use a suitable stand to raise the front wheel off the ground.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wheel axle pinch bolt</td>
<td>1</td>
<td>Loosen</td>
</tr>
<tr>
<td>2</td>
<td>Brake hose holder (left/right)</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Front brake caliper (left/right)</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Wheel axle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Front wheel assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Brake disc (left/right)</td>
<td>1/1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>
Disassembling the front wheel

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.
FRONT WHEEL

REMOVING THE FRONT WHEEL
1. Stand the vehicle on a level surface.

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

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

2. Remove:
   • Left brake caliper
   • Right brake caliper

NOTE:
Do not apply the brake lever when removing the brake calipers.

3. Elevate:
   • Front wheel

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

4. Remove:
   • Front wheel axle “1”

NOTE:
Remove the front wheel axle using a 19 mm hexagonal wrench “2” and T handle “3”.

T-handle
90890-01326
T-handle 3/8” drive 60 cm long
YM-01326

DISASSEMBLING THE FRONT WHEEL
1. Remove:
   • Oil seals
   • Wheel bearings

   a. Clean the outside of the front wheel hub.
   b. Remove the oil seals “1” with a flathead screwdriver.

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

WARNING
Do not attempt to straighten a bent wheel axle.

2. Check:
   • Tire
   • Front wheel
     Damage/wear → Replace.
     Refer to “CHECKING THE TIRES” on page 3-30 and “CHECKING THE WHEELS” on page 3-32.

3. Measure:
   • Radial wheel runout “a”
   • Lateral wheel runout “b”
     Over the specified limits → Replace.
FRONT WHEEL

<table>
<thead>
<tr>
<th>Radial wheel runout limit</th>
<th>1.0 mm (0.04 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lateral wheel runout limit</td>
<td>0.5 mm (0.02 in)</td>
</tr>
</tbody>
</table>

4. Check:
- Wheel bearings
  Front wheel turns roughly or is loose → Replace the wheel bearings.
- Oil seals
  Damage/wear → Replace.

EAS21960

ASSEMBLING THE FRONT WHEEL

1. Install:
   - Wheel bearings
   - Oil seals **New**

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

**CAUTION:**

Do not contact the wheel bearing inner race “1” or balls “2”. Contact should be made only with the outer race “3”.

NOTE:______________________________

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

EAS21970

ADJUSTING THE FRONT WHEEL STATIC BALANCE

NOTE:______________________________

- After replacing the tire, wheel or both, the front wheel static balance should be adjusted.
- Adjust the front wheel static balance with the brake disc installed.

1. Remove:
   - Balancing weight(s)

2. Find:
   - Front wheel’s heavy spot

   NOTE:______________________________

Place the front wheel on a suitable balancing stand.

**CAUTION:**

Do not contact the wheel bearing inner race “1” or balls “2”. Contact should be made only with the outer race “3”.

NOTE:______________________________

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

1. Remove:
   - Balancing weight(s)

2. Find:
   - Front wheel’s heavy spot

   NOTE:______________________________

Place the front wheel on a suitable balancing stand.

**CAUTION:**

Do not contact the wheel bearing inner race “1” or balls “2”. Contact should be made only with the outer race “3”.

NOTE:______________________________

Use a socket “4” that matches the diameter of the wheel bearing outer race and oil seal.
f. Repeat steps (d) through (f) several times until all the marks come to rest at the same spot.
g. The spot where all the marks come to rest is the front wheel’s heavy spot “X”.

3. Adjust:
   • Front wheel static balance

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

   **NOTE:**
   Start with the lightest weight.

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

c. If the heavy spot does not stay in that position, install a heavier weight.

d. Repeat steps (b) and (c) until the front wheel is balanced.

4. Check:
   • Front wheel static balance

   a. Turn the front wheel and make sure it stays at each position shown.

   b. If the front wheel does not remain stationary at all of the positions, rebalance it.

INSTalling the Front Wheel (Disc)

1. Stand the vehicle on a level surface.

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

2. Install:
   • Front wheel axle “1”

   **NOTE:**
   • Align the tire rotation mark “a” with the wheel rotation direction, and install the wheel.
   • Remove the front wheel axle using a 19 mm hexagonal wrench “2” and T handle “3”.

   | Front wheel axle | 72 Nm (7.2 m•kg, 52 ft•lb) |
   | T-handle         | 90890-01326               |
   | T-handle 3/8” drive 60 cm long | YM-01326               |

   **CAUTION:**
   Before tightening the wheel axle, push down on the handlebars several times and check if the front fork rebounds smoothly.
3. Install:
   - Right brake caliper
   - Left brake caliper

**Brake caliper bolt**
40 Nm (4.0 m•kg, 29 ft•lb)

---

**WARNING**
Proper brake hose routing is essential to ensure safe vehicle operation. Refer to “CA- BLE ROUTING” on page 2-31.
Removing the rear wheel

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chain adjuster</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Nut</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Washers</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Left chain puller</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Wheel axle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Right chain puller</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rear wheel assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Spacer (left)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Spacer (right)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

150 Nm (15.0 m·kg, 109 ft·lb)
Removing the brake disc and rear wheel sprocket

Order | Job/Parts to remove | Q'ty | Remarks
--- | --- | --- | ---
1 | Brake disc | 1 | *
2 | Rear wheel sprocket | 1 | *
3 | Rear wheel drive hub | 1 | *
4 | Rear wheel drive hub damper | 5 | *
5 | Oil seal | 1 | *
6 | Bearing | 1 | *
7 | Collars | 1 | *

For installation, reverse the removal procedure.

- 23 Nm (2.3 m·kg, 17 ft·lb)
- 69 Nm (6.9 m·kg, 50 ft·lb)
Disassembling the rear wheel

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.
REAR WHEEL

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

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

2. Remove:
   - Rear wheel

   NOTE: Place the vehicle on a suitable stand so that the rear wheel is elevated.

3. Remove:
   - Brake caliper “1”

   NOTE: Do not depress the brake pedal when removing the brake caliper.

4. Loosen:
   - Locknut “1”
   - Adjusting nut “2”

5. Remove:
   - Wheel axle nut “3”
   - Wheel axle
   - Rear wheel

   NOTE: Push the rear wheel forward and remove the drive chain from the rear wheel sprocket.

6. Remove:
   - Spacer (left)
   - Spacer (right)

DISASSEMBLING THE REAR WHEEL
1. Remove:
   - Oil seals
   - Wheel bearings
   - Refer to “DISASSEMBLING THE FRONT WHEEL” on page 4-4.

CHECKING THE REAR WHEEL
1. Check:
   - Wheel axle
   - Rear wheel
   - Wheel bearings
   - Oil seals
   - Refer to “CHECKING THE FRONT WHEEL” on page 4-4.

2. Check:
   - Tire
   - Rear wheel
   - Damage/wear → Replace.
   - Refer to “CHECKING THE TIRES” on page 3-30 and “CHECKING THE WHEELS” on page 3-32.

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

CHECKING THE REAR WHEEL DRIVE HUB
1. Check:
   - Rear wheel drive hub
   - Cracks/damage → Replace.
   - Rear wheel drive hub dampers
   - Damage/wear → Replace.

CHECKING THE REAR WHEEL SPROCKET
1. Check:
   - Rear wheel sprocket
     - Tooth face “a” is worn above 1/4 → replace drive chain, drive sprocket, rear wheel sprocket as a set.
     - Bends → Replace the drive chain, drive sprocket and rear wheel sprocket as a set.

4-11
Replace: Rear wheel sprocket

a. Remove the self-locking nuts and the rear wheel sprocket.
b. Wipe the rear wheel drive hub with a clean cloth. Thoroughly clean the portion that contacts the sprocket.
c. Install the new rear wheel sprocket.

NOTE: Tighten the self-locking nuts in stages and in a crisscross pattern.

Assembling the Rear Wheel

1. Install:
   - Bearing “1”

   Use a socket “2” with an outer diameter slightly smaller than the bearing outer diameter, and knock in the bearing.

   CAUTION:
   Do not tap in the bearing at an angle.

   NOTE:
   Knock in the bearing so that dimension “a” is 7 mm, as in the illustration.

Installing the Rear Wheel

1. Lubricate:
   - Wheel axle
   - Wheel bearings
   - Oil seal lips

   Recommended lubricant: Lithium-soap-based grease

2. Tighten:
   - Wheel axle nut

   EAS22140

Adjusting the Rear Wheel Static Balance

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

1. Adjust:
   - Rear wheel static balance

   Refer to “ADJUSTING THE FRONT WHEEL STATIC BALANCE” on page 4-5.
3. Adjust:
  - Drive chain slack
    Refer to “ADJUSTING THE DRIVE CHAIN SLACK” on page 3-24.

Wheel axle nut
150 Nm (15.0 m•kg, 109 ft•lb)

Drive chain slack
20.0–30.0 mm (0.79–1.18 in)
Removing the front brake pads

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clip</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Pad pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pad support</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake pad/Brake pad shim</td>
<td>2/2</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
Removing the front brake master cylinder

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brake lever</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Front brake switch lead</td>
<td>2</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Front brake switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake hose union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Copper washer/front brake hose</td>
<td>3/2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake master cylinder holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Brake master cylinder</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
</tbody>
</table>


For installation, reverse the removal procedure.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
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>Master cylinder boots</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>Master cylinder kit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spring</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>
Removing the front brake caliper

1 Brake hose union bolt  1
2 Copper washer  2
3 Brake hose  1
4 Front brake caliper  1

For installation, reverse the removal procedure.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drain the brake fluid</td>
<td></td>
<td>Refer to &quot;BLEEDING THE HYDRAULIC BRAKE SYSTEM&quot; on page 3-23.</td>
</tr>
<tr>
<td>1</td>
<td>Brake hose union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Copper washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Front brake caliper</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

40 Nm (4.0 m • kg, 29 ft • lb)

30 Nm (3.0 m • kg, 22 ft • lb)
Disassembling the front brake caliper

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clip</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Pad pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pad support</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake pad/Brake pad shim</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake caliper piston</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake caliper dust seal</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Brake caliper piston seal</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bleed screw</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.

6 Nm (0.6 m·kg, 4.3 ft·lb)
INTRODUCTION

**WARNING**

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

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

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

---

**CHECKING THE FRONT BRAKE DISC**

The following procedure applies to both brake disc.

1. **Remove:**
   - Front wheel
     Refer to “FRONT WHEEL” on page 4-2.

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.

<table>
<thead>
<tr>
<th>Brake disc deflection limit</th>
<th>0.10 mm (0.0039 in)</th>
</tr>
</thead>
</table>

---

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

| Brake disc thickness limit | 4.5 mm (0.18 in) |
5. Adjust:
   - Brake disc deflection

   a. Remove the brake disc.
   b. Rotate the brake disc by one bolt hole.
   c. Install the brake disc “1”.

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

   d. Measure the brake disc deflection.
   e. If out of specification, repeat the adjustment steps until the brake disc deflection is within specification.
   f. If the brake disc deflection cannot be brought within specification, replace the brake disc.

6. Install:
   - Front wheel
     Refer to “FRONT WHEEL” on page 4-2.

   BRAKE DISC BOLT
   18 Nm (1.8 m•kg, 13 ft•lb)
   (Apply the LOCTITE®)

   a. Use a caliper piston presser “1” to push back the caliper piston.

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

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

1. Remove:
   - Clip “1”
     Turn the pad pin with pliers to change to a position for easy removal of the clip.
   - Pad pin “2”
   - Pad support “3”

2. Remove:
   - Brake pads

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

4. Install:
   - Brake pad shims
     (onto the brake pads)
   - Brake pads
   - Pad support

   NOTE:
   Always install new brake pads, brake pad shims, and a brake pad spring as a set.

   BRAKE PAD LINING THICKNESS (INNER)
   5.5 mm (0.22 in)
   Limit
   0.5 mm (0.02 in)

   BRAKE PAD LINING THICKNESS (OUTER)
   5.5 mm (0.22 in)
   Limit
   0.5 mm (0.02 in)
b. Install a new brake pad shim onto each new brake pad.
c. Install new brake pads and a new brake pad spring “1”.
d. Install pad pin “2” and clip “3”.

NOTE:
- The arrow mark “a” on the brake pad spring must point in the direction of disc rotation.
- After installing the clip, turn the pad pin so that the head of the clip goes to the inside of the pad support.

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

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

EAS22300
REMOVING THE FRONT BRAKE CALIPERS
The following procedure applies to both of the brake caliper.

NOTE: ____________________________
Before removing the brake caliper, drain the brake fluid from the entire brake system.

1. Remove:
- Union bolt “1”
- Copper washers “2”
- Brake hose

NOTE: ____________________________
Put the end of the brake hose into a container and pump out the brake fluid carefully.

EAS22360
DISASSEMBLING THE FRONT BRAKE CALIPER
The following procedure applies to both of the brake calipers.

1. Remove:
- Brake caliper pistons
- Dust seals “1”
- Brake caliper piston seals “2”

a. Secure the right side brake caliper piston with
a piece of wood “a”.
b. Blow compressed air into the brake hose joint opening “b” to force out the left side piston from the brake caliper.

- **WARNING**
  Never try to pry out the brake caliper piston.

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

c. Remove the brake caliper dust seals and piston seals.
d. Repeat the previous steps to force out the right side piston from the brake caliper.

### CHECKING THE FRONT BRAKE CALIPER

<table>
<thead>
<tr>
<th>Recommended brake component replacement schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake pads</td>
</tr>
<tr>
<td>Dust seals/Piston seals</td>
</tr>
<tr>
<td>Brake hose</td>
</tr>
<tr>
<td>Brake fluid</td>
</tr>
</tbody>
</table>

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

- **WARNING**
  Whenever a brake caliper is disassembled,

### RECOMMENDED BRAKE COMPONENT REPLACEMENT SCHEDULE

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

1. Install:
   - Brake caliper piston seal “1” New
   - Dust seals “2” New

2. Install:
   - Brake caliper piston “1”
3. Install:
- Brake pads
- Pad support
- Brake pad pins
  Install with the arrow in the direction of rotation.

INSTALLING THE FRONT BRAKE CALIPERS
The following procedure applies to both of the brake calipers.
1. Install:
   - Brake caliper “1” (temporarily)
   - Copper washers “2” New
   - Brake hose “3”
   - Union bolt “4”

2. Install:
   - Brake caliper
   - Brake hose holder

<table>
<thead>
<tr>
<th>Brake caliper bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 Nm (4.0 m•kg, 29 ft•lb)</td>
</tr>
</tbody>
</table>

   Refer to “REPLACING THE FRONT BRAKE PADS” on page 4-20.

3. Add the recommended brake fluid to the proper level.
   - Brake master cylinder reservoir

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

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

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

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

EAS22490
REMOVING THE FRONT BRAKE MASTER CYLINDER
NOTE: ____________________________
Before removing the front brake master cylinder, drain the brake fluid from the entire brake system.

1. Disconnect:
  * Brake switch lead
    (from the brake switch)
2. Remove:
  * Union bolt “1”
  * Copper washers “2”
  * Brake hoses “3”
NOTE: ____________________________
To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

EAS22500
CHECKING THE FRONT BRAKE MASTER CYLINDER
1. Check:
  * Brake master cylinder “1”
    Damage/scratches/wear → Replace.
  * Brake fluid delivery passages “2”

2. Check:
  * Brake master cylinder kit “1”
    Damage/scratches/wear → Replace.

3. Check:
  * Brake master cylinder reservoir “1”
    Cracks/damage → Replace.
  * Brake master cylinder reservoir diaphragm “2”
    Damage/wear → Replace.

4. Check:
  * Brake hoses “1”
    Cracks/damage/wear → Replace.
FRONT BRAKE

ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

**WARNING**

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

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

1. Install:
   - Master cylinder kit “1”
   - Circlip “2” New
   - Dust boot “3”

INSTALLING THE FRONT BRAKE MASTER CYLINDER

1. Install:
   - Brake master cylinder “1”

- **Brake master cylinder bracket bolt**
  - 10 Nm (1.0 m•kg, 7.2 ft•lb)

**NOTE:**

- Install the brake master cylinder holder with the “UP” mark facing up.
- Align the end of the brake master cylinder holder with the punch mark “a” on the handlebar.

- First, tighten the upper bolt, then the lower bolt.

| Brake hose union bolt | 30 Nm (3.0 m•kg, 22 ft•lb) |

**WARNING**

Proper brake hose routing is essential to ensure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-31.

**NOTE:**

- While holding the brake hose, tighten the union bolt.
- 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.

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

- **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.

---

**CAUTION:**

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

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

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

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

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rear brake caliper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Clip</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pad pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Pad support</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake pad</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake caliper shim</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Bleed screw</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

- 6 Nm (0.6 m·kg, 4.3 ft·lb)
- 40 Nm (4.0 m·kg, 29 ft·lb)

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

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

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Footrest bracket bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Right footrest assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear brake switch hook</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake hose union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Copper washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Clip/hose</td>
<td>2/1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Clip/washer</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Rear brake master cylinder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Rear brake fluid reservoir/brake fluid reservoir diaphragm/brake fluid reservoir cap</td>
<td>1/1/1</td>
<td>For installation, reverse the removal procedure.</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>Brake master cylinder boots</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>Spring</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.
Removing the rear brake caliper

Drain the brake fluid

<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 hose union bolt</td>
<td>1</td>
<td>Refer to &quot;BLEEDING THE HYDRAULIC BRAKE SYSTEM&quot; on page 3-23.</td>
</tr>
<tr>
<td>2</td>
<td>Copper washer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Brake hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Front brake caliper</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

30 Nm (3.0 m·kg, 22 ft·lb)

40 Nm (4.0 m·kg, 29 ft·lb)
Disassembling the rear brake caliper

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
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<td>Pad support</td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake pad/Brake pad shim</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake caliper piston</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake caliper dust seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Brake caliper piston seal</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bleed screw</td>
<td>2</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>

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

1. **Remove:**
   - Rear wheel
   Refer to “REAR WHEEL” on page 4-8.

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

3. **Measure:**
   - Brake disc deflection
     Out of specification → Correct the brake disc deflection or replace the brake disc.
     Refer to “CHECKING THE FRONT BRAKE DISC” on page 4-19.

4. **Measure:**
   - Brake disc thickness
     Measure the brake disc thickness at a few different locations.
     Out of specification → Replace.
     Refer to “CHECKING THE FRONT BRAKE DISC” on page 4-19.

5. **Adjust:**
   - Brake disc deflection
   Refer to “CHECKING THE FRONT BRAKE DISC” on page 4-19.

6. **Install:**
   - Rear wheel
   Refer to “REAR WHEEL” on page 4-8.

**REPLACING THE REAR BRAKE PADS**

**NOTE:**

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

1. **Remove:**
   - Brake caliper “1”

2. **Remove:**
   - Pad pin
   - Brake pads
   - Brake pad shims
   - Pad support

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

**Brake Disc Thickness Limit**

- 4.5 mm (0.18 in)

**Brake Disc Bolt**

- 23 Nm (2.3 m•kg, 17 ft•lb)
  Apply the LOCTITE®

**Brake Pad Lining Thickness**

- (inner) 5.5 mm (0.22 in)
  Limit 0.5 mm (0.02 in)

- (outer) 5.5 mm (0.22 in)
  Limit 0.5 mm (0.02 in)
4. Install:
   - Brake pad shims
     (onto the brake pads)
   - Brake pads
   - Pad support

NOTE: Always install new brake pads, brake pad shims, and a brake pad spring as a set.

a. Use a caliper piston presser “1” to push back the caliper piston.

b. Install a new brake pad shim onto each new brake pad.

c. Install new brake pads and a new brake pad support.

d. Install pad pin and clip.

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

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

REMOVING THE REAR BRAKE CALIPER

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

1. Remove:
   - Union bolt “1”
   - Copper washers “2”
   - Brake hose
   - Brake caliper

NOTE: Put the end of the brake hose into a container and pump out the brake fluid carefully.

DISASSEMBLING THE REAR BRAKE CALIPER

1. Remove:
   - Brake caliper pistons “1”
   - Brake caliper dust seal/brake caliper piston seal “2”
a. Secure the right side brake caliper piston with a waste cloth.
b. Blow compressed air into the brake hose joint opening to force out the left side piston from the brake caliper.

**WARNING**

Never try to pry out the brake caliper piston.

c. Remove the brake caliper dust seals and piston seals.
d. Repeat the previous steps to force out the right side piston from the brake caliper.

---

**CHECKING THE REAR BRAKE CALIPER**

<table>
<thead>
<tr>
<th>Recommended brake component</th>
<th>Replacement schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake pads</td>
<td>If necessary</td>
</tr>
<tr>
<td>Dust seals</td>
<td>Every four years</td>
</tr>
<tr>
<td>Piston seals</td>
<td></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 dismantled</td>
</tr>
</tbody>
</table>

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

**INSTALLING THE REAR BRAKE CALIPER**

1. Install:
   - Brake caliper piston seal
   - Brake caliper dust seal

2. Install:
   - Brake caliper piston

3. Install:
   - Brake pads
   - Pad support
   - Brake pad pins
   - Clip

**Recommended fluid**

DOT 4

1. Install:
   - Brake caliper “1” (temporarily)
   - Brake hose “2”
   - Copper washers “3” New
   - Union bolt “4”
REAR BRAKE

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

WARNING
Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-31.

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

2. Install:
- Brake caliper
- Brake hose holder
  Refer to “REPLACING THE REAR BRAKE PADS” on page 4-32.

Brake caliper bolt
40 Nm (4.0 m•kg, 29 ft•lb)

3. Fill the brake fluid with the specified amount.
- Brake fluid reservoir

Recommended fluid
DOT 4

NOTE:
To collect any remaining brake fluid, place a

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

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

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

REMOVING THE REAR BRAKE MASTER CYLINDER

1. Remove:
- Union bolt “1”
- Copper washers “2”
- Brake hose “3”

NOTE:
To collect any remaining brake fluid, place a

4-35
container under the master cylinder and the end of the brake hose.

CHECKING THE REAR BRAKE MASTER CYLINDER
1. Check:
   • Brake master cylinder “1”
     Damage/scratches/wear → Replace.
   • Brake fluid delivery passages “2” (brake master cylinder body)
     Obstruction → Blow out with compressed air.

2. Check:
   • Brake master cylinder kit “1”
     Damage/scratches/wear → Replace.

3. Check:
   • Brake fluid reservoir “1”
     Cracks/damage → Replace.
   • Brake fluid reservoir diaphragm “2”
     Cracks/damage → Replace.

4. Check:
   • Brake hoses “1”
     Cracks/damage/wear → Replace.

ASSEMBLING THE REAR BRAKE MASTER CYLINDER
1. Install:
   • Master cylinder kit “1”
   • Circlip “2” New
   • Dust boot “3”

Installing the Rear Brake Master Cylinder
1. Install:
   • Copper washers “1” New
   • Brake hoses “2”
   • Union bolt “3”

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

WARNING
Proper brake hose routing is essential to in-
sure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-31.

**CAUTION:**

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

---

2. Add the recommended brake fluid to the proper level.
   - Brake fluid reservoir
     (LOWER level mark “a” or over)

   **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.

---

**CAUTION:**

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 “a” → Add the recommended brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.

---

5. Check:
   - Brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.
## 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>Master cylinder holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brake master cylinder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Throttle cable housing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Right handle switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Throttle cable housing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Throttle cable</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Grip end</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Throttle grip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Master cylinder holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Clutch master cylinder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Left handlebar switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Grip end</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Handlebar grip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Collars</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Handlebar upper holder</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Handlebar</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

**Tightening Torques**

- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 26 Nm (2.6 m·kg, 19 ft·lb)
- 23 Nm (2.3 m·kg, 17 ft·lb)
**REMOVING THE HANDLEBAR**

1. Stand the vehicle on a level surface.

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

2. Remove:
   - Handlebar grip “1”

   **NOTE:**
   Blow compressed air between the handlebar and the handlebar grip, and gradually push the grip off the handlebar.

3. Remove:
   - Throttle cable housing “1”
   - Throttle grip “2”

   **NOTE:**
   While removing the throttle cable housing, pull back the rubber cover “3”.

**CHECKING THE HANDLEBAR**

1. Check:
   - Handlebar “1”

   Bends/cracks/damage → Replace.

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

**INSTALLING THE HANDLEBAR**

1. Stand the vehicle on a level surface.

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

2. Install:
   - Handlebar “1”
   - Handlebar upper holder “2”

   **CAUTION:**
   - First, tighten the bolts on the front side of the handlebar holder, and then on the rear side.
   - Turn the handlebar all the way to the left and right. If there is any contact with the fuel tank, adjust the handlebar position.

   **NOTE:**
   - Align the match mark “a” on the handlebar with the upper surface of the lower handlebar holders.
   - Install with the handlebar arrow mark “b” facing forward “A”.

   **Handle upper holder**
   - 23 Nm (2.3 m•kg, 17 ft•lb)
3. Install:
   - Handlebar grip
     a. Apply a thin coat of rubber adhesive onto the left end of the handlebar.
     b. Slide the handlebar grip over the left end of the handlebar.
     c. Wipe off any excess rubber adhesive with a clean rag.

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

4. Install:
   - Throttle grip “1”
   - Throttle cable housing “2”
   - Throttle cables “3”

**NOTE:**
Align the projections “a” on the handlebar switches with the holes “b” in the handlebar.

5. Install:
   - Right handlebar switch “1”

**NOTE:**
Align the projection on the handlebar switch with the hole “a” on the handlebar.

6. Install:
   - Left handlebar switch “1”

**NOTE:**
Align the projection on the left handlebar switch with the hole “a” on the handlebar.

7. Install:
   - Brake master cylinder

Refer to “INSTALLING THE FRONT BRAKE MASTER CYLINDER” on page 4-25.

8. Adjust:
   - Throttle cable free play

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

<table>
<thead>
<tr>
<th>Throttle cable free play</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0–5.0 mm (0.12–0.20 in)</td>
</tr>
</tbody>
</table>
Removing the front fork legs

### 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>Front wheel</td>
<td></td>
<td>Refer to “FRONT WHEEL” on page 4-2.</td>
</tr>
<tr>
<td>1</td>
<td>Bracket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Front fender</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Upper bracket pinch bolt</td>
<td>2</td>
<td>Loosen.</td>
</tr>
<tr>
<td>4</td>
<td>Cap bolt</td>
<td>2</td>
<td>Loosen.</td>
</tr>
<tr>
<td>5</td>
<td>Lower bracket pinch bolt</td>
<td>4</td>
<td>Loosen.</td>
</tr>
<tr>
<td>6</td>
<td>Fork leg (left/right)</td>
<td>1/1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>

**Torque Specifications:**
- 30 Nm (3.0 m·kg, 22 ft·lb)
- 23 Nm (2.3 m·kg, 17 ft·lb)
- 7 Nm (0.7 m·kg, 5.1 ft·lb)
## Disassembling the Front Fork Legs

- **Order**: Cap bolt
- **Parts to remove**: 1
- **Q'ty**: 1
- **Remarks**: 23 Nm (2.3 m·kg, 17 ft·lb)

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cap bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Valve stem lock nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spring guide</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Push rod</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Stopper ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Oil seal washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Slide metal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Inner tube</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Piston metal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Tapered spindle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Damper rod assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Outer tube</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Disassembling the front fork legs

For assembly, reverse the disassembly procedure.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
</table>

For assembly, reverse the disassembly procedure.
REMOVING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Stand the vehicle on a level surface.

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

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

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

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

3. Remove:
   - Front fork leg

DISASSEMBLING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Remove:
   - Cap bolt “1”
     (from inner tube)
   - Loosen “2” and remove.

2. Remove:

   - Nut “1”
   - Spring guide “2”
   - Push rod “3”
   - Spacer “4”
   - Front fork spring

3. Drain:
   - Fork oil

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

   CAUTION:
   Do not scratch the inner tube.

5. Remove:
   - Stopper ring “1”
     (with a flat-head screwdriver)

   CAUTION:
   Do not scratch the inner tube.

6. Remove:
   - Damper rod assembly bolt “1”
FRONT FORK

- Damper rod assembly

**NOTE:**
While holding the damper rod with the damper rod holder “2”, loosen the damper rod assembly bolt.

<table>
<thead>
<tr>
<th>Damper rod holder</th>
</tr>
</thead>
<tbody>
<tr>
<td>90890-01513</td>
</tr>
</tbody>
</table>

7. Remove:
- Inner tube

 Hướng dẫn chi tiết:

- Hold the front fork leg horizontally.
- Securely clamp the brake caliper bracket in a vise with soft jaws.
- Take care and pull the inner tube “1” with some force, and knock it out from the outer tube.

**CAUTION:**
- Excessive force will damage the oil seal and bushing. A damaged oil seal or bushing must be replaced.
- Avoid bottoming the inner tube into the outer tube during the above procedure, as the oil flow stopper will be damaged.

8. Remove:
- Inner tube “1”
- Piston metal “2”

---

- Tapered spindle “3”
- Spring “4”
- Damper rod assembly “5”

---

**CHECKING THE FRONT FORK LEGS**
The following procedure applies to both of the front fork legs.

1. Check:
- Inner tube “1”
- Outer tube
  - Bends/damage/scratches → Replace.
- Damper rod assembly “2”
  - Damage/wear → Replace.
  - Obstruction → Blow out all of the oil passageways with compressed air.

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

---

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

---

<table>
<thead>
<tr>
<th>Fork spring free length</th>
</tr>
</thead>
<tbody>
<tr>
<td>284.0 mm (11.18 in)</td>
</tr>
<tr>
<td>Limit</td>
</tr>
<tr>
<td>275.5 mm (10.85 in)</td>
</tr>
</tbody>
</table>
FRONT FORK

3. Check:
   - Tapered spindle “1”
   - Spring “2”
     Damage → Replace.

4. Check:
   - Cap bolt O-ring
     Damage/wear → Replace.

5. Check:
   - Push rod
     Bends/damage/clog → Replace.

1. Install:
   - Damper rod assembly “1”
   - Spring “2”
   - Tapered spindle “3”
   - Piston metal “4” New
   - Inner tube “5”

CAUTION:
Allow the damper rod assembly to slide slowly down the inner tube “2” until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.

NOTE:
When assembling the front fork leg, be sure to replace the following parts:
- Slide metal
- Piston metal
- Oil seal
- Dust seal
Before assembling the front fork leg, make sure all of the components are clean.

2. Lubricate:
   - Inner tube's outer surface

   | Recommended oil |
   | Suspension oil 01 or equivalent |

3. Install:
   - Gasket
   - Damper rod assembly bolt “1”

   | Damper rod assembly bolt |
   | 23 Nm (2.3 m·kg, 17 ft·lb) |
   | (Apply the LOCTITE®) |

NOTE:
While holding the damper rod assembly with the damper rod holder “2”, tighten the damper rod assembly bolt.

New

WARNING
Make sure the oil levels in both front fork legs are equal.
Uneven oil levels can result in poor handling and a loss of stability.
4. Install:
- Slide metal “1” New
- Oil seal washer “2”
- Oil seal “3” New
  (with the fork seal driver “4” and attachment “5”)

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

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

5. Install:
- Stopper ring
- Dust seal “1” New
  (with the fork seal driver “2” and attachment “3”)

**NOTE:**
Fit the stopper ring into the outer tube.

6. Check:
- Inner tube operation
  Not operating smoothly → Disassemble and check again.

7. Fully compress the front fork leg.
8. Fill the fork oil with the specified amount of the recommended.
   • Front fork leg

   Recommended oil
   Suspension oil 01 or equivalent
   Quantity
   516.0 cm³ (17.45 US oz) (18.20 Imp.oz)

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

9. After filling the front fork leg, slowly stroke the damper rod “1” up and down (at least ten times) to distribute the fork oil.

   NOTE:
   Be sure to stroke the damper rod slowly because the fork oil may spurt out.

10. Slowly stroke the inner tube “1” up and down to distribute the fork oil once more. (1 stroke = approx. 150 mm)

   NOTE:
   Be careful not to stroke the inner tube over 150 mm (8.12 in) as this will cause air to enter.

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

   CAUTION:
   Be sure to fill to the top of the inner tube with fork oil and remove air. If the inner tube is not filled to the top, the fork oil will not circulate outside the tube, resulting in incorrect spring performance.

12. Measure:
   • Front fork leg oil level “a” (at max. pressure)
     Out of specification → Correct.

13. Install:
   • Fork spring
   • Spacer “1”
   • Push rod “2”
   • Spring guide “3”
   • Nut “4”
   • Cap bolt

   a. Install the nut “4” and locate in the specified position “a”.

   b. Adjust the adjuster “5” to the standard position.
Refer to "ADJUSTING THE FRONT FORKS" on page 3-27.

c. Measure the distance from the adjuster "5" bottom end to the adjuster "6" bottom end.

d. When not "a", turn adjuster "6". Refer to "ADJUSTING THE FRONT FORKS" on page 3-27.

e. Install the cap bolt "7" and finger tighten it.

f. Hold the cap bolt and tighten the damper adjusting rod locknut "4" to specification.

- **WARNING**
  Always use a new cap bolt O-ring.

g. Fit the cap bolt to the inner tube and temporarily tighten.

--------

**INSTALLING THE FRONT FORK LEGS**
The following procedure applies to both of the front fork legs.

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

   **NOTE:**
   Check that the top end of the inner tube is level with the upper bracket's top end.

2. Tighten:
   - Lower bracket pinch bolt
     23 Nm (2.3 m•kg, 17 ft•lb)
   - Cap bolt
     23 Nm (2.3 m•kg, 17 ft•lb)
   - Upper bracket pinch bolt
     30 Nm (3.0 m•kg, 22 ft•lb)

   **WARNING**
   Make sure the brake hoses are routed properly.

3. Adjust:
   - Spring preload
   - Rebound damping
   - Compression damping
   Refer to "ADJUSTING THE FRONT FORKS" on page 3-27.

---

**Brush length “a”**
15 mm

**Valve stem lock nut**
15 Nm (1.5 m•kg, 11 ft•lb)
### STEERING HEAD

**Remove headlight and meters**

![Diagram showing headlight and meters removal](image)

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Headlight bracket</td>
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<td>Disconnect.</td>
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<td>For installation, reverse the removal procedure.</td>
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- TR.  10 Nm (1.0 m • kg, 7.2 ft • lb)
- TR.  7 Nm (0.7 m • kg, 5.1 ft • lb)
Removing the lower bracket

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<tr>
<td>3</td>
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<td>1</td>
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</tr>
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<td>5</td>
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<tr>
<td>6</td>
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<tr>
<td>7</td>
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<td></td>
</tr>
<tr>
<td>8</td>
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<td></td>
</tr>
<tr>
<td>9</td>
<td>Ball race cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bearing set (upper)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Bearing set (lower)</td>
<td>1</td>
<td></td>
</tr>
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<td>12</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Handlebar lower holder</td>
<td>2</td>
<td>For installation, reverse the removal proce-</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

1st: 52 Nm (5.2 m - kg, 38 ft - lb) Return fully
2nd: 18 Nm (1.8 m - kg, 13 ft - lb)

110 Nm (11.0 m - kg, 80 ft - lb)
40 Nm (4.0 m - kg, 29 ft - lb)
52 Nm (5.2 m - kg, 38 ft - lb)
18 Nm (1.8 m - kg, 13 ft - lb)
STEERING HEAD

REMOVING THE LOWER BRACKET
1. Stand the vehicle on a level surface.

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

2. Remove:
   • Ring nut “1”
     (with a steering nut wrench “2”)

---

CHECKING THE STEERING HEAD
1. Wash:
   • Bearings
   • Bearing races

   Recommended cleaning solvent
   Kerosene

2. Check:
   • Bearings “1”
   • Bearing races
     Damage/pitting → Replace.

---

3. Replace:
   • Bearings
   • Bearing races

   a. Remove the bearing races from the steering head pipe with a long rod “1” and hammer.
   b. Remove the bearing race from the lower bracket with a floor chisel “2” and hammer.
   c. Install a new dust seal and new bearing races.

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

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

---

INSTALLING THE STEERING HEAD
1. Lubricate:
   • Upper bearing

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

3. Install:
   - Upper bracket
   - Steering stem nut

4. Install:
   - Front fork legs
   Refer to “FRONT FORK” on page 4-41.

**NOTE:**
Temporarily tighten the upper and lower bracket pinch bolts.
Removing the rear shock absorber assembly

- **23 Nm (2.3 m·kg, 17 ft·lb)**
- **30 Nm (3.0 m·kg, 22 ft·lb)**

### Order Details

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Right/left rear shock absorber assembly</td>
<td>1/1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
REAR SHOCK ABSORBER ASSEMBLY

HANDLING THE REAR SHOCK ABSORBER AND GAS CYLINDER

**WARNING**

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

- Do not tamper or attempt to open the rear shock absorber or gas cylinder.
- Do not subject the rear shock absorber or gas cylinder to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.
- Do not deform or damage the rear shock absorber or gas cylinder in any way. If the rear shock absorber, gas cylinder or both are damaged, damping performance will suffer.

DISPOSING OF A REAR SHOCK ABSORBER AND GAS CYLINDER

1. Gas pressure must be released before disposing of a rear shock absorber and gas cylinder. To release the gas pressure, drill a 2-3 mm hole through the rear shock absorber at a point 15-20mm from its end as shown.

**WARNING**

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

REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the vehicle on a level surface.

**WARNING**

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

**NOTE:**

Place the vehicle the mainstand so that the rear wheel is elevated.

2. Remove:

   - Rear shock absorber assembly

**NOTE:**

Remove left and right upper bolts, fully lower the rear arm, and remove the lower bolts of the rear shock absorber assembly.

CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

1. Check:

   - Rear shock absorber rod “1”
     Bends/damage → Replace the rear shock absorber assembly.
   - Rear shock absorber
     Gas leaks/oil leaks → Replace the rear shock absorber assembly.
   - Spring “2”
     Damage/wear → Replace the rear shock absorber assembly.
   - Gas cylinder “3”
     Damage/gas leaks → Replace the rear shock absorber assembly.
   - Bushings
     Damage/wear → Replace.
   - Dust seals
     Damage/wear → Replace.
   - Bolts
     Bends/damage/wear → Replace.
INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Install:
   ● Rear shock absorber assembly

**NOTE:**
With the rear shock absorber assembly, tighten in the order: left/right lower bolts, then upper bolts.

<table>
<thead>
<tr>
<th>Description</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear shock absorber assembly lower bolt</td>
<td>30 Nm (3.0 m•kg, 22 ft•lb)</td>
</tr>
<tr>
<td>Rear shock absorber assembly upper bolt</td>
<td>23 Nm (2.3 m•kg, 17 ft•lb)</td>
</tr>
</tbody>
</table>
Removing the swingarm

Order | Job/Parts to remove | Q'ty | Remarks
-----|---------------------|-----|------------------------
1    | Rear wheel         |     | Refer to “REAR WHEEL” on page 4-8.
2    | Rear shock absorber|     | Refer to “REAR SHOCK ABSORBER ASSEMBLY” on page 4-54.
3    | Chain case         | 1   |                        
4    | Brake hose clamp   | 2   |                        
5    | Brake torque rod/brake caliper bracket | 1/1 |                        
6    | Pivot shaft        | 1   |                        
7    | Swingarm           | 1   |                        
8    | Seal guard         | 1   |                        
9    | Thrust cover/oil seal | 2/2 |                        
10   | Bushing            | 1   |                        
11   | Bearing            | 2   | For installation, reverse the removal procedure.

T R. 23 Nm (2.3 m·kg, 17 ft·lb)

T R. 10 Nm (1.0 m·kg, 7.2 ft·lb)

T R. 7 Nm (0.7 m·kg, 5 ft·lb)

T R. 125 Nm (12.5 m·kg, 90 ft·lb)

T R. 30 Nm (3.0 m·kg, 22 ft·lb)
REMOVING THE SWINGARM

1. Stand the vehicle on a level surface.

**WARNING**

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

**NOTE:**

Place the vehicle the suitable stand so that the rear wheel is elevated.

2. Measure:
   - Swingarm side play
   - Swingarm up/down stroke

   a. Measure the tightening torque of the swingarm pivot shaft nut.

   Swingarm pivot shaft nut
   125 Nm (12.5 m•kg, 90 ft•lb)

   b. Measure the swingarm side play “A” by moving the swingarm from side to side.
   c. If the swingarm side play is out of specification, check the spacers and bearings.

   Swingarm side play (at the end of the swingarm)
   1 mm (0.04 in)

d. Check the swingarm vertical movement “B” by moving the swingarm up and down.
   If swingarm vertical movement is not smooth or if there is binding, check the spacers and bearings.

CHECKING THE SWINGARM

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

2. Check:
   - Pivot shaft
     Bends/damage → Replace.

3. Check:
   - Thrust cover “1”
   - Oil seals “2”
   - Bearings “3”
   - Spacer “4”
     Damage/wear → Replace.

INSTALLING THE SWINGARM

1. Lubricate:
   - Bearings
   - Spacers
   - Thrust cover
   - Pivot shaft

   **Recommended lubricant**
   Molybdenum disulfide grease

2. Install:
   - Bearings
• Spacers
• Oil seals New
• Thrust cover
• Swingarm
• Pivot shaft

3. Install:
• Rear shock absorber assembly
• Rear wheel
  Refer to “REAR SHOCK ABSORBER ASSEMBLY” on page 4-54 and “REAR WHEEL” on page 4-8.

4. Adjust:
• Drive chain slack
  Refer to “ADJUSTING THE DRIVE CHAIN SLACK” on page 3-24.

<table>
<thead>
<tr>
<th>Drive chain slack</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.0–30.0 mm (0.79–1.18 in)</td>
</tr>
</tbody>
</table>
Removing the drive chain

Order Job/Parts to remove Q’ty Remarks
1 Drive sprocket nut 1 Loosen
   Refer to “ENGINE REMOVAL” on page 5-1.
2 Lock washer 1
3 Drive sprocket 1
4 Drive chain 1

Refer to “REAR SHOCK ABSORBER ASSEMBLY” on page 4-54.
Refer to “REAR WHEEL” on page 4-8.
Refer to “SWINGARM” on page 4-57.

For installation, reverse the removal procedure.

\[ \times 85 \text{ Nm (8.5 m\cdot kg, 62 ft\cdot lb)} \]
REMOVING THE DRIVE CHAIN
1. Stand the vehicle on a level surface.

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

NOTE:__________________________
Place the vehicle on a suitable stand so that the rear wheel is elevated.

2. Remove:
   - Drive sprocket nut “1”
   - Lock washer “2”

NOTE:__________________________
- Straighten the lock washer tab.
- Operate the rear brake, and loosen the drive sprocket.
- After loosening the drive sprocket, remove the rear wheel and swingarm.

3. Remove:
   - REAR WHEEL
     Refer to “REAR WHEEL” on page 4-8.
   - Swingarm
     Refer to “SWINGARM” on page 4-57.

CHECKING THE DRIVE CHAIN
1. Measure:
   - 15-link length of the drive chain
     Out of specification → Replace the drive chain.

   15-link length limit
   239.3 mm (9.42 in)

   a. Measure the 15-link section inside length “a” and pin outer length “b”.

   b. Measure the drive chain’s 15-link length “c” using the following formula.
     15-link section “a” of the drive chain = (Pin inside length “a” + pin outer length “b”)/2

NOTE:__________________________
- While measuring the 15-link section, push down on the drive chain to increase its tension.
- Perform this measurement at two or three different places.

2. Check:
   - Drive chain
     Stiffness → Clean and lubricate or replace.

3. Clean:
   - Drive chain

   a. Wipe the drive chain with a clean cloth.
   b. Put the drive chain in kerosene and remove any remaining dirt.
c. Remove the drive chain from the kerosene and completely dry it.

**CAUTION:**
This vehicle has a drive chain with small rubber O-rings “1” between the drive chain side plates. Steam cleaning, high-pressure washing, certain solvents, and the use of a coarse brush can damage these O-rings.

4. Check:
- O-rings “1” Damage → Replace the drive chain.
- Drive chain rollers “2” Damage/wear → Replace the drive chain.
- Drive chain side plates “3” Damage/wear/cracks → Replace the drive chain.

5. Lubricate:

---

**Recommended lubricant**
Engine oil or chain lubricant suitable for O-ring chains

---

**CHECKING THE DRIVE SPROCKET**
1. Check:
- Drive sprocket
  Refer to “CHECKING THE REAR WHEEL SPROCKET” on page 4-11.

**CHECKING THE REAR WHEEL SPROCKET**
1. Check:
- Rear wheel sprocket
  Refer to “CHECKING THE REAR WHEEL SPROCKET” on page 4-11.

**CHECKING THE REAR WHEEL DRIVE HUB**
Refer to “CHECKING THE REAR WHEEL DRIVE HUB” on page 4-11.
ENGINE

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<td>Assembling the Crankcase</td>
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<td>Checking the Starter Clutch Shaft</td>
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<td>Checking the Hy-vo Chain</td>
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<td>Installing the Connecting Rods</td>
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Removing the exhaust pipe

Order | Job/Parts to remove | Q’ty | Remarks
--- | --- | --- | ---
1 | Exhaust band | 1 | Loosen
2 | Muffler | 1 |
3 | EXUP cover | 1 |
4 | EXUP cable | 2 |
5 | O₂ sensor | 1 |
6 | Exhaust pipe/exhaust gasket | 1/4 |
7 | Exhaust pipe bracket | 1 |
8 | Oil cooler | 1 |
9 | O-ring | 2 |
10 | Air scoop (left/right) | 1/1 |
11 | Crankcase breather hose | 1 |
12 | Ground lead | 1 | Disconnect.

For installation, reverse the removal procedure.
Removing the starter motor, generator and drive chain

<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></td>
</tr>
<tr>
<td>2</td>
<td>Engine temperature sensor coupler</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Crankshaft position sensor lead/Oil level gauge lead/neutral lead</td>
<td>1/1/1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Crankcase cover 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Shift arm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Generator</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Clutch push lever Comp.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Cover stay 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Speed sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Drive sprocket cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Starter motor lead</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Starter motor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Dowel pin</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Drive sprocket nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Lock washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Drive sprocket/Drive chain</td>
<td>1/1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
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>Right foot rest assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Down tube</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Engine bracket (front)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Engine bracket (rear upper left/rear upper right)</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Engine bracket (rear lower)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Engine</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

* T/R. = Torque Rating

- 48 Nm (4.8 m·kg, 35 ft·lb)
- 88 Nm (8.8 m·kg, 64 ft·lb)
- 30 Nm (3.0 m·kg, 22 ft·lb)
- 55 Nm (5.5 m·kg, 40 ft·lb)
- 26 Nm (2.6 m·kg, 19 ft·lb)
- 64 Nm (6.4 m·kg, 46 ft·lb)
INSTALLING THE ENGINE

1. Install:
   - Engine bracket bolt (rear upper) “1”
   - Engine bracket bolt (rear upper) “2”
   - Engine mounting nut (rear upper) “3”
   - Engine bracket bolt (front) “4”
   - Engine mounting nut (front) “5”
   - Engine mounting nut (rear lower) “6”

   **NOTE:**
   Do not fully tighten the bolts. Temporarily tighten.

2. Tighten:
   - Engine bracket bolt (rear upper)
   - Engine bracket bolt (rear upper)
   - Engine mounting nut (rear upper)
   - Engine bracket bolt (front)
   - Engine mounting nut (front)
   - Engine mounting nut (rear lower)

   **Engine bracket bolt (rear upper)**
   88 Nm (8.8 m•kg, 64 ft•lb)
   Engine bracket bolt (rear upper)
   48 Nm (4.8 m•kg, 35 ft•lb)
   Engine mounting nut (rear upper)
   55 Nm (5.5 m•kg, 40 ft•lb)
   Engine bracket bolt (front)
   30 Nm (3.0 m•kg, 22 ft•lb)
   Engine mounting nut (front)
   64 Nm (6.4 m•kg, 46 ft•lb)
   Engine mounting nut (rear lower)
   64 Nm (6.4 m•kg, 46 ft•lb)

3. Install:
   - Shift arm “1”
   **Shift arm mounting bolt**
   10 Nm (1.0 m•kg, 7.2 ft•lb)

   **NOTE:**
   Align the punch mark “a” in the shift shaft with the punch mark “b” in the shift arm.

4. Adjust:
   - Shift pedal position
   Refer to “ADJUSTING THE SHIFT PEDAL” on page 3-24.
Removing the cylinder head cover

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oil cooler bolt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Air scoop (left/right)</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Plug cap</td>
<td>4</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Cylinder head cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Gasket</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

Refer to “AIR INDUCTION SYSTEM” on page 6-13.
Removing the camshafts

Order | Job/Parts to remove | Q'ty | Remarks
--- | --- | --- | ---
1 | Spark plug | 4 |  
2 | Timing plate cover/gasket | 1/1 |  
3 | Timing chain guide (top side) | 1 |  
4 | Timing chain tensioner assembly | 1 |  
5 | Chain guide | 1 |  
6 | Camshaft cap | 8 |  
7 | Intake camshaft | 1 |  
8 | Exhaust camshaft | 1 |  
9 | Camshaft sprockets | 2 | For installation, reverse the removal procedure.

For installation, reverse the removal procedure.
REMOVING THE CAMSHAFTS

1. Remove:
   - Timing plate cover
2. Align:
   - “T” mark on timing plate
     (align with crankshaft position sensor stationary pointer)

a. Turn the crankshaft clockwise.
b. When piston #1 is at TDC on the compression stroke, align the “T” mark “a” with the stationary pointer “b”. (TDC)

NOTE: TDC on the compression stroke can be found when the camshaft lobes are turned away from each other.

3. Loosen:
   - Camshaft sprocket bolts
4. Remove:
   - Timing chain tensioner cap bolt
   - Timing chain tensioner
   - Gasket
5. Remove:
   - Timing chain guide (top side) “1”
   - Camshaft sprockets “2”
   - Camshaft caps “3”
   - Timing chain guide (exhaust side)

NOTE: For reference during installation, put identification marks on each camshaft cap.

CAUTION: To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.

6. Remove:
   - Intake camshaft “1”
   - Exhaust camshaft “2”

NOTE: To prevent the timing chain from falling into the crankcase, fasten it with a wire “3” to it.

CHECKING THE CAMSHAFTS

1. Check:
   - Camshaft lobes
     Blue discoloration/pitting/scratches → Replace the camshaft.
2. Measure:
   - Camshaft lobe dimensions “a” and “b”
     Out of specification → Replace the camshaft.
3. Measure:
   - Camshaft runout
     Out of specification → Replace.

Camshaft lobe dimension limit
Intake A
35.849–35.949 mm
(1.4114–1.4153 in)
Limit
35.749 mm (1.4074 in)
Intake B
28.010–28.110 mm
(1.1023–1.1067 in)
Limit
27.910 mm (1.0988 in)
Exhaust A
35.950–36.050 mm
(1.4154–1.4193 in)
Limit
35.850 mm (1.4114 in)
Exhaust B
28.045–28.145 mm
(1.1041–1.1081 in)
Limit
27.945 mm (1.1002 in)

4. Measure:
   - Camshaft-journal-to-camshaft-cap clearance
     Out of specification → Measure the camshaft journal diameter.

Camshaft-journal-to-camshaft-cap clearance
0.020–0.054 mm
(0.0008–0.0021 in)

a. Install the camshaft into the cylinder head (without the dowel pins and camshaft caps).
b. Position "a" strip of Plastigauge® "1" onto the camshaft journal as shown.

c. Install the dowel pins and camshaft caps.

**NOTE:**
- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.
- Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance with the Plastigauge®.

d. Remove the camshaft caps and then measure the width of the Plastigauge® "2".
5. Measure:
   - Camshaft journal diameter “a”
     Out of specification → Replace the camshaft.
     Within specification → Replace the cylinder head and the camshaft caps as a set.

Camshaft journal diameter “a”
24.967–24.980 mm
(0.9830–0.9835 in)

EAS23950
CHECKING THE TIMING CHAIN GUIDES
1. Check:
   - Timing chain guide (exhaust side)
   - Timing chain guide (top side)
     Damage/wear → Replace.

EAS23960
CHECKING THE TIMING CHAIN TENSIONER
1. Check:
   - Timing chain tensioner
     Cracks/damage → Replace.

2. Check:
   - One-way cam operation
     Rough movement → Replace the timing chain tensioner housing.

3. Check:
   - Cap bolt
   - Spring
   - One-way cam
   - Timing chain tensioner rod
     Damage/wear → Replace.

EAS24000
INSTALLING THE CAMSHAFTS
1. Install:
   - Intake camshaft sprocket
   - Exhaust camshaft sprocket
     (with the camshaft sprockets temporarily tightened)

NOTE:
- Align the camshaft position mark “a” to the stamped mark “E” “b” on the exhaust side, and “I” “c” on the intake side when installing (see illustration).
- Do not tighten the camshaft cap bolts yet.
2. Install:
   - Intake camshaft
   - Exhaust camshaft

   a. Turn the crankshaft clockwise.
   b. When piston #1 is at TDC on the compression stroke, align the “T” mark “a” with the stationary pointer “b”. (Compression stroke TDC)

c. Install the timing chain onto both camshaft sprockets and then install the camshaft sprockets onto the camshafts.

   NOTE:
   - Install the exhaust camshaft “1” first, then the intake camshaft “2”.
   - Install each camshaft with the punch mark facing upwards.
   - Be sure to keep the timing chain as tight as possible on the exhaust side.

   CAUTION:
   - Do not turn the crankshaft when installing the camshaft(s) to avoid damage or improper valve timing.

   d. Install the camshaft caps “3”.

   NOTE:
   - Make sure each camshaft cap is installed in its original place. Refer to the identification marks as follows:
     “I”: Intake
     “E”: Exhaust
   - Make sure the arrow mark on each camshaft points towards the right side of the engine.
   - Do not tighten the camshaft cap bolts yet.

   CAUTION:
   - The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft caps, and camshafts will result.

   e. Turn both camshafts opposite each other so that the punch mark “c” on the camshaft is aligned with the hole “d” in the camshaft cap as shown. When out of alignment, re-install each camshaft.

   f. Tighten the camshaft cap bolts.
**NOTE:**
Tighten the camshaft cap bolts in a crisscross pattern, working from the inside out.

------------------------------------------------------------------------------------------

3. Install:
   - Timing chain guide (exhaust side)

4. Install:
   - Timing chain tensioner
   - Timing chain tensioner gasket

------------------------------------------------------------------------------------------

a. Remove the cap bolt “1”, washer “2”, and springs “4”.
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 new gasket “6” onto the cylinder block.

**NOTE:**
The timing chain tensioner teeth should face down.

------------------------------------------------------------------------------------------

Timing chain tensioner bolt
10 Nm (1.0 m•kg, 7.2 ft•lb)

d. Install the springs “3”, washer “2”, and cap bolt “1”.

------------------------------------------------------------------------------------------

Timing chain tensioner cap bolt
20 Nm (2.0 m•kg, 15 ft•lb)

------------------------------------------------------------------------------------------

5. Turn:
   - Crankshaft
     (several turns counterclockwise)

6. Check:
   - “T” mark “a”
     “T” mark should be aligned with the stationary pointer “b”.
   - Camshaft punch mark “c”
     Make sure the punch mark on the camshaft is aligned with the camshaft cap hole “d”.
     When out of alignment → re-install.
     Refer to the installation steps above.

------------------------------------------------------------------------------------------

7. Tighten:
   - Camshaft sprocket bolts

    Camshaft sprocket bolts
    20 Nm (2.0 m•kg, 15 ft•lb)

**CAUTION:**
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.

8. Install:
   - Timing chain guide (top side)

9. Measure:
   - Valve clearance
     Out of specification → Adjust.
Refer to “ADJUSTING THE VALVE CLEARANCE” on page 3-4.

10. Install:
   - Timing plate cover
Removing the cylinder head

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>Protector assembly1/protector assembly2</td>
<td>1/1</td>
<td>Refer to “CAMSHAFTS” on page 5-5.</td>
</tr>
<tr>
<td>2</td>
<td>Cylinder head</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cylinder head gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Gasket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dowel pin</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Left/right protector bracket</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Intake manifold/O-ring</td>
<td>2/4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Engine temperature sensor/gasket</td>
<td>1/1</td>
<td></td>
</tr>
</tbody>
</table>
CYLINDER HEAD

REMOVING THE CYLINDER HEAD
1. Remove:
   • Cylinder head nuts

   NOTE:
   • Loosen the nuts in the proper sequence as shown.
   • Loosen each nut 1/2 of a turn at a time. After all of the nuts are fully loosened, remove them.

CHECKING THE CYLINDER HEAD
1. Eliminate:
   • Combustion chamber carbon deposits
     (with a rounded scraper)

   NOTE:
   Do not use a sharp instrument to avoid damaging or scratching:
   • Spark plug bore threads
   • Valve seats

2. Check:
   • Cylinder head

3. Measure:
   • Cylinder head warpage

   Out of specification → Resurface the cylinder head

   Warpage limit
   0.20 mm (0.0079 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.

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

INSTALLING THE CYLINDER HEAD
1. Install:
   • Cylinder head gasket “1” New
   • Gasket
   • Dowel pins “2”

2. Check:
   • Cylinder head
2. Install:
   - Cylinder head

   **NOTE:**
   Pass the timing chain through the timing chain cavity.

3. Tighten:
   - Cylinder head nuts

<table>
<thead>
<tr>
<th>Cylinder head nuts</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 Nm (3.5 m·kg, 25 ft·lb)</td>
</tr>
</tbody>
</table>

   **NOTE:**
   - Lubricate the cylinder head nuts with engine oil.
   - Tighten the cylinder head nuts in the proper tightening sequence as shown and torque them in two stages.

4. Install:
   - Exhaust camshaft
   - Intake camshaft

   Refer to “CAMSHAFTS” on page 5-5.
Removing the valves and valve springs

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Valve pad</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Valve lifter</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Valve cotter</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Valve spring retainer</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Valve spring (inner)</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Valve spring (outer)</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Intake valve</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Exhaust valve</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Valve stem seal</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Valve spring seat</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

Refer to "CYLINDER HEAD" on page 5-13.

For installation, reverse the removal procedure.
REMOVING THE VALVES
The following procedure applies to all of the valves and related components.

NOTE:________
Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.

1. Remove:
   - Valve lifter “1”
   - Valve pad “2”

NOTE:________
Make a note of the position of each valve lifter and valve pad so that they can be reinstalled in their original place.

2. Check:
   - Valve sealing
     Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.
     Refer to "CHECKING THE VALVE SEATS" on page 5-19.

a. Pour a clean solvent “a” into the intake and exhaust ports.
b. Check that the valves properly seal.

NOTE:________
There should be no leakage at the valve seat “1”.

3. Remove:
   - Valve cotters “1”

NOTE:________
Remove the valve cotters by compressing the valve spring with the valve spring compressor “2”.

4. Remove:
   - Upper spring seat “1”
   - Valve spring (inner)/(outer) “2”
   - Valve stem seal “3”
   - Valve spring seat “4”
   - Valve “5”

NOTE:________
Identify the position of each part very carefully.

Valve spring compressor
90890-04019
YM-04019

Diagram:
- Valve lifter “1”
- Valve pad “2”
- Valve spring compressor
- Valve stem seal “3”
- Valve spring seat “4”
- Valve “5”
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 spring.

Valve-stem-to-valve-guide clearance =
Valve guide inside diameter “a” -
Valve stem diameter “b”

<table>
<thead>
<tr>
<th>Valve-stem-to-valve-guide clearance</th>
<th>Valve-stem-to-valve-guide clearance (intake)</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.010–0.037 mm (0.0004–0.0015 in)</td>
<td>0.080 mm (0.0032 in)</td>
<td></td>
</tr>
<tr>
<td>Limit</td>
<td>Valve-stem-to-valve-guide clearance (exhaust)</td>
<td></td>
</tr>
<tr>
<td>0.025–0.052 mm (0.0010–0.0020 in)</td>
<td>Limit</td>
<td>0.100 mm (0.0039 in)</td>
</tr>
</tbody>
</table>
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.

NOTE: After replacing the valve guide, reface the valve seat.

### Valve guide remover & installer set (ø5.5)
- 90890-04016
- YM-01122
- YM-04015
- YM-01196

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

4. Check:
   - Valve face
     Pitting/wear → Grind the valve face.

### Valve margin thickness “a”
- 0.8 mm – 1.2 mm
  (0.0315 – 0.0472 in)

5. Measure:
   - Valve margin thickness “a”
     Out of specification → Replace the valve.

### Valve stem runout
- 0.010 mm (0.0004 in)

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

NOTE:
- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the oil seal.

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

1. Clean: 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 “a”
     Out of specification → Replace the cylinder head.

![Valve seat width](image)

**Valve seat width**

<table>
<thead>
<tr>
<th>0.90–1.10 mm (0.0354–0.0433 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wear limit</td>
</tr>
<tr>
<td>1.6 mm (0.06 in)</td>
</tr>
</tbody>
</table>

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

4. Lap:
   - Valve face
   - Valve seat

---

**NOTE:**
Where the valve seat and valve face contacted one another, the blueing will have been removed.

---

**CAUTION:**
Do not let the lapping compound enter the gap between the valve stem and the valve guide.

---

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.

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

---

**Valve lapper**

90890-04101

**Valve lapping tool**

YM-A8998
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.

---

**CHECKING THE VALVE SPRINGS**

The following procedure applies to all of the valve springs.
VALVES AND VALVE SPRINGS

b. Installed length

3. Measure:
   • Valve spring tilt “a”
     Out of specification → Replace the valve spring.

<table>
<thead>
<tr>
<th>Spring tilt limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner</td>
</tr>
<tr>
<td>Spring tilt (intake)</td>
</tr>
<tr>
<td>2.5°/1.7 mm (2.5°/0.067 in)</td>
</tr>
<tr>
<td>Spring tilt (exhaust)</td>
</tr>
<tr>
<td>2.5°/1.7 mm (2.5°/0.067 in)</td>
</tr>
<tr>
<td>Outer</td>
</tr>
<tr>
<td>Spring tilt (intake)</td>
</tr>
<tr>
<td>2.5°/1.8 mm (2.5°/0.071 in)</td>
</tr>
<tr>
<td>Spring tilt (exhaust)</td>
</tr>
<tr>
<td>2.5°/1.8 mm (2.5°/0.071 in)</td>
</tr>
</tbody>
</table>

EAS24340

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

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

2. Lubricate:
   • Valve stem “1”
   • Valve stem seal “3”
     (with the recommended lubricant)

<table>
<thead>
<tr>
<th>Recommended lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molybdenum disulfide oil</td>
</tr>
</tbody>
</table>

EAS24320

CHECKING THE VALVE LIFTERS
The following procedure applies to all of the valve lifters.

1. Check:
   • Valve lifter
     Damage/scratches → Replace the valve lifters and cylinder head.

3. Install:
   • Valve “1”
   • Lower spring seat “2”
   • Valve stem seal “3”
   • Valve spring “4”
   • Upper spring seat “5”
     (into the cylinder head)
NOTE:

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

4. Install:
   - Valve cotters “1”

   **NOTE:**
   Install the valve cotters by compressing the valve springs with the valve spring compressor “2” and the valve spring compressor attachment.

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

   **CAUTION:**
   Hitting the valve tip with excessive force could damage the valve.

6. Lubricate:
   - Valve pad “1”
   - Valve lifter “2”
   (with the recommended lubricant)

   **Recommended lubricant**
   Molybdenum disulfide oil

7. Install:
   - Valve pad
   - Valve lifter

   **NOTE:**
   - The valve lifter must move smoothly when rotated with a finger.
   - Each valve lifter and valve pad must be reinstalled in its original position.
Removing the cylinder and piston

1 Cylinder
2 Dowel pin
3 Cylinder gasket
4 Piston pin clip
5 Piston pin
6 Piston
7 Piston ring set

For installation, reverse the removal procedure.

Order | Job/Parts to remove | Q’ty | Remarks
--- | --- | --- | ---
1 | Cylinder | 1 | Refer to “CYLINDER HEAD” on page 5-13.
2 | Dowel pin | 3 |
3 | Cylinder gasket | 1 |
4 | Piston pin clip | 8 |
5 | Piston pin | 4 |
6 | Piston | 4 |
7 | Piston ring set | 4 |

\[20 \text{ Nm (2.0 m\cdot kg, 15 ft\cdot lb)}\]
REMOVING THE PISTON

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

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

NOTE:
- Before removing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- Before removing the piston pin, deburr the piston pin clip’s groove and the piston’s pin bore area.

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

NOTE:
When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.

CHECKING THE CYLINDER AND PISTON

1. Check:
   - Piston wall
   - Cylinder wall

Vertical scratches → Rebore or replace the cylinder, and replace the piston and piston rings as a set.

2. Measure:
   - Piston-to-cylinder clearance

NOTE:
Measure cylinder bore “C” by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

<table>
<thead>
<tr>
<th>Cylinder bore “C” - Bore</th>
<th>79.000–79.010 mm (3.1102–3.1106 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taper limit</td>
<td>0.05 mm (0.0020 in)</td>
</tr>
<tr>
<td>Out of round limit</td>
<td>0.100 mm (0.0039 in)</td>
</tr>
<tr>
<td>Warp limit</td>
<td>0.03 mm (0.0012 in)</td>
</tr>
</tbody>
</table>

“C”=maximum of D1–D6
“T”=maximum of D1 or D2—maximum of D5 or D6
“R”=maximum of D1, D3 or D5—minimum of D2, D4 or D6

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

c. Measure piston skirt diameter “D” with the micrometer.
Cyliner and Piston

b. 5 mm (0.20 in) from the bottom edge of the piston

**Piston diameter “D”**
78.970–78.985 mm
(3.1090–3.1096 in)

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.

**Piston-to-cylinder clearance**
Cylinder bore “C” -
Piston skirt diameter “D”

**Piston-to-cylinder clearance** 0.015–0.040 mm (0.0006–0.0016 in)
Limit 0.15 mm (0.0059 in)

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

---

**CHECKING THE PISTON RINGS**

1. Measure:
   - Piston ring side clearance
     Out of specification → Replace the piston and piston rings as a set.

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

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

   **NOTE:**
   Level the piston ring into the cylinder with the piston crown.

3. Measure:
   - Piston ring end gap
     Out of specification → Replace the piston ring.

   **NOTE:**
   The oil ring expander spacer’s end gap cannot be measured. If the oil ring rail’s gap is excessive, replace all three piston rings.

---

**piston ring side clearance**
Top ring
Ring side clearance 0.045–0.080 mm (0.0018–0.0032 in)
Limit 0.100 mm (0.0039 in)
2nd ring
Ring side clearance 0.030–0.070 mm (0.0012–0.0028 in)
Limit 0.100 mm (0.0039 in)
CHECKING THE PISTON PIN

1. Check:
   - Piston pin
     Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.

2. Measure:
   - Piston pin outside diameter “a”
     Out of specification → Replace the piston pin.

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

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

INSTALLING THE PISTON AND CYLINDER

1. Install:
   - Top ring “1”
   - 2nd ring “2”
   - Lower oil ring rail “3”
   - Upper oil ring rail “4”
   - Oil ring expander “5”

   NOTE: 
   Be sure to install the piston rings so that the manufacturer’s marks face up.

Piston pin/piston pin hole clearance

0.004–0.024 mm
(0.00016–0.00094 in)
2. Install:
- Piston “1”
- Piston pin “2”
- Piston pin clips “3” New

**NOTE:**
- Apply engine oil the piston pin.
- Make sure the arrow mark “a” on the piston points towards the exhaust side of the engine.
- Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- Reinstall each piston into its original cylinder. (In order from left #1–#4).

3. Install:
- Cylinder gasket “1” New
- Dowel pins “2”

A. Exhaust side
B. Intake side
4. Lubricate:
   - Piston
   - Piston rings
   - Cylinder
   (Apply recommended lubricant)

<table>
<thead>
<tr>
<th>Recommended lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine oil</td>
</tr>
</tbody>
</table>

5. Offset:
   - Piston ring end gap

![Diagram]

a. Top ring
b. Lower oil ring rail
c. Upper oil ring rail
d. 2nd ring

A. Forward

6. Install:
   - Cylinder
## Generator Disassembly

Refer to "ENGINE REMOVAL" on page 5-1.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>End cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Brush holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Regulator</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rectifier cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rectifier</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Rear cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rotor assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bearing cover plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Bearing (drive side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bearing (slip ring side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Stator assembly</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

- 7 Nm (0.7 m·kg, 5 ft·lb)
- 25 Nm (2.5 m·kg, 18 ft·lb)
CHECKING THE GENERATOR

1. Remove:
   - End cover

2. Measure:
   - Stator coil resistance
     Out of specification → Replace the stator coil.

   Stator coil resistance
   0.19–0.21 Ω at 20°C

3. Check:
   - Brush dimensions
   - Brush spring force
     Over limit of use, off specification → Replace the brush and brush spring.

4. Measure:
   - Field coil (rotor) resistance
     Out of specification → Replace the rotor coil.

   Field coil (rotor) resistance
   2.75–3.04 Ω

---

Brush use limit
4.7mm (0.19 in)

Brush spring force
5.10–5.69 N (18.36–20.48 oz)
(520–580 gf)

---

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

Tester positive probe
White “1”
Negative tester probe
Black “2”

---

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

Tester positive probe
Inside spring “1”
Negative tester probe
Outside spring “2”

---

Tester positive probe
White “1”
Negative tester probe
Black “2”

---

Tester positive probe
White “1”
Negative tester probe
Black “3”

---

Brush use limit
4.7mm (0.19 in)

Brush spring force
5.10–5.69 N (18.36–20.48 oz)
(520–580 gf)
b. Measure the stator coil resistances.
Removing the timing plate

**Order** | **Job/Parts to remove**                           | **Q’ty** | **Remarks**
---|---|---|---
   | Seat/side cover                           |           | Refer to “GENERAL CHASSIS” on page 4-1.
   | Fuel tank                                 |           | Refer to “FUEL TANK” on page 6-1.
1  | Crankshaft position sensor lead coupler    | 1         | Disconnect.
2  | Timing plate cover                        | 1         |           
3  | Gasket                                    | 1         |           
4  | Crankshaft position sensor                | 1         |           
5  | Timing plate                              | 1         |           
6  | Dowel pin                                 | 1         |           
7  | Pickup base                               | 1         | For installation, reverse the removal procedure.

\[4 \text{Nm (0.4 m \cdot kg, 2.9 ft \cdot lb)}\]

\[7 \text{Nm (0.7 m \cdot kg, 5.1 ft \cdot lb)}\]

\[45 \text{Nm (4.5 m \cdot kg, 33 ft \cdot lb)}\]
Disassembling the starter motor

**Order**  | **Job/Parts to remove** | **Q'ty** | **Remarks**
---|---|---|---
Starter motor |  |  | Refer to “ENGINE REMOVAL” on page 5-1.
1 | Front bracket | 1 |  
2 | Washer kit | 1 |  
3 | Rear bracket | 1 |  
4 | Washer kit | 1 |  
5 | Brush holder/Brush | 1/1 |  
6 | Armature coil | 1 |  
7 | Stator assembly | 1 | For assembly, reverse the disassembly procedure.
CHECKING THE STARTER MOTOR

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

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

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

3. Measure:
   - Mica undercut “a.”
     Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

   **Mica undercut (depth)**
   - 0.70 mm (0.03 in)

**NOTE:**
The mica of the commutator must be undercut to ensure proper operation of the commutator.

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

   **Armature coil**
   - Commutator resistance “1”
     - 0.002 - 0.003 Ω 20°C
   - Insulation resistance “2”
     - Above 1 MΩ at 20°C (reference)

5. Measure:
   - Brush length “a”
     Out of specification → Replace the brushes as a set.

   **Limit**
   - 5.00 mm (0.20 in)

6. Measure:
   - Brush spring force
     Out of specification → Replace the brush springs as a set.

---

a. Measure the resistance “1” and mica “2” resistance with the pocket tester.

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

b. If any resistance is out of specification, replace the starter motor.
ELECTRIC STARTER

7. Check:
  - Gear teeth
    Damage/wear → Replace the gear.

ASSEMBLING THE STARTER MOTOR
1. Install:
   - Brush seat “1”

   NOTE: Align the tab “a” on the brush seat with the slot “b” in the starter motor rear cover.

2. Install:
   - Starter motor yoke “1”
   - Front bracket “2”
   - Rear bracket “3”

   NOTE: Align the match marks “a” on the starter motor yoke with the match marks “b” on the front and rear brackets.

INSTALLING THE STARTER MOTOR
1. Install:
   - Starter motor
   - Starter motor bolts

   STARTER MOTOR
   10 Nm (1.0 m•kg, 7.2 ft•lb)

2. Connect:
   - Starter motor lead
Removing the crankcase cover

Drain the engine oil. Refer to “ENGINE” on page 3-4.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Crankcase cover (right)</td>
<td>1</td>
<td>Refer to “ENGINE” on page 3-4.</td>
</tr>
<tr>
<td>2</td>
<td>Crankcase cover gasket (right)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Dowel pin</td>
<td>2</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

\[10 \text{Nm (1.0 m \cdot kg, 7.2 ft \cdot lb)} \]
Removing the clutch

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pressure plate 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Clutch spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Clutch spring seat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Pressure plate 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Short clutch push rod</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Ball</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Long clutch push rod</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Friction plate 1 (narrow)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Clutch plate</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Friction plate 2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Friction plate 3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Clutch boss nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Lock washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Clutch boss</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Wire circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Clutch plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Spring seat plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Friction plate 1 (narrow)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**T R.**

- 70 Nm (7.0 m·kg, 51 ft·lb)
- 8 Nm (0.8 m·kg, 5.8 ft·lb)
Removing the clutch

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Thrust plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Primary driven gear</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>
Removing the clutch 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>Clutch lever</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Clutch switch lead</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Clutch switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Copper washer/ Clutch hose</td>
<td>2/1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Master cylinder bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>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>

Drain the clutch fluid

Refer to "ENGINE" on page 3-4.

**T R.**

- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 30 Nm (3.0 m·kg, 22 ft·lb)
Disassembling the clutch 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>Master cylinder 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>Master cylinder kit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spring</td>
<td>1</td>
<td>For assembly, reverse the disassembly pro-</td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.
Removing the clutch release cylinder

Drain the clutch fluid Refer to "ENGINE" on page 3-4.

<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>Drain the clutch fluid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Clutch release cylinder bolt (long)/(short)</td>
<td>2/1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Clutch hose union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Copper washer</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spacers</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Clutch hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Clutch release 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>

\[30 \text{Nm (3.0 m} \cdot \text{kg, 22 ft} \cdot \text{lb)}\]

\[10 \text{Nm (1.0 m} \cdot \text{kg, 7.2 ft} \cdot \text{lb)}\]
Disassembling the clutch release 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>Clutch release cylinder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Piston seals</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Clutch release cylinder piston</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Piston seals</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.
REMOVING THE CLUTCH

1. Straighten the lock washer tab.
2. Loosen:
   - Clutch boss nut “1”

**NOTE:**
- While holding the clutch boss “3” with the universal clutch holder “2”, loosen the clutch boss nut.
- There is a built-in damper between the clutch boss “3” and the clutch plate. It is not necessary to remove the wire circlip “4” and disassemble the built-in damper unless there is serious clutch chattering.

3. Remove:
   - Spacer “1”
   - Bearing

**NOTE:**
Insert M6 bolts “2” into the spacer and then remove the spacer by pulling on the bolts.

CHECKING THE FRICTION PLATES

The following procedure applies to inspection of all friction plates.

1. Check:
   - Friction plate
     Damage/wear → Replace the friction plate as a set.

2. Measure:
   - Friction plate thickness
     Out of specification → Replace the friction plate as a set.

**NOTE:**
Measure the friction plate at four places.

<table>
<thead>
<tr>
<th>Friction plate thickness</th>
<th>Wear limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.90 – 3.10 mm (0.114 – 0.122 in)</td>
<td>2.80 mm (0.1102 in)</td>
</tr>
</tbody>
</table>
CHECKING THE CLUTCH PLATES
The following procedure applies to inspection of clutch plates.
1. Check:
   - Clutch plate
     Damage → Replace the clutch plate as a set.
2. Measure:
   - Clutch plate warpage
     (with a plate surface and thickness gauge “1”)
     Out of specification → Replace the clutch plate as a set.

CHECKING THE CLUTCH SPRING PLATE
1. Check:
   - Clutch spring
     Damage → Replace.
2. Check:
   - Clutch spring seat
     Damage → Replace.
3. Measure:
   - Clutch spring free height
     Out of specification → Replace the clutch spring plate.

<table>
<thead>
<tr>
<th>Clutch spring height</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.78 mm (0.27 in)</td>
</tr>
<tr>
<td>Limit</td>
</tr>
<tr>
<td>6.40 mm (0.25 in)</td>
</tr>
</tbody>
</table>

CHECKING THE CLUTCH HOUSING
1. Check:
   - Clutch housing dogs
     Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.
NOTE: Pitting on the clutch housing dogs will cause erratic clutch operation.
2. Check:
   - Bearing
     Damage/wear → Replace the bearing and clutch housing.

A. Friction plate 1 (narrow)
B. Friction plate 2
C. Friction plate 3

Warpage limit
0.10 mm (0.0039 in)
CHECKING THE CLUTCH BOSS
1. Check:
   • Clutch boss splines
     Damage/pitting/wear → Replace the clutch boss.

NOTE: Pitting on the clutch boss spline will cause erratic clutch operation.

CHECKING THE PRESSURE PLATE
1. Check:
   • Pressure plate
     Cracks/damage → Replace.
   • Bearing
     Damage/wear → Replace.

CHECKING THE CLUTCH PUSH RODS
1. Check:
   • O-ring “1”
   • Short clutch push rod “2”
   • Long clutch push rod “3”
   • Ball “4”
   • Bearing “5”
     Cracks/damage/wear → Replace the defective part(s).

2. Measure:
   • Long clutch push rod bending limit
     Out of specification → Replace.

INSTALLING THE CLUTCH
1. Install:
   • Clutch housing “1”

NOTE: Make sure the oil pump drive gear and primary driven gear are installed with the two projections meshed into the two slots respectively.

2. Install:
   • Bearing “1”
   • Spacer “2”
   • Thrust plate “3”

NOTE: Install the spacer with the two screw holes facing towards the clutch boss.
3. Install:
   - Friction plate 1 (narrow) “1”
   - Spring seat plate “2”
   - Spring “3”
   - Clutch plate “4”
   - Wire circlip “5”

**NOTE:**
Install spring “3” as shown in the illustration.

4. Install:
   - Clutch boss nut “1”

**NOTE:**
While holding the clutch boss with the universal clutch holder “2”, loosen the clutch boss nut.

5. Bend the lock washer tab along a flat side of the nut.

6. Lubricate:
   - Long clutch push rod “1”
   - Ball “2”
   - Short clutch push rod “3”

**NOTE:**
Insert the rounded end of the long clutch push rod into the clutch boss first.

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

7. Lubricate:
   - Friction plates 1, 2, 3
   - Clutch plates
   - (with the recommended lubricant)

**NOTE:**
First, install a friction plate and then alternate between a clutch plate and a friction plate.

<table>
<thead>
<tr>
<th>Universal clutch holder</th>
</tr>
</thead>
<tbody>
<tr>
<td>90890-04086</td>
</tr>
<tr>
<td>YM-91042</td>
</tr>
</tbody>
</table>

8. Install:
   - Friction plates 3 “1”
   - Friction plates 2 “2”
   - Friction plates 1 “3”
   - Clutch plates “4”

**NOTE:**
Tighten the clutch spring bolts in stages and in a crisscross pattern.

<table>
<thead>
<tr>
<th>Clutch spring bolts</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Nm (0.8 m•kg, 5.8 ft•lb)</td>
</tr>
</tbody>
</table>

9. Install:
   - Pressure plate “1”
   - Clutch plate spring “2”
   - Clutch springs “3”
   - Clutch spring bolts “4”

**NOTE:**
Tighten the clutch spring bolts in stages and in a crisscross pattern.
10. Install:
- Right crankcase cover
- Right crankcase cover gasket

**Right crankcase cover bolt**
10 Nm (1.0 m•kg, 7.2 ft•lb)

---

**DISASSEMBLING THE CLUTCH MASTER CYLINDER**

**NOTE:**
Before disassembling the clutch master cylinder, drain the clutch fluid from the entire clutch system.

1. Remove:
- Union bolt
- Copper washers
- Clutch hose

**NOTE:**
To collect any remaining clutch fluid, place a container under the master cylinder and the end of the clutch hose.

---

**CHECKING THE CLUTCH MASTER CYLINDER**

---

**ASSEMBLING THE CLUTCH MASTER CYLINDER**

**WARNING**
- Before installation, all internal clutch components must be cleaned and lubricated
with clean or new clutch fluid.

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

1. Install:
   - Master cylinder kit “1”
   - Circlip “2” New
   - Dust boot “3”

2. Install:
   - Copper washers New
   - Clutch hose “1”
   - Union bolt “2”

3. Install:
   - Clutch lever “1”

   NOTE:
   Lubricate the clutch lever pivot bolt with silicon grease.

4. Fill:
   Fill with the specified amount of recommended clutch fluid.
   - Clutch master cylinder reservoir

   WARNING
   - Use only the designated clutch fluid. Other clutch fluids may cause the rubber seals to deteriorate, causing leakage and poor clutch performance.
   - Refill with the same type of clutch fluid that

NOTE:
While holding the clutch hose, tighten the union bolt.

**Recommended fluid**

DOT 4

**Clutch hose union bolt**

30 Nm (3.0 m•kg, 22 ft•lb)

**WARNING**

Proper clutch hose routing is essential to ensure safe motorcycle operation. Refer to “CABLE ROUTING” on page 2-31.
is already in the system. Mixing clutch fluids may result in a harmful chemical reaction, leading to poor clutch performance.

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

**CAUTION:**

Clutch fluid may damage painted surfaces or plastic parts. Therefore, always clean up any split clutch fluid immediately.

**NOTE:**

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

5. Bleed:
   - Clutch system
     Refer to “BLEEDING THE HYDRAULIC CLUTCH SYSTEM” on page 3-16.

6. Check:
   - Clutch fluid level
     Below the minimum level mark “a” → Add the recommended clutch fluid to the proper level. Refer to “CHECKING THE CLUTCH FLUID LEVEL” on page 3-15.

7. Check:
   - Clutch lever operation
     Soft or spongy feeling → Bleed the clutch system.
     Refer to “BLEEDING THE HYDRAULIC CLUTCH SYSTEM” on page 3-16.

**DISASSEMBLING THE CLUTCH RELEASE CYLINDER**

1. Remove:
   - Oil seal “1”
   - Clutch release cylinder piston “2”
   - Spring “3”
   - Piston seal “4”

a. Blow compressed air into the bleed screw of the clutch hose joint opening to force out the piston from the clutch release cylinder.

**WARNING**

- Cover the clutch release cylinder with a rag. Be careful not to get injured when the piston is expelled from the clutch release cylinder.
- Never try to pry out the clutch release cylinder piston.

b. Remove the clutch release cylinder piston seals.

**CHECKING THE CLUTCH RELEASE CYLINDER**

1. Check:
   - Clutch release cylinder body
     Cracks/damage → Replace the clutch release cylinder.
   - Clutch release cylinder “1”
   - Clutch release cylinder piston “2”
     Rust/scratches/wear → Replace the clutch release cylinder and clutch release cylinder piston as a set.
ASSEMBLING THE CLUTCH RELEASE CYLINDER

**WARNING**
- Before installation, all internal clutch components must be cleaned and lubricated with clean or new clutch fluid.
- Never use solvent on internal clutch components as they will cause the piston seal to swell and distort.
- Whenever a clutch release cylinder is disassembled, replace the piston seal.

1. Install:
   - Piston seal “1” New
   - Spring “2”
   - Release cylinder piston “3”
   - Oil seal “4” New

2. Fill:
   Fill with the specified amount of recommended clutch fluid.
   - Clutch master cylinder reservoir

INSTALLING THE CLUTCH RELEASE CYLINDER

1. Check:
   - Copper washers New
   - Clutch hose “1”
   - Union bolt “2”

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

**CAUTION:**
Clutch fluid may damage painted surfaces or plastic parts. Therefore, always clean up any spilled clutch fluid immediately.

**NOTE:**
In order to ensure a correct reading of the clutch fluid level, make sure the top of the reservoir is horizontal.
3. Bleed:
   - Clutch system
     Refer to “BLEEDING THE HYDRAULIC CLUTCH SYSTEM” on page 3-16.

4. Check:
   - Clutch fluid level
     Below the minimum level mark “a” → Add the recommended clutch fluid to the proper level.
     Refer to “CHECKING THE CLUTCH FLUID LEVEL” on page 3-15.

5. Check:
   - Clutch lever operation
     Soft or spongy feeling → Bleed the clutch system.
     Refer to “BLEEDING THE HYDRAULIC CLUTCH SYSTEM” on page 3-16.
Removing the oil pump

Order | Job/Parts to remove       | Q'ty | Remarks
--- | -------------------------- | ---- | ------------------
1 | Oil pump drive gear       | 1   | Refer to “CLUTCH” on page 5-37.
2 | Collar                    | 1   |                    
3 | Washer                    | 1   |                    
4 | Oil buffer plate          | 1   |                    
5 | Circlip                   | 1   |                    
6 | Oil pump driven gear      | 1   |                    
7 | Plate washer              | 1   |                    
8 | Oil pump assembly         | 1   |                    
9 | Dowel pin                 | 1   |                    
10 | Collar                    | 1   |                    
11 | O-ring                    | 3   | For installation, reverse the removal procedure.

\[4 \text{Nm} \ (0.4 \text{ m} \cdot \text{kg}, \ 2.9 \text{ ft} \cdot \text{lb})\]

\[10 \text{Nm} \ (1.0 \text{ m} \cdot \text{kg}, \ 7.2 \text{ ft} \cdot \text{lb})\]
Disassembling the oil pump

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>Rotor housing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Inner rotor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Outer rotor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dowel pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dowel pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Housing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Inner rotor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Outer rotor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Dowel pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Pump shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Pump cover</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

7 Nm (0.7 m · kg, 5.2 ft · lb)
DISASSEMBLING THE OIL PUMP
1. Remove:
   - Screw
   - Oil pump drive gear “1”
   - Oil pump driven gear “2”
   - Oil pump housing “3”
   - Oil pump housing cover “4”

CHECKING THE OIL PUMP
1. Check:
   - Oil pump drive gear “1”
   - Oil pump driven gear “2”
   - Oil pump housing “3”
   - Oil pump housing cover “4”
   Cracks/damage/wear → Replace.

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.

ASSEMBLING THE OIL PUMP
1. Lubricate:
   - Inner rotor
   - Outer rotor
   - Oil pump shaft
   (with the recommended lubricant)
2. Install:
- Oil pump shaft “1”
  (to the oil pump cover “2”)
- Pin “3”
- Inner rotor “4”
- Outer rotor “5”
- Pin “6”
- Oil pump housing “7”

**NOTE:**
When installing the inner rotor, align the pin “3” in the oil pump shaft with the groove “a” in the inner rotor “4”.

3. Check:
- Oil pump operation
  Refer to “CHECKING THE OIL PUMP” on page 5-55.

**INSTALLING THE OIL PUMP**

1. Install:
- Oil pump “1”

**CAUTION:**
After tightening the bolts, make sure the oil pump turns smoothly.

**NOTE:**
Align the arrow mark “a” on the oil pump with the arrow mark “b” on the crankcase.
### Removing the shift shaft and stopper lever

**Order**

<table>
<thead>
<tr>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil pump</td>
<td></td>
<td>Refer to &quot;OIL PUMP&quot; on page 5-53.</td>
</tr>
<tr>
<td>Drive sprocket cover</td>
<td></td>
<td>Refer to &quot;ENGINE REMOVAL&quot; on page 5-1.</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

- **10 Nm (1.0 m • kg, 7.2 ft • lb)**
CHECKING THE SHIFT SHAFT
1. Check:
- Shift shaft “1”
- Shift shaft lever
  Bends/damage/wear → Replace.
- Shift shaft lever spring
  Damage/wear → Replace.

CHECKING THE STOPPER LEVER
1. Check:
- Stopper lever “1”
  Bends/damage → Replace.
- Roller turns roughly → Replace the stopper lever.

INSTALLING THE SHIFT SHAFT
1. Install:
- Stopper lever “1”
- Stopper lever spring “2”
- Shift shaft lever “3”

NOTE:
- Hook the ends “4” of the stopper lever spring onto the stopper lever and the crankcase boss.
- Mesh the stopper lever with the shift drum segment assembly.
## Removing the Oil Pan

For installation, reverse the removal procedure.

### Order | Job/Parts to remove | Q’ty | Remarks
--- | --- | --- | ---
| | Engine | | Refer to "ENGINE REMOVAL" on page 5-1. |
| 1 | Oil level switch/O-ring | 1/1 | |
| 2 | Oil pan | 1 | |
| 3 | Dowel pin | 2 | |
| 4 | Oil pan gasket | 1 | |
| 5 | Relief valve (Large)/O-ring | 1/1 | |
| 6 | Relief valve (Small)/O-ring | 1/1 | |
| 7 | Oil strainer | 1 | |
| 8 | Oil strainer housing | 1 | |
| 9 | Gasket | 1 | |
OIL PAN

REMOVING THE OIL PAN
1. Remove:
   - Oil level switch
   - Oil pan
   - Gasket
   - Dowel pins

CHECKING THE RELIEF VALVE
1. Check:
   - Relief valve body “1”
   - Relief valve “2”
   - Spring “3”
   - Cover “4”
   - O-ring “5”
   Damage/wear → Replace.

CHECKING THE OIL STRAINER
1. Check:
   - Oil strainer “1”
     Damage → Replace.
     Contaminants → Clean with solvent.

INSTALLING THE OIL STRAINER
1. Install:
   - Oil strainer housing “1”

   Oil strainer housing
   10 Nm (1.0 m•kg, 7.2 ft•lb)
   (Apply the LOCTITE®)

NOTE:
Install with the oil strainer housing arrow mark

“a” facing forward.

INSTALLING THE OIL PAN
1. Install:
   - Dowel pins
   - Gasket
   - Oil pan
   - Oil level switch
   - Engine oil drain bolt

   Oil pump mounting bolt
   10 Nm (1.0 m•kg, 7.2 ft•lb)

NOTE:
Tighten the oil pump mounting bolts in two stages and in a crisscross pattern.

NOTE:
Tighten the oil pump mounting bolts in two stages and in a crisscross pattern.
## Separating the crankcase

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Engine</td>
<td></td>
<td>Refer to &quot;ENGINE REMOVAL&quot; on page 5-1.</td>
</tr>
<tr>
<td></td>
<td>Camshaft</td>
<td></td>
<td>Refer to &quot;CAMSHAFTS&quot; on page 5-5.</td>
</tr>
<tr>
<td></td>
<td>Cylinder head</td>
<td></td>
<td>Refer to &quot;CYLINDER HEAD&quot; on page 5-13.</td>
</tr>
<tr>
<td></td>
<td>Cylinder(s) and piston(s)</td>
<td></td>
<td>Refer to &quot;CYLINDER AND PISTON&quot; on page 5-24.</td>
</tr>
<tr>
<td></td>
<td>Clutch</td>
<td></td>
<td>Refer to &quot;CLUTCH&quot; on page 5-37.</td>
</tr>
<tr>
<td></td>
<td>Oil pump</td>
<td></td>
<td>Refer to &quot;OIL PUMP&quot; on page 5-53.</td>
</tr>
<tr>
<td></td>
<td>Shift shaft</td>
<td></td>
<td>Refer to &quot;SHIFT SHAFT&quot; on page 5-57.</td>
</tr>
<tr>
<td></td>
<td>Timing plate/crankshaft position sensor</td>
<td></td>
<td>Refer to &quot;TIMING PLATE&quot; on page 5-33.</td>
</tr>
<tr>
<td></td>
<td>Oil pan</td>
<td></td>
<td>Refer to &quot;OIL PAN&quot; on page 5-59.</td>
</tr>
<tr>
<td>1</td>
<td>Spring/Rod</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Timing chain guide (intake side)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bearing cover plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Lower crankcase</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dowel pin</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

**Torque Values:**
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 24 Nm (2.4 m·kg, 17 ft·lb)
- 35 Nm (3.5 m·kg, 25 ft·lb)
- 12 Nm (1.2 m·kg, 8.7 ft·lb)
DISASSEMBLING THE CRANKCASE

1. Remove:
   - Crankcase bolts

   NOTE:
   - 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.
   - Loosen the bolts in decreasing numerical order. (Refer to illustration)
   - The numbers embossed on the crankcase indicate the crankcase tightening sequence.

2. Place the engine upside down.

3. Remove:
   - Lower crankcase

   CAUTION:
   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.

   - M8 x 100mm bolt “1”–“10”
   - M8 x 45mm bolt “11”–“15”
   - M10 x 50mm bolt “16”, “17”
   - M6 x 110mm bolt “18”
   - M6 x 95mm bolt “19”, “21”
   - M6 x 40mm bolt “20”, “23”
   - M6 x 50mm bolt “22”, “26”
   - M6 x 65mm bolt “25”, “37”
   - M6 x 30mm bolt “27”
   - M8 x 55mm bolt “28”, “30”
   - M6 x 125mm bolt “24”
   - M6 x 70mm bolt “31”
   - M10 x 60mm bolt “32”, “34”
   - M6 x 55mm bolt “35”, “36”

4. Remove:
   - Dowel pins

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. Lubricate:
   - Crankshaft journal bearings
     (with the recommended lubricant)

<table>
<thead>
<tr>
<th>Recommended lubricant</th>
<th>Engine oil</th>
</tr>
</thead>
</table>

2. Apply:
   - Yamaha bond No. 1215 (Three Bond No. 1215®)
     (onto the crankcase mating surfaces)
NOTE:
Apply a thin, even layer of Yamaha Bond 1215 to the upper crankcase
- No application required "1" (slanted line section)
- Apply all around the top and bottom case tightening bolts (star mark "a") "2"
- Keep out of the lower case O-ring groove "3"
- Crankcase oil passages "4"

CAUTION:
Before tightening the crankcase bolts, make sure the transmission gears shift correctly when the shift drum assembly is turned by hand.

NOTE:
Carefully position the shift forks so that they are installed correctly into the transmission gears.
Refer to "TRANSMISSION" on page 5-77.

3. Install:
   - Dowel pin
4. Set the shift drum assembly and transmission gears in the neutral position.
5. Install:
   - Lower crankcase "1"
     (onto the upper crankcase "2")

6. Install:
   - Crankcase bolts

<table>
<thead>
<tr>
<th>Bolt Description</th>
<th>Torque Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crankcase bolt &quot;1&quot;–&quot;15&quot;, &quot;28&quot;, &quot;30&quot; (M8)</td>
<td>24 Nm (2.4 m•kg, 17 ft•lb)</td>
</tr>
<tr>
<td>Crankcase bolt &quot;16&quot;, &quot;17&quot;, &quot;32&quot;, &quot;34&quot; (M10)</td>
<td>35 Nm (3.5 m•kg, 25 ft•lb)</td>
</tr>
<tr>
<td>Crankcase bolt &quot;18&quot;–&quot;27&quot;, &quot;29&quot;, &quot;31&quot;, &quot;35&quot;–&quot;37&quot; (M6)</td>
<td>12 Nm (1.2 m•kg, 8.7 ft•lb)</td>
</tr>
</tbody>
</table>

NOTE:
- Tighten the bolts in the tightening sequence cast on the crankcase.
- "35" and "36" tighten with clamp, "1", "3", "5", "7"–" and 10" have washers "37" is tightened with negative lead and "2", "4" and "6" have no washers.
- M8x100mm bolt "1"–"10"
- M8x45mm bolt "11", "15"
- M10×50mm bolt “16”, “17”
- M6 ×110mm bolt “18”
- M6 ×95mm bolt “19”, “21”
- M6 ×40mm bolt “20”, “23”
- M6 ×50mm bolt “22”, “26”
- M6 ×65mm bolt “25”, “37”
- M6 ×30mm bolt “27”
- M8×55mm bolt “28”, “30”
- M6 ×125mm bolt “24”
- M6 ×70mm bolt “31”
- M10×60mm bolt “32”, “34”
- M6 ×55mm bolt “35”, “36”

A. Upper crankcase
B. Lower crankcase
Removing the starter clutch

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bearing housing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Nozzle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Shaft 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Starter clutch drive gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Starter clutch gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Starter clutch roller</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Stopper plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Shaft 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Starter clutch idle gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Bearing</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
</tbody>
</table>

Separate
Refer to “CRANKCASE” on page 5-61.

10 Nm (1.0 m·kg, 7.2 ft·lb)
CHECKING THE STARTER CLUTCH

1. Check:
   - Starter clutch rollers “1”
     Damage/wear → Replace.
   - Starter clutch gear “2”
   - Starter clutch drive gear “3”
   - Starter clutch idle gear “4”
     Burrs/chips/roughness/wear → Replace the defective part(s).

2. Check:
   - Starter clutch gear’s contacting surfaces
     Damage/pitting/wear → Replace the starter clutch gear.

3. Check:
   - Starter clutch operation

   a. Install the starter clutch drive gear “1” onto the starter clutch “2” and hold the starter clutch.
   b. When turning the starter clutch gear clockwise “A”, the starter clutch and the starter clutch gear should engage. Otherwise the starter clutch is faulty and must be replaced.
   c. When turning the starter clutch gear counter-clockwise “B", it should turn freely. Otherwise the starter clutch is faulty and must be replaced.

CHECKING THE STARTER CLUTCH SHAFT

1. Check:
   - Starter clutch shaft “1”
   - Starter clutch shaft spline “2”
     Damage/wear → Replace the starter clutch shaft.
   - Oil passages “3”
     Dirt/obstruction → Wash the generator shaft and then blow out the oil passages with compressed air.
   - Bearing “4”
     Incorrect → Change.

INSTALLING THE STARTER CLUTCH ROLLER

1. Install:
   - Starter clutch drive gear “1”
   - Starter clutch roller “2”
   - Circlip “3”
Removing the crankshaft assembly

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Starter clutch</td>
<td></td>
<td>Refer to “STARTER CLUTCH” on page 5-65.</td>
</tr>
<tr>
<td>1</td>
<td>Crankshaft assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Oil seal (left)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Timing chain</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>HY-VO chain</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Crankshaft plane bearing</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Upper guide</td>
<td>1</td>
<td>For installation, reverse the removal proce-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dure.</td>
</tr>
</tbody>
</table>
Removing the connecting rod

Order | Job/Parts to remove     | Q'ty | Remarks
--- | ------------------------|-----|-------------------
1    | Nut                     | 8   |                   
2    | Connecting bolt         | 8   |                   
3    | Connecting rod          | 4   |                   
4    | Connecting rod cap      | 4   |                   
5    | Connecting rod bearing  | 8   |                   

For installation, reverse the removal procedure.

36 Nm (3.6 m·kg, 26 ft·lb)
CRANKSHAFT ASSEMBLY

REMOVING THE CRANKSHAFT ASSEMBLY
1. Remove:
   • Crankshaft assembly “1”
   • Crankshaft journal upper bearings (from the upper crankcase)

NOTE: Identify the position of each crankshaft journal lower bearing so that it can be reinstalled in its original place.

REMOVING THE CONNECTING RODS
The following removal procedure applies to both connecting rods.
1. Remove:
   • Connecting rod “1”
   • Big end bearings

NOTE: Identify the position of each big end bearing so that it can be reinstalled in its original place.

CHECKING THE CRANKSHAFT AND CONNECTING RODS
1. Measure:
   • Crankshaft runout
     Out of specification ➔ Replace the crankshaft.

   Crankshaft runout
   0.020 mm (0.0008 in)

   Journal oil clearance (using plastigauge®)
   0.020–0.044 mm (0.0008–0.0017 in)
   Wear limit
   0.09 mm (0.0035 in)

CAUTION:
Do not interchange the crankshaft journal bearings. To obtain the correct crankshaft-journal-to-crankshaft-journal bearing clearance and prevent engine damage, the crankshaft journal bearings must be installed in their original positions.

\[a.\] Clean the crankshaft journal bearings, crankshaft journals, and bearing portions of the crankcase.
[b. Place the upper crankcase upside down on a bench.
[c. Install the crankshaft journal upper bearings “1” and the crankshaft into the upper crankcase.

NOTE: Align the projections “a” on the crankshaft journal upper bearings with the notches “b” in the upper crankcase.
d. Put a piece of Plastigauge® “2” on each crankshaft journal.

**NOTE:**
Do not put the Plastigauge® over the oil hole in the crankshaft journal.

e. Install the crankshaft journal lower bearings into the lower crankcase and assemble the crankcase halves.

**NOTE:**
- Align the projections “c” of the crankshaft journal lower bearings with the notches “d” in the lower crankcase.
- Do not move the crankshaft until the clearance measurement has been completed.

f. Assemble the crankcase and tighten bolts to the specified torque.

---

**CRANKCASE ASSEMBLY**

<table>
<thead>
<tr>
<th>Crankcase bolt “1”–“15”, “28”, “30” (M8)</th>
<th>24 Nm (2.4 m•kg, 17 ft•lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crankcase bolt “16”–“17”, “32”, “34” (M10)</td>
<td>35 Nm (3.5 m•kg, 25 ft•lb)</td>
</tr>
<tr>
<td>Crankcase bolt “18”–“27”, “29”, “31” “35”–“37” (M6)</td>
<td>12 Nm (1.2 m•kg, 8.7 ft•lb)</td>
</tr>
</tbody>
</table>

**NOTE:**
- Tighten the bolts in the tightening sequence cast on the crankcase.
- “35” and “36” tighten with clamp, “1”, “3”, “5”, “7”–“10” have copper washers, “37” is tightened with negative lead, and “2”, “4” and “6” have no washers.

- M8×100mm bolt “1”–“10”
- M8×45mm bolt “11”–“15”
- M10×50mm bolt “16”, “17”
- M6×110mm bolt “18”
- M6×95mm bolt “19”, “21”
- M6×40mm bolt “20”, “23”
- M6×50mm bolt “22”, “26”
- M6×65mm bolt “25”, “37”
- M6×30mm bolt “27”
- M8×55mm bolt “28”, “30”
- M6×125mm bolt “24”
- M6×70mm bolt “31”
- M10×60mm bolt “32”, “34”
- M6×55mm bolt “35”, “36”
g. Remove the lower crankcase and the crankshaft journal lower bearings.
h. Measure the compressed Plastigauge® width “e” on each crankshaft journal.
If the crankshaft-journal-to-crankshaft-journal-bearing clearance is out of specification, select replacement crankshaft journal bearings.

i. Select:
* Crankshaft journal bearings (J₁–J₅)

**NOTE:**
* The numbers “A” stamped into the crankshaft web and the numbers “1” on the crankcase are used to determine the replacement big end bearing sizes.
* J₁–J₅ refer to the bearings shown in the crankshaft illustration.
* If J₁–J₅ are the same, use the same size for all

<table>
<thead>
<tr>
<th>Bearing color code</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blue</td>
</tr>
<tr>
<td>2</td>
<td>Black</td>
</tr>
<tr>
<td>3</td>
<td>Brown</td>
</tr>
<tr>
<td>4</td>
<td>Green</td>
</tr>
<tr>
<td>5</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

For example, if the crankcase J₁ and crankshaft web J₁; numbers are 6 and 2 respectively, then the bearing size for J₁ is as follows:

J₁ (crankcase) - J₁ (crankshaft web) = 6 - 2 = 4 (green)
4. Measure:
- Crankshaft pin-to-big end bearing clearance
  Out of specification → Replace the big end bearings.

Crankshaft pin-to-big end bearing clearance
0.021–0.045 mm (0.0008–0.0018 in)
Wear limit
0.08 mm (0.0032 in)

---

**CAUTION:**
Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.

a. Clean the big end bearings, crankshaft pins, and the inside of the connecting rods halves.
b. Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

**NOTE:**
Align the projections “a” on the big end bearings with the notches “b” in the connecting rod and connecting rod cap.

c. Put a piece of Plastigauge® “1” on the crankshaft pin.

d. Assemble the connecting rod halves.

**NOTE:**
- Do not move the connecting rod and crankshaft until the clearance measurement has been completed.
- Lubricate the bolt threads and nut seats with molybdenum disulfide grease.
- Make sure the “Y” mark “c” on the connecting rod faces towards the left side of the crankshaft.
- Make sure the characters “d” on both the connecting rod and connecting rod cap are aligned.

e. Tighten the connecting rod nuts.

**CAUTION:**
- When tightening the connecting rod nuts, be sure to use an F-type torque wrench.
- Without pausing, tighten the connecting rod nuts to the specified torque. Tighten to a torque of 30 Nm (3.0 m•kg). When the gauge reading reaches 30 Nm (3.0 m•kg), tighten in one to specification. If tightening is interrupted, tighten again from the beginning.

Refer to “INSTALLING THE CONNECTING RODS” on page 5-74.

**NOTE:**
- If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.

---

**Connecting rod nut**
36 Nm (3.6 m•kg, 26 ft•lb)
5. Select:
× Big end bearings (P₁–P₄)

**NOTE:**
× The numbers “A” stamped into the crankshaft web and the numbers “1” on the connecting rod big ends are used to determine the replacement big end bearing sizes.
× P₁–P₄ refer to the bearings shown in the crankshaft illustration.

For example, if the connecting rod P₁ and the crankshaft web P₁ numbers are 4 and 1 respectively, then the bearing size for P₁ is as follows: J₁ bearing size:

<table>
<thead>
<tr>
<th>Bearing color code</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>P</td>
</tr>
<tr>
<td>1</td>
<td>Blue</td>
</tr>
<tr>
<td>2</td>
<td>Black</td>
</tr>
<tr>
<td>3</td>
<td>Brown</td>
</tr>
</tbody>
</table>

**CHECKING THE HY-VO CHAIN**

1. Check:
× HY-VO chain “1”
  Damage/stiffness → Replace the HY-VO chain and sprockets as a set.

2. Check:
× HY-VO chain guide
  Damage/wear → Replace.

**INSTALLING THE CONNECTING RODS**

1. Lubricate:
× Bolt threads
× Nut seats
  (with the recommended lubricant)

2. Lubricate:
× Crankshaft pins
× Big end bearings
× Connecting rod inner surface
  (with the recommended lubricant)

3. Install:
× Big end bearings “1”
× Connecting rods “2”
× Connecting rod bolt “3”

**Recommended lubricant**

- Molybdenum disulfide grease
- Engine oil
NOTE:

- Align the projections “a” on the big end bearings with the notches “b” in the connecting rod and connecting rod cap.
- Be sure to reinstall each big end bearing in its original place.
- Make sure the “Y” mark “c” on the connecting rod faces towards the left side of the crankshaft.
- Make sure the characters “d” on both the connecting rod and connecting rod cap are aligned.

4. Align:
   - Bolt heads “1” (with the connecting rod caps)

5. Tighten:
   - Connecting rod nuts

<table>
<thead>
<tr>
<th>Connecting rod nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 Nm (3.6 m•kg, 26 ft•lb)</td>
</tr>
</tbody>
</table>

CAUTION:
- When tightening the connecting rod nuts, be sure to use an F-type torque wrench.
- Without pausing, tighten the connecting rod nuts to the specified torque. Tighten to a torque of 30 Nm (3.0 m•kg). When the gauge reading reaches 30 Nm (3.0 m•kg), tighten in one to specification. If tightening is interrupted, tighten again from the beginning.

INSTALLING THE CRANKSHAFT JOURNAL BEARING
1. Install:
   - Crankshaft journal bearings

NOTE:
Align the projections “a” on the crankshaft journal lower bearings with the slots “b” in the lower crankcase.
CRANKSHAFT ASSEMBLY

INSTALLING THE CRANKSHAFT

1. Install:
   - Crankshaft journal upper bearings
     (into the upper crankcase)

   **NOTE:**
   - Align the projections "a" on the crankshaft journal upper bearings with the notches "b" in the upper crankcase.
   - Be sure to install each crankshaft journal upper bearing in its original place.

2. Install:
   - HY-VO chain “1”
     (onto the crankshaft sprocket)
   - Timing chain “2”
     (onto the crankshaft sprocket)
   - Crankshaft assembly “3”

   **NOTE:**
   - Pass the timing chain through the timing chain cavity.
   - To prevent the timing chain from falling into the crankcase, fasten it with a wire.
# REMOVING THE TRANSMISSION

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Main axle assembly</td>
<td>1</td>
<td>Separate Refer to “CRANKCASE” on page 5-61.</td>
</tr>
<tr>
<td>2</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Drive axle assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oil seal</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>Bearing</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
Removing the shift drum 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>Shift fork guide bar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Shift fork 1 (L)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Shift fork 2 (C)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Shift fork 3 (R)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Stopper plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Shift cam</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
Disassembling the transmission

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plate washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1st wheel gear/Collar</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Plate washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4th wheel gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Plate washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>3rd wheel gear/Collar</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Plate washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>5th wheel gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Plate washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>2nd wheel gear/Collar</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Drive axle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>2nd Pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>5th Pinion gear/Collar</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Plate washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>3rd Pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Plate washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>4th Pinion gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Main axle</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Disassembling the transmission

For installation, reverse the removal procedure.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>
CHECKING THE SHIFT FORKS

The following procedure applies to checks and adjustments of all shift fork related parts.

1. Check:
   - Shift fork cam follower “1"
   - Shift fork pawl “2"
     Bends/damage/scoring/wear → Replace the shift fork.

2. Check:
   - Shift fork guide bar
     Roll the shift fork guide bar on a flat surface.
     Bends → Replace.

   **WARNING**
   Do not attempt to straighten a bent shift fork guide bar.

3. Check:
   - Shift fork movement
     (along the shift fork guide bar)
     Rough movement → Replace the shift forks and shift fork guide bar as a set.

CHECKING THE TRANSMISSION

1. Measure:
   - Main axle runout
     (with a centering device and dial gauge “1”)
     Out of specification → Replace the main axle.

   **Main axle runout limit 0.60 mm (0.0236 in)**

2. Measure:
   - Drive axle runout
     (with a centering device and dial gauge “1”)
     Out of specification → Replace the drive axle.

   **Drive axle runout limit 0.60 mm (0.0236 in)**

3. Check:
   - Transmission gears
     Blue discoloration/pitting/wear → Replace.
   - Transmission gear dogs
     Cracks/damage/wear → Replace.
4. Check:
- Transmission gear engagement
  (each pinion gear to its respective wheel gear)
  Rough operation → Reassemble the transmission axle assemblies.

5. Check:
- Transmission gear movement
  Rough movement → Replace the defective part(s).

6. Check:
- Circlips
  Bends/damage/looseness → Replace.

### INSTALLING THE SHIFT FORKS AND SHIFT DRUM

1. Install:
- Shift drum assembly “1”
- Shift fork guide bars “2”
- Shift fork-R “3”
- Shift fork-C “4”
- Shift fork-L “5”

**NOTE:**
The embossed marks on the shift forks should face towards the right side of the engine and be in the following sequence. “R”, “C” and “L”.

### INSTALLING THE TRANSMISSION

1. Install:
- Main axle assembly “1”
- Drive axle assembly “2”

**NOTE:**
- Check that the drive axle bearing circlip “3” is aligned with the slot in the “4” upper crankcase.
- Check that the drive axle bearing pin “5” is aligned with the notch in the upper crankcase.
- Check that the main axle bearing pin “6” is aligned with the hole in the upper crankcase.
2. Check:
   • Transmission gear movement
     Rough movement → Repair.

**NOTE:**
Oil each gear, shaft, and bearing thoroughly.
FUEL SYSTEM

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   REMOVING THE FUEL PUMP ................................................................. 6-2
   CHECKING THE FUEL PUMP BODY ..................................................... 6-2
   INSTALLING THE FUEL PUMP ............................................................... 6-2
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## Removing the fuel tank

### Order

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seat/side cover (right/left)</td>
<td>1</td>
<td>Refer to “GENERAL CHASSIS” on page 4-1.</td>
</tr>
<tr>
<td>2</td>
<td>Fuel tank</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fuel pump coupler/fuel sender coupler</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fuel return hose/clip</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fuel hoses</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Fuel drain hose/clip</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Stopper ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Fuel pump assembly</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- **4 Nm (0.4 m·kg, 2.9 ft·lb)**
- **19 Nm (1.9 m·kg, 14 ft·lb)**

For installation, reverse the removal procedure.
REMOVING THE FUEL TANK
1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
   - Fuel return hose
   - Fuel hose

CAUTION:
Although the fuel has been removed from the fuel tank be careful when removing the fuel hoses, since there may be fuel remaining in it.

NOTE:
- Slide the fuel hose connector cover “1” in the direction of the arrow mark, and press the buttons “2” on both sides of the connector to remove the fuel hose.
- Disconnecting the hose is done by hand. There is no need to use tools.
- Before removing the hoses, place a few rags in the area under where it will be removed.

3. Remove:
   - Fuel tank

NOTE:
Do not set the fuel tank down so that the installation surface of the fuel pump is directly under the tank. Be sure to lean the fuel tank in an upright position.

REMOVING THE FUEL PUMP
1. Remove:
   - Fuel pump

CAUTION:
Do not drop the fuel pump or subject it to a strong shock.

CHECKING THE FUEL PUMP BODY
1. Check:
   - Fuel pump body

Contaminants ➔ Clean the fuel pump passage.
Rust/scratches/wear ➔ Replace the fuel pump assembly.

INSTALLING THE FUEL TANK
1. Install:
   - Fuel hose
   - Fuel return hose

NOTE:
- Insert the fuel hose on the fuel pipe until you hear a definite “click.”
- Slide the fuel hose connector cover “1” at the...
fuel hose end in the direction of the arrow.
## Removing the Throttle Bodies

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to Remove</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Battery negative lead</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>2</td>
<td>Battery positive lead</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>3</td>
<td>Battery</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Air filter mounting bolt</td>
<td>3</td>
<td>Loosen the 2 rear bolts.</td>
</tr>
<tr>
<td>5</td>
<td>Throttle position sensor coupler/ISC motor coupler/Sub-throttle motor coupler/Sub-throttle position sensor coupler</td>
<td>1/1/1/1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>6</td>
<td>Throttle body side cover left/right</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>ISC hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Throttle body joint clamp screw</td>
<td>4</td>
<td>Loosen</td>
</tr>
<tr>
<td>9</td>
<td>Throttle body joint clamp screw</td>
<td>8</td>
<td>Loosen</td>
</tr>
<tr>
<td>10</td>
<td>Throttle body assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Throttle body joint</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Breather hose/breather assembly</td>
<td>2/1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Intake air pressure sensor 1 coupler/intake air pressure sensor 2 coupler</td>
<td>1/1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>14</td>
<td>Intake air pressure sensor 1/intake air pressure sensor 2</td>
<td>1/1</td>
<td></td>
</tr>
</tbody>
</table>
Removing the throttle bodies

**Order** | **Job/Parts to remove** | **Q'ty** | **Remarks**
---|---|---|---
15 | Throttle cable | 2 | For installation, reverse the removal procedure.
16 | Sub-throttle cover | 1 | 
17 | Sub-throttle link | 1 | 
18 | Sub-throttle motor assembly | 1 | 
19 | Throttle position sensor | 1 | 

**T R.** 4 Nm (0.4 m • kg, 2.9 ft • lb)

**T R.** 3 Nm (0.3 m • kg, 2.2 ft • lb)

**T R.** 4 Nm (0.4 m • kg, 2.9 ft • lb)

**T R.** 7 Nm (0.7 m • kg, 5.1 ft • lb)
Removing the fuel hoses and injectors

<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>Fuel return hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Fuel hose 1/fuel hose 2</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Injector coupler</td>
<td>4</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>4</td>
<td>Left fuel rail</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Pressure regulator</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Right fuel rail</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Injector</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Vacuum hose</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

- Torque: 4 Nm (0.4 m·kg, 2.9 ft·lb)
- Torque: 5 Nm (0.5 m·kg, 3.6 ft·lb)
CHECKING THE INJECTORS
1. Check:
   - Injectors
     Damage → Replace.

CHECKING THE THROTTLE BODIES
1. Check:
   - Throttle bodies
     Rust/scratches/wear → Replace the throttle body assembly.
2. Check:
   - Fuel passages
     Contaminants → Clean the throttle body passages.

a. Wash the throttle bodies in a petroleum-based solvent.
   Do not use carburetor cleaner.
b. Blow out all of the passages with compressed air.

c. Connect the pressure gauge “3” and adapter “4” to the fuel injection pipe.

d. Connect the pressure gauge “3” and adapter “4” to the fuel injection pipe.

e. Install the fuel tank.
   Refer to “FUEL TANK” on page 6-1.
f. Start the engine.
g. Measure the fuel pressure.

h. Use the vacuum/pressure gauge set to change the vacuum pressure, and check that the fuel pressure is correctly adjusted to the vacuum pressure state.

NOTE:
The vacuum pressure should not exceed 100 kPa (760 mm Hg).

CHECKING THE PRESSURE REGULATOR
1. Check:
   - Pressure regulator
     Damage → Replace.

CHECKING THE PRESSURE REGULATOR OPERATION
1. Check:
   - Pressure regulator operation

a. Remove the fuel tank.
   Refer to “FUEL TANK” on page 6-1.
b. Disconnect the negative pressure hose “1” from the pressure regulator at the hose joint.
c. Connect the vacuum/pressure pump gauge set “2” to the negative pressure hose of the pressure regulator.
**THROTTLE BODIES**

<table>
<thead>
<tr>
<th>Vacuum pressure increase →</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel pressure too low.</td>
</tr>
<tr>
<td>Vacuum pressure decrease →</td>
</tr>
<tr>
<td>Fuel pressure too high.</td>
</tr>
</tbody>
</table>

Faulty → Replace the pressure regulator.

---

**ADJUSTING THE THROTTLE POSITION SENSOR**

**NOTE:**
Before adjusting the throttle position sensor, the engine idling speed should be checked.

1. Check:
- Throttle position sensor
  Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 7-97.

2. Adjust:
- Throttle position sensor angle

a. Reconnect the throttle position sensor coupler.

b. Connect the digital circuit tester (DC 20 V) to the throttle position sensor coupler.

c. Set the main switch to “ON”.

d. Measure the throttle position sensor output voltage.

e. Loosen the throttle position sensor bolt “1”.

f. Adjust the throttle position sensor angle so that the output voltage is within the specified range.

g. After adjusting the throttle position sensor angle, tighten the throttle position sensor bolt.

**CHECKING AND ADJUSTING THE SUB-THROTTLE POSITION SENSOR**

1. Check:
- Sub-throttle position sensor

a. Remove the sub-throttle position sensor coupler

b. Remove the sub-throttle position sensor from the sub-throttle servo motor.

c. Connect the pocket tester (Ω × 1k) to the sub-throttle position sensor as shown.

**Tester positive probe**
- Yellow

**Negative tester probe**
- Black/Blue

**Digital circuit tester**
- 90890-03174
- Model 88 Multimeter with tachometer
- YU-A1927

c. Set the main switch to “ON”.

d. Measure the throttle position sensor output voltage.

**Tester positive probe**
- Blue “1”

**Negative tester probe**
- Black/Blue “2”

**Pocket tester**
- 90890-03112
- Analog pocket tester
- YU-03112-C
d. Check the sub-throttle position sensor overall resistance. Out of specification → Replace the sub-throttle position sensor.

<table>
<thead>
<tr>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0–6.0 kΩ</td>
</tr>
</tbody>
</table>

e. Connect the pocket tester (Ω x 1k) to the throttle position sensor as shown.

Tester positive lead →
Gray/Black “3”
Tester negative lead →
Black/Blue “2”

f. Check that the sub-throttle position sensor resistance is within specification while slowly opening the sub-throttle worm nut. Resistance does not change, or changes rapidly → Replace the sub-throttle position sensor.

NOTE:
The read value (sub-throttle from fully closed to fully open) may differ from specification. Check whether the resistance changes gradually while turning the sub-throttle.

<table>
<thead>
<tr>
<th>Sub-throttle position sensor resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–6 kΩ 20°C</td>
</tr>
</tbody>
</table>

2. Adjust:
- Sub-throttle position sensor during full-open

a. Remove the worm shaft cover “1”.
b. Turn the sub-throttle worm shaft nut “2” until the full-open stopper is contacted.

c. Measure the throttle body dimensions “a”.
d. Turn the adjusting screw “3” within specification.

3. Adjust:
- Initial value

a. Turn the sub-throttle worm shaft nut fully clockwise.
b. Measure the throttle body dimensions “b”.
c. Adjust so that dimension “b” comes within specification.
d. Connect the sub-throttle position sensor coupler.
e. Connect the pocket tester (Ω × 1) to the throttle position sensor coupler as shown.

NOTE:
If ECU control information and sub-throttle position sensor output is not match, error code 48 (sub-throttle motor lockup) will be detected. After adjustment, there is a normal condition when the sub-throttle motor coupler is connected. Erase the failure history.

h. Measure the sub-throttle position sensor output voltage.

i. Loosen the sub-throttle position sensor bolt.
j. Adjust the sub-throttle position sensor angle so that the output voltage is within the specified range.
k. After adjusting the sub-throttle position sensor angle, tighten the sub-throttle position sensor bolt.

Sub-throttle position sensor output voltage
0.91–1.01 V

Sub-throttle position sensor bolt
3.5 Nm (0.35 m·kg, 2.5 ft·lb)

NOTE:
- On setting the sub-throttle position sensor, turn the worm shaft nut towards fully closed until it contacts the stopper, and check whether the sub-throttle position sensor output voltage is 0.4 V or more.
- If the sub-throttle position sensor output voltage is 0.4 V or more, turn the worm shaft nut towards fully open until it stops, and check whether the sub-throttle position sensor output voltage is 4.5 V or more.

CHECKING THE SUB-THROTTLE SERVO MOTOR

1. Check:
- Sub-throttle servo motor operation Incorrect—Replace.

a. Check whether the sub-throttle valve is locked or not.
1) Turn the worm shaft nut of the sub-throttle servo motor by hand, and check that the sub-throttle valve operates smoothly.
2) When the valve does not operate smoothly, remove the sub-throttle link between the sub-throttle servo motor and sub-throttle valve, and check whether the sub-throttle valve operates smoothly by hand. Refer to “THROTTLE BODIES” on page 6-4.
3) When the sub-throttle valve does not operate smoothly, the cause is locking of the sub-throttle valve itself. Repair or replace the valve. If there is a smooth operation in either step 1) or step 2), replace the...
sub-throttle servo motor.
b. Execute diagnostic mode, and make a visual inspection of sub-throttle valve operation (Code No. 56). Operate the sub-throttle valve in the full open direction for five seconds, stop for two seconds, and operate in the full close direction for five seconds.

**NOTE:**
Do not place the finger between the valve when the sub-throttle valve operates and do not crowd.

............................................................

EASUXB019

**FUEL SUPPLY SYSTEM AIR BLEEDING**

After disassemble the fuel injectors, fuel rail and fuel hose, according to the following method, and bleed the system of air.

1. Check the injectors, fuel rail and fuel hose have been correctly installed.
2. Turn the main switch “ON”, “OFF” repeatedly several times for several seconds.
3. Check that the fuel path is free of leaks and smears.
4. Start the engine and idling for about five minutes.
1. Air filter case
2. Air induction system hose (Air filter case—Air cut-off valve)
3. Air cut-off valve
4. Air induction system hose (Air cut-off valve—Cylinder head)
5. Exhaust port
Removing the air cut-off valve assembly and hoses

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Parts to remove</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Spark plug cap</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Air induction system solenoid coupler</td>
<td>1</td>
<td>Disconnect.</td>
</tr>
<tr>
<td>3</td>
<td>Air induction system hose (Air filter case—Air cut-off valve)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Air induction system hose (Air cut-off valve—Cylinder head)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Air induction system pipe left/right</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Air cut-off valve</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.

### Torque Specifications

- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 4 Nm (0.4 m·kg, 2.9 ft·lb)
CHECKING THE AIR INDUCTION SYSTEM

Air induction system
The air induction system burns unburned exhaust gases by injecting fresh air (secondary air) into the exhaust port, reducing the emission of hydrocarbons. When there is negative pressure at the exhaust port, the reed valve opens, allowing secondary air to flow into the exhaust port. The required temperature for burning the unburned exhaust gases is approximately 600 to 700°C.

Air cut-off valve
The air cut-off valve is controlled by the signals from the ECU. The air cut-off valve is normally open during idling, but shuts off when the vehicle starts to move, to prevent reverse flow.

INSTALLING THE AIR INDUCTION SYSTEM

1. Install:
   - Reed valves
   - Reed valve stoppers
2. Install:
   - Reed valve cover

A. From the air filter
B. To the cylinder head

1. Check:
   - Hoses
     Loose connection → Connect properly.
     Cracks/damage → Replace.
   - Pipes
     Cracks/damage → Replace.
2. Check:
   - Reed valve
   - Reed valve stopper
   - Reed valve seat
     Cracks/scratches→Replace the air cut-off valve assembly.
3. Check:
   - Air cut-off valve
     Cracks/damage → Replace.
ELECTRICAL SYSTEM

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IGNITION SYSTEM

2. Main switch
3. Ignition fuse
4. Main fuse
7. Battery
13. Engine stop switch
15. Relay unit
16. Neutral switch
17. Sidestand switch
19. Ignition coil 1
20. Ignition coil 2
29. Crankshaft position sensor
30. Lean angle sensor
38. ECU
65. Clutch switch
**IGNITION SYSTEM**

**TROUBLE SHOOTING**
The ignition system fails to operate. (no spark or intermittent spark).

**NOTE:**
Before troubleshooting, remove the following part(s):
1. Seat
2. Fuel tank
3. Headlight unit
4. Left side cover

<table>
<thead>
<tr>
<th>Step</th>
<th>Check</th>
<th>NG Action</th>
<th>OK Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuse (Main fuse, Ignition fuse)  Refer to “CHECKING THE FUSES” on page 7-86.</td>
<td>Replace the fuse(s).</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check the battery.  Refer to “CHECKING AND CHARGING THE BATTERY” on page 7-87.</td>
<td>Clean the battery terminals.  Recharge or replace the battery.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Check the spark plug.  Refer to “CHECKING THE SPARK PLUGS” on page 3-10.</td>
<td>Re-gap or replace the spark plug.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Check the spark plug cap.  Refer to “CHECKING THE SPARK PLUG CAPS” on page 7-93.</td>
<td>Replace the spark plug cap.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Check the ignition coil.  Refer to “CHECKING THE IGNITION COIL” on page 7-93.</td>
<td>Replace the ignition coil.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Check the crankshaft position sensor.  Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 7-94.</td>
<td>Replace the crankshaft position sensor</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Check the main switch.  Refer to “CHECKING THE SWITCHES” on page 7-81.</td>
<td>Replace the main switch.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Check the engine stop switch.  Refer to “CHECKING THE SWITCHES” on page 7-81.</td>
<td>Replace the right handlebar switch.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Check the neutral switch.  Refer to “CHECKING THE SWITCHES” on page 7-81.</td>
<td>Replace the neutral switch.</td>
<td></td>
</tr>
</tbody>
</table>
10. Check the sidestand switch.
   Refer to “CHECKING THE SWITCHES” on page 7-81.
   <br>NG→ Replace the sidestand switch.
   OK↓

11. Check the clutch switch.
   Refer to “CHECKING THE SWITCHES” on page 7-81.
   <br>NG→ Replace the clutch switch.
   OK↓

12. Check the relay unit (starting circuit cut-off relay).
    Refer to “CHECKING THE RELAYS” on page 7-90.
    <br>NG→ Replace the relay unit (starting circuit cut-off relay)
    OK↓

13. Check the diode.
    Refer to “CHECKING THE DIODE” on page 7-91.
    <br>NG→ Replace the relay unit (diode).
    OK↓

14. Check the lean angle sensor.
    Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 7-94.
    <br>NG→ Replace the lean angle sensor.
    OK↓

15. Check the entire ignition system’s wiring.
    Refer to “CIRCUIT DIAGRAM” on page 7-1.
    <br>OK↓
    Replace the ECU.
2. Main switch
3. Ignition fuse
4. Main fuse
7. Battery
8. Starter relay
9. Starter motor
13. Engine stop switch
14. Start switch
15. Relay unit
16. Neutral switch
17. Sidestand switch
65. Clutch switch
STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to “✓” and the main switch is set to “ON” (both switches are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch is closed).
- The clutch lever is pulled to the handlebar (the clutch switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor. When at least one of the above conditions has been met the starting circuit cut-off relay is closed and the engine can be started by pressing the starter switch.
ELECTRIC STARTING SYSTEM

a. WHEN THE TRANSMISSION IS IN NEUTRAL
b. WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED TO THE HANDLEBAR

1. Battery
2. Main
3. Main switch
4. Ignition
5. Engine stop switch
6. Starting circuit cut-off relay
7. Diode
8. Clutch switch coupler
9. Sidestand switch
10. Neutral switch
11. Start switch
12. Starter relay
13. Starter motor
## TROUBLE SHOOTING

The starter motor fails to turn.

**NOTE:**
Before troubleshooting, remove the following part(s):
1. Seat
2. Fuel tank
3. Headlight unit

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Result</th>
</tr>
</thead>
</table>
| 1.   | Check the fuse  
(Main fuse, Ignition fuse)  
Refer to “CHECKING THE FUSES” on page 7-86. | NG→ Replace the fuse(s). |
|   |   | OK↓ |
| 2.   | Check the battery.  
Refer to “CHECKING AND CHARGING THE BATTERY” on page 7-87. | NG→ Clean the battery terminals.  
Recharge or replace the battery. |
|   |   | OK↓ |
| 3.   | Check the starter motor  
Refer to “CHECKING THE STARTER MOTOR” on page 5-35. | NG→ Repair or replace the starter motor. |
|   |   | OK↓ |
| 4.   | Check the relay unit (starting circuit cut-off relay).  
Refer to “CHECKING THE RELAYS” on page 7-90. | NG→ Replace the relay unit (starting circuit cut-off relay) |
|   |   | OK↓ |
| 5.   | Check the diode.  
Refer to “CHECKING THE DIODE” on page 7-91. | NG→ Replace the relay unit (diode) |
|   |   | OK↓ |
| 6.   | Replace the starter relay.  
Refer to “CHECKING THE RELAYS” on page 7-90. | NG→ Replace the starter relay. |
|   |   | OK↓ |
| 7.   | Check the main switch.  
Refer to “CHECKING THE SWITCHES” on page 7-81. | NG→ Replace the main switch. |
|   |   | OK↓ |
| 8.   | Check the engine stop switch.  
Refer to “CHECKING THE SWITCHES” on page 7-81. | NG→ Replace the right handlebar switch. |
|   |   | OK↓ |
| 9.   | Check the neutral switch.  
Refer to “CHECKING THE SWITCHES” on page 7-81. | NG→ Replace the neutral switch. |
|   |   | OK↓ |
| 10.  | Check the sidestand switch.  
Refer to “CHECKING THE SWITCHES” on page 7-81. | NG→ Replace the sidestand switch. |
### ELECTRIC STARTING SYSTEM

1. **Check the clutch switch.**
   - Refer to “CHECKING THE SWITCHES” on page 7-81.
   - **OK**
     - Replace the clutch switch.
   - **NG**

2. **Check the start switch.**
   - Refer to “CHECKING THE SWITCHES” on page 7-81.
   - **OK**
     - Replace the right handlebar switch.
   - **NG**

3. **Check the entire starting system’s wiring.**
   - Refer to “CIRCUIT DIAGRAM” on page 7-5.
   - **OK**
   - **NG**
     - Properly connect or repair the starting system’s wiring.

---

The starting system circuit is OK.
1. Generator
2. Main switch
4. Main fuse
7. Battery
**TROUBLESHOOTING**

The battery is not being charged.

**NOTE:**

Before troubleshooting, remove the following part(s):
1. Seat
2. Fuel tank
3. Headlight unit

1. Check the fuse
   (Main fuse)
   Refer to “CHECKING THE FUSES” on page 7-86.
   
   **OK**

2. Check the battery.
   Refer to “CHECKING AND CHARGING THE BATTERY” on page 7-87.
   
   **OK**

3. Check the generator
   Refer to “CHECKING THE GENERATOR” on page 5-31.
   
   **OK**

4. Check the main switch.
   Refer to “CHECKING THE SWITCHES” on page 7-81.
   
   **OK**

5. Check the entire charging system’s wiring.
   Refer to “CIRCUIT DIAGRAM” on page 7-11.
   
   **OK**

**NG** → Replace the rectifier/regulator

**NG** → Replace the fuse.

**NG** → Clean the battery terminals. Recharge or replace the battery.

**NG** → Replace the bluses and blush springs as a set. Replace the stator coil assembly. Replace the field coil.

**NG** → Replace the main switch.

**NG** → Properly connect or repair the charging system’s wiring.
2. Main switch
3. Ignition fuse
4. Main fuse
7. Battery
38. ECU
41. Meter light
44. Multi-function display
50. High beam indicator
53. Tail/brake light
54. Licence light
60. Pass switch
61. Dimmer switch
68. Headlight relay
69. Headlight fuse
72. Headlight
73. Taillight fuse
74. Auxiliary light
TROUBLE SHOOTING

Any of the following fail to light: Headlight, high beam indicator light, taillight, license plate light or meter light.

NOTE:

Before troubleshooting, remove the following part(s):
1. Seat
2. Fuel tank
3. Headlight unit

1. Check the each bulbs and bulb sockets condition. Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 7-85.
   NG → Replace the bulb(s) and bulb socket(s).

2. Check the fuse (Main, headlight, ignition, taillight) Refer to “CHECKING THE FUSES” on page 7-86.
   NG → Replace the fuse.

3. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 7-87.
   NG → Clean the battery terminals. Recharge or replace the battery.

4. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 7-81.
   NG → Replace the main switch.

5. Check the dimmer switch. Refer to “CHECKING THE SWITCHES” on page 7-81.
   NG → Replace the left handlebar switch.

6. Check the pass switch. Refer to “CHECKING THE SWITCHES” on page 7-81.
   NG → Replace the left handlebar switch.

7. Check the headlight relay. Refer to “CHECKING THE RELAYS” on page 7-90.
   NG → Replace the headlight relay.

8. Check the entire lighting system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 7-15.
   NG → Properly connect or repair the lighting system’s wiring.

OK ↓ Replace the ECU.
2. Main switch  
3. Ignition fuse  
4. Main fuse  
7. Battery  
12. Front brake switch  
15. Relay unit  
16. Neutral switch  
18. Fuel pump  
31. Speed sensor  
38. ECU  
42. Speedometer  
43. Tachometer  
44. Multi-function display  
45. Oil level warning light  
47. Neutral indicator light  
48. Left turn signal indicator  
49. Right turn signal indicator light  
51. Oil level switch  
52. Rear brake switch  
53. Tail/brake light  
55. Front left turn signal light  
56. Front right turn signal light  
57. Rear left turn signal light  
58. Rear right turn signal light  
62. Horn switch  
63. Turn signal switch  
64. Hazard switch  
66. Turn signal relay  
67. Horn  
70. Signal fuse  
73. Taillight fuse
TROUBLE SHOOTING

- Any of the following fail to light:
  - Flasher light, brake light and indicator light.
- The horn fails to sound.

NOTE:

Before troubleshooting, remove the following part(s):
1. Seat
2. Fuel tank
3. Headlight unit

CHECKING THE SIGNALING SYSTEM

The horn fails to sound.

1. Check the fuse (Main, ignition, signal, taillight)
   Refer to “CHECKING THE FUSES” on page 7-86.
   NG → Replace the fuse(s).
   
   OK ↓

2. Check the battery.
   Refer to “CHECKING AND CHARGING THE BATTERY” on page 7-87.
   NG → Clean the battery terminals.
   Recharge or replace the battery.
   
   OK ↓

3. Check the main switch.
   Refer to “CHECKING THE SWITCHES” on page 7-81.
   NG → Replace the main switch.
   
   OK ↓

4. Check the entire signaling system’s wiring.
   Refer to “CIRCUIT DIAGRAM” on page 7-19.
   NG → Properly connect or repair the signaling system’s wiring.
   
   OK ↓

   This circuit is OK.

CHECKING THE SIGNALING SYSTEM

The horn fails to sound.

1. Check the horn switch.
   Refer to “CHECKING THE SWITCHES” on page 7-81.
   NG → Replace the handlebar switch.
   
   OK ↓

2. Check the horn.
   Refer to “CHECKING THE HORN” on page 7-95.
   NG → Replace the horn.
   
   OK ↓

3. Check the entire signaling system’s wiring.
   Refer to “CIRCUIT DIAGRAM” on page 7-19.
   NG → Properly connect or repair the signaling system’s wiring.
   
   OK ↓

   This circuit is OK.
The tail/brake light fails to come on.

1. Check the brake light switch. Refer to “CHECKING THE SWITCHES” on page 7-81.
   NG→ Replace the brake light switch

   OK↓

2. Check the entire signaling system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 7-19.
   NG→ Properly connect or repair the signaling system’s wiring.

   OK↓

Replace the tail/brake light assembly (LED)

The turn signal light, turn signal indicator light or both fail to blink.

1. Check the flasher, flasher indicator light bulb and socket. Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 7-85.
   NG→ Replace the flasher, flasher indicator light bulb, socket or both.

   OK↓

2. Check the turn signal switch. Refer to “CHECKING THE SWITCHES” on page 7-81.
   NG→ Replace the handlebar switch.

   OK↓

3. Check the hazard switch. Refer to “CHECKING THE SWITCHES” on page 7-81.
   NG→ Replace the handlebar switch.

   OK↓

4. Check the turn signal relay. Refer to “CHECKING THE RELAYS” on page 7-90.
   NG→ Replace the turn signal relay.

   OK↓

5. Check the entire signaling system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 7-19.
   NG→ Properly connect or repair the signaling system’s wiring.

   OK↓

This circuit is OK.
The neutral indicator light fails to come on.

1. Check the neutral indicator light bulb and socket. Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 7-85.  
   NG→ Replace the neutral indicator light bulb, socket or both. 

   OK↓

2. Check the neutral switch. Refer to “CHECKING THE SWITCHES” on page 7-81.  
   NG→ Replace the neutral switch. 

   OK↓

3. Check the diode. Refer to “CHECKING THE DIODE” on page 7-91.  
   NG→ Replace the relay unit (diode) 

   OK↓

4. Check the entire signaling system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 7-19.  
   NG→ Properly connect or repair the signaling system’s wiring. 

   OK↓

This circuit is OK.

The oil level warning light fails to come on.

1. Checking the oil level warning light bulb and socket. Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 7-85.  
   NG→ Replace the oil level warning light bulb, socket or both. 

   OK↓

2. Check the oil level switch. Refer to “CHECKING THE SWITCHES” on page 7-81.  
   NG→ Replace the oil level switch. 

   OK↓

3. Check the entire signaling system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 7-19.  
   NG→ Properly connect or repair the signaling system’s wiring. 

   OK↓

This circuit is OK.
### The speedometer fails to operate.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the speed sensor. Refer to “CHECKING THE SPEED SENSOR” on page 7-96.</td>
</tr>
<tr>
<td>NG</td>
<td>Replace the speed sensor.</td>
</tr>
<tr>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check the entire signaling system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 7-19.</td>
</tr>
<tr>
<td>NG</td>
<td>Properly connect or repair the signaling system’s wiring.</td>
</tr>
<tr>
<td>OK</td>
<td>Replace the meter assembly.</td>
</tr>
</tbody>
</table>

### The fuel meter fails to operate.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuel level sender. Refer to “CHECKING THE SPEED SENSOR” on page 7-96.</td>
</tr>
<tr>
<td>NG</td>
<td>Replace the fuel pump.</td>
</tr>
<tr>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check the entire signaling system’s wiring. Refer to “CIRCUIT DIAGRAM” on page 7-19.</td>
</tr>
<tr>
<td>NG</td>
<td>Properly connect or repair the signaling system’s wiring.</td>
</tr>
<tr>
<td>OK</td>
<td>Replace the meter assembly.</td>
</tr>
</tbody>
</table>
2. Main switch
3. Ignition fuse
4. Main fuse
5. Backup fuse
6. EFI fuse
7. Battery
13. Engine stop switch
14. Start switch
15. Relay unit
16. Neutral switch
17. Sidestand switch
18. Fuel pump
19. Ignition coil 1
20. Ignition coil 2
21. Injector 1
22. Injector 2
23. Injector 3
24. Injector 4
25. AI solenoid
26. ISC (idle speed control) valve
27. Sub throttle servo motor
28. EXUP servo motor
29. Crankshaft position sensor
30. Lean angle sensor
31. Speed sensor
32. O₂ sensor
33. Intake air temperature sensor
34. Engine temperature sensor
35. Throttle position sensor
36. Intake air pressure sensor 1
37. Intake air pressure sensor 2
38. ECU
44. Multi-function display
46. Engine trouble warning light
68. Headlight relay
69. Headlight fuse
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, errors are displayed on the LCD of the odometer in order from the latest error code number. 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 (Normal signal not emitted)
19: Sidestand switch (Open circuit wireharness to ECU)
30: Lean angle sensor (Latch up detected)
41: Lean angle sensor (open or short-circuit)
50: ECU internal malfunction (faulty ECU memory)

Checking for a defective engine trouble warning light bulb
The engine trouble warning light comes on for 1.4 seconds after the main switch has been turned to “ON”. And when the start switch is being pushed. If the warning light does not come on under these conditions, the warning light bulb may be defective.

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>c</td>
<td>d</td>
</tr>
</tbody>
</table>

- a. Main switch OFF
- b. Main switch ON
- c. Light OFF
- d. Light ON for 1.4 seconds
FAIL-SAFE ACTIONS (SUBSTITUTE CHARACTERISTICS OPERATION CONTROL)

If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU illuminationates 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.

The ECU takes fail-safe actions in two ways: one in which the sensor output is set to a prescribed value, and the other in which the ECU directly operates an actuator. Details on the fail-safe actions are given in the table below.

**Self-Diagnostic Function**

<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 1 (open or short-circuit)</td>
<td>Intake air pressure sensor-open or short circuit</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>14</td>
<td>Intake air pressure sensor 1 (pipe system)</td>
<td>Intake air pressure sensor-pipe system malfunction (clogged or detached hose).</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>15</td>
<td>Throttle position sensor (open or short-circuit)</td>
<td>Throttle position sensor-open or short circuit detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>16</td>
<td>Throttle position sensor (stuck)</td>
<td>Stuck throttle position sensor is detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>17</td>
<td>EXUP servo motor circuit (Open or short-circuit)</td>
<td>EXUP servo motor circuit open or short circuit is detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>18</td>
<td>EXUP servo-motor (stuck)</td>
<td>EXUP servo motor is stuck.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>19</td>
<td>Sidestand switch (Open circuit wire harness to ECU)</td>
<td>Open circuit is detected in the input line from the sidestand switch to the ECU.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>20</td>
<td>Intake air pressure sensor 1 or intake air pressure sensor 2</td>
<td>When the main switch is “ON “, the voltage varies substantially between intake air pressure sensor 1 and intake air pressure sensor 2.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>22</td>
<td>Intake air temperature sensor</td>
<td>Intake air temperature sensor-open or short circuit detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>24</td>
<td>O₂ sensor</td>
<td>No normal signal is received from the O₂ sensor.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>Fault code No.</td>
<td>Item</td>
<td>Symptom</td>
<td>Able / unable to start</td>
<td>Able / unable to drive</td>
</tr>
<tr>
<td>---------------</td>
<td>------</td>
<td>---------</td>
<td>------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>25</td>
<td>Intake air pressure sensor 2 (open or short-circuit)</td>
<td>Intake air pressure sensor-open or short circuit is detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>26</td>
<td>Intake air pressure sensor 2 (pipe system)</td>
<td>Intake air pressure sensor-pipe system malfunction (clogged or detached hose).</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>28</td>
<td>Engine temperature sensor (Open or short-circuit)</td>
<td>Engine temperature sensor open or short circuit is detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>30</td>
<td>Lean angle sensor</td>
<td>Latch up detected. No normal signals received from the lean angle sensor.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>33</td>
<td>Ignition coil (#1 and #4) (faulty ignition)</td>
<td>Malfunction detected in the primary lead of the ignition coil. (#1 and #4)</td>
<td>Able (depending on the number of faulty cylinders)</td>
<td>Able (depending on the number of faulty cylinders)</td>
</tr>
<tr>
<td>34</td>
<td>Ignition coil (#2 and #3) (faulty ignition)</td>
<td>Malfunction detected in the primary lead of the ignition coil. (#2 and #3)</td>
<td>Able (depending on the number of faulty cylinders)</td>
<td>Able (depending on the number of faulty cylinders)</td>
</tr>
<tr>
<td>37</td>
<td>ISC (Idle speed control) valve</td>
<td>Engine speed is high when the engine is idling.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>39</td>
<td>Injector</td>
<td>Injector open or short-circuit is detected.</td>
<td>Able (depending on the number of faulty cylinders)</td>
<td>Able (depending on the number of faulty cylinders)</td>
</tr>
<tr>
<td>41</td>
<td>Lean angle sensor (open or short-circuit)</td>
<td>Lean angle sensor open or short circuit is 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>
</tbody>
</table>
### FUEL INJECTION SYSTEM

<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>43</td>
<td>Fuel system voltage (monitor voltage)</td>
<td>Voltage supplied to the fuel injector and fuel pump is not normal.</td>
<td>Impossible, depending on case</td>
<td>Impossible, depending on case</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 (monitor voltage)</td>
<td>Power supply to the ECU is not normal.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>47</td>
<td>Sub-throttle position sensor (open or short-circuit)</td>
<td>Throttle position sensor-open or short circuit detected.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>48</td>
<td>Sub-throttle servo motor (stuck)</td>
<td>Sub-throttle servo motor is stuck.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td>50</td>
<td>ECU internal malfunction (memory check error)</td>
<td>Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)</td>
<td>Unable</td>
<td>Unable</td>
</tr>
<tr>
<td>70</td>
<td>Left idle control</td>
<td>After 20 minutes left idling, the ECU automatically stops the engine.</td>
<td>Able</td>
<td>Able</td>
</tr>
<tr>
<td></td>
<td>Start unable warning</td>
<td>Relay is not turned ON even if the crank signal is input while the start switch is turned ON. When the start switch is turned ON while an error is detected with the error code No.12, 19, 30, 41 or 50 displayed.</td>
<td>Unable</td>
<td>Unable</td>
</tr>
</tbody>
</table>

**Communication error with the meter**

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
<th>Symptom</th>
<th>Able / unable to start</th>
<th>Able / unable to drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Er-1</td>
<td>ECU internal malfunction (output signal error)</td>
<td>No signals are received from the ECU.</td>
<td>*Able</td>
<td>*Able</td>
</tr>
<tr>
<td>Er-2</td>
<td>ECU internal malfunction (output signal error)</td>
<td>Not within the specified signal time from the ECU.</td>
<td>*Able</td>
<td>*Able</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>*Able</td>
<td>*Able</td>
</tr>
</tbody>
</table>
*If multiple malfunctions have been detected for the ECU or immobilizer unit, you may not be able to start or drive the vehicle.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Item</th>
<th>Symptom</th>
<th>Able / unable to start</th>
<th>Able / unable to drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Er-4</td>
<td>ECU internal malfunction (input signal error)</td>
<td>Non-registered data has been received from the meter.</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 faulty system with the fault code.
     c. Identify the probable cause of the malfunction. Refer to “Fault code table”.

2. Check and repair the probable case of malfunction.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>No fault code No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check and repair. Refer to “TROUBLESHOOTING DETAILS” on page 7-41. Monitor the operation of the sensors and actuators in the diagnostic mode. Refer to “Sensor operation table” and “Actuator operation table”.</td>
<td>Check and repair.</td>
</tr>
</tbody>
</table>

3. Perform the fuel injection system reinstatement action. Refer to “Reinstatement method” of table in “TROUBLESHOOTING DETAILS” on page 7-41.

4. Turn the main switch to “OFF” and back to “ON”, then check that no fault code number is displayed.

NOTE:
- All displays on the meter disappear except the clock and tripmeter displays.
- “DIAG” appears on the clock LCD.

5. Erase the malfunction history in the diagnostic mode. Refer to “Sensor operation table (Diagnostic code No.62)”.

NOTE: Turning the main switch to “OFF” will not erase the malfunction history.

The engine operation is not normal but the engine trouble warning light does not come on.

1. Check the operation of following sensors and actuators in the Diagnostic mode. Refer to “Sensor operation table” and “Actuator operation table”.
   - If a malfunction is detected in the sensors or actuators, repair or replace all faulty parts.
   - If no malfunction is detected in the sensors and actuators, check and repair inner parts of the engine.

DIAGNOSTIC MONITORING MODE

Setting the diagnostic monitoring mode

1. Turn the main switch to “OFF” and set the engine stop switch to “✓”.
2. Disconnect the wire harness coupler from the fuel pump.
3. Press the SELECT button and RESET button simultaneously, turn the main switch “ON”, and keep switch pressed for at least 8 seconds.

NOTE:  
- All displays on the meter disappear except the clock and tripmeter displays.
- “DIAG” appears on the clock LCD.

4. Press the SELECT button to select the CO adjustment mode “CO” or the diagnostic monitoring mode “DIAG”.
5. After selecting “CO”, press the SELECT and RESET buttons simultaneously for at least 2 seconds.
6. Set the engine stop switch to “✓”.
7. Select the diagnostic monitoring code number that applies to the item that was verified with the fault code number by pressing the SELECT and RESET buttons.
NOTE: The diagnostic monitoring code number appears on the clock LCD (01–70).

* To decrease the selected diagnostic monitoring code number, press the RESET button. Press the RESET button for 1 second or longer to automatically decrease the diagnostic monitoring code numbers.
* To decrease the selected diagnostic monitoring code number, press the SELECT button. Press the SELECT button for 1 second or longer to automatically increase the diagnostic monitoring code numbers.

8. Verify the operation of the sensor or actuator.
   - Sensor operation
     The data representing the operating conditions of the sensor appears on the trip LCD.
   - Actuator operation
     Set the engine stop switch to “○” to operate the actuator.

NOTE: If the engine stop switch is set to “○”, set it to “×”, and then set it to “○” again.

9. Turn the main switch to “OFF” to cancel the diagnostic monitoring mode.

NOTE: To perform a reliable diagnosis, make sure to turn “OFF” the power supply before every check and then start right from the beginning.
## Diagnostic monitoring 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 circuit in wire harness. • Defective crankshaft position sensor. • Faulty timing plate.</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Malfunction in ECU. • Improperly installed crankshaft position sensor.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Intake air pressure sensor-open or short circuit</td>
<td>• Open or short circuit in wire harness. • Defective intake air pressure sensor. • Malfunction in ECU.</td>
<td>03</td>
</tr>
<tr>
<td>14</td>
<td>Intake air pressure sensor-pipe system malfunction (clogged or detached hose)</td>
<td>• Intake air pressure sensor hose is detached, clogged, kinked, or pinched. • Malfunction in ECU.</td>
<td>03</td>
</tr>
<tr>
<td>15</td>
<td>Throttle position sensor-open or short circuit detected.</td>
<td>• Open circuit in wire harness. • Defective throttle position sensor. • Malfunction in ECU.</td>
<td>01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Improperly installed throttle position sensor.</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Stuck throttle position sensor.</td>
<td>• Stuck throttle position sensor. • Malfunction in ECU.</td>
<td>01</td>
</tr>
<tr>
<td>17</td>
<td>EXUP servo motor circuit open or short circuit</td>
<td>• Open circuit in wire harness. • Defective EXUP servo motor • Malfunction in ECU.</td>
<td>53</td>
</tr>
<tr>
<td>18</td>
<td>EXUP servo motor is stuck</td>
<td>• Open circuit in wire harness. • Stuck EXUP servo motor (mechanism/motor)</td>
<td>53</td>
</tr>
<tr>
<td>19</td>
<td>Open circuit is detected in the side stand switch input line to the ECU.</td>
<td>• Wire harness open circuit • Malfunction in ECU.</td>
<td>20</td>
</tr>
<tr>
<td>20</td>
<td>Intake air pressure sensor 1 and intake air pressure sensor 2 differ greatly.</td>
<td>• Open circuit in wire harness. • Defective intake vacuum sensor 1 or intake vacuum sensor 2 • Malfunction in ECU. • Intake air pressure sensor hose is detached, clogged, kinked, or pinched. • Defective intake air pressure sensor 1 or intake air pressure sensor 2</td>
<td>03/04</td>
</tr>
<tr>
<td>22</td>
<td>Intake air temperature sensor-open or short circuit detected.</td>
<td>• Defective intake air temperature sensor • Malfunction in ECU.</td>
<td>05</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>
| 24            | No normal signal is received from the O₂ sensor. | • Open circuit in wire harness.  
• Defective O₂ sensor.  
• Malfunction in ECU.  
• Improperly installed O₂ sensor. | — |
| 25            | Intake air pressure sensor 2-open or short circuit | • Open or short circuit in wire harness.  
• Defective intake vacuum sensor 2.  
• Malfunction in ECU. | 04 |
| 26            | Intake air pressure sensor 2-pipe system malfunction (clogged or detached hose). | • Intake air pressure sensor hose is detached, clogged, kinked, or pinched.  
• Malfunction in ECU. | 04 |
| 28            | Engine warm-up sensor open or short circuit | • Open or short circuit in wire harness.  
• Defective engine temperature sensor.  
• Malfunction in ECU.  
• Improperly installed engine temperature sensor. | 11 |
| 30            | Vehicle has overturn | • Overturned.  
• Defective lean angle sensor.  
• Malfunction in ECU. | 08 |
| 33            | Malfunction detected in the primary lead of the ignition coil (#1 and #4) | • Open circuit in wire harness.  
• Malfunction in ignition coil.  
• Malfunction in ECU.  
• Defective ignition circuit cut-off circuit | 30 |
| 34            | Malfunction detected in the primary lead of the ignition coil (#2 and #3) | • Open circuit in wire harness.  
• Malfunction in ignition coil.  
• Malfunction in ECU.  
• Defective ignition circuit cut-off circuit | 31 |
| 37            | Engine speed is high when the engine is idling. | • Open circuit in wire harness.  
• Malfunction in throttle body.  
• Malfunction in throttle cables.  
• ISC (Idle Speed Control) valve stuck in fully open state due to disconnected ISC hose or coupler.  
• Malfunction in ECU. | 54 |
| 39            | Injector-open or short-circuit | • Open circuit in wire harness.  
• Defective injector.  
• Improperly installed injector  
• Malfunction in ECU. | 36/37/38/39 |
| 41            | Lean angle sensor open or short circuit detected | • Open circuit in wire harness.  
• Defective lean angle sensor  
• Malfunction in ECU. | 08 |
<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Symptom</th>
<th>Probable cause of malfunction</th>
<th>Diagnostic code No.</th>
</tr>
</thead>
</table>
| 42            | No normal signals are received from the speed sensor.                   | ● Open circuit in wire harness.  
● Defective speed sensor.  
● Malfunction in ECU.                                                  | 07                  |
|               | Open or short circuit is detected in the neutral switch.                | ● Open circuit in wire harness.  
● Defective neutral switch.  
● Malfunction in ECU.                                                   | 21                  |
| 43            | Supplied power to the fuel injector and fuel pump is not normal.       | ● Open circuit in wire harness.  
● Malfunction in ECU.  
● Defective relay unit (fuel pump relay)                                | 09                  |
| 44            | Error is detected while reading or writing on EEPROM (code re-regis-    | ● Malfunction in ECU. (CO concentration adjustment value cannot be correctly written to or read from internal memory) | 60                  |
|               | tering key code and throttle valve fully closed notification value).   |                                                                                                 |                     |
| 46            | Power supply to the ECU is not normal.                                  | ● Malfunction in charging system.                                                               | —                   |
| 47            | Sub-throttle position sensor-open or short circuit detected.           | ● Open circuit in wire harness.  
● Improperly installed sub-throttle position sensor.  
● Malfunction in ECU.                                                   | 56                  |
| 48            | Sub-throttle servo motor stuck                                          | ● Open circuit in wire harness.  
● Sub-throttle servo motor is stuck (mechanical)  
● Sub-throttle servo motor is stuck (motor)                             | 56                  |
| 50            | Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.) | ● Malfunction in ECU. (The program and data are not properly written on or read from the internal memory.) | —                   |
| 70            | Left idle control                                                      | ● When approximately 20 minutes has elapsed in idling state                                      | —                   |
| Er-1          | No signals are received from the ECU.                                  | ● Open circuit or short circuit in wire harness.  
● Malfunction in meter unit.                                             | —                   |
| Er-2          | No signals are received from the ECU within the specified duration.    | ● Open circuit in wire harness.  
● Malfunction in meter unit.                                             | —                   |
| Er-3          | Data from the ECU cannot be received correctly.                         | ● Open circuit in wire harness.  
● Malfunction in meter unit.                                             | —                   |
| Er-4          | Non-registered data has been received from the meter.                  | ● Open circuit in wire harness.  
● Malfunction in meter unit.                                             | —                   |
Sensor operation table

Switch the meter display from the regular mode to the diagnostic mode. To switch the display, refer to “DIAGNOSTIC MONITORING MODE”.

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Meter display</th>
<th>Checking method</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Throttle angle</td>
<td></td>
<td>Check with throttle fully closed.</td>
</tr>
<tr>
<td></td>
<td>● Fully closed position</td>
<td>15–18</td>
<td>Check with throttle fully open.</td>
</tr>
<tr>
<td></td>
<td>● Fully opened position</td>
<td>100–105</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>Intake air pressure sensor 1</td>
<td>Displays the intake air pressure.</td>
<td>Set the engine stop switch to “☑”, then operate the throttle while pressing the start switch. (If the display value changes, the performance is OK.)</td>
</tr>
<tr>
<td></td>
<td>(atmospheric pressure and intake air pressure)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>Intake air pressure sensor 2</td>
<td>Displays the intake air pressure.</td>
<td>Set the engine stop switch to “☑”, then operate the throttle while pressing the start switch. (If the display value changes, the performance is OK.)</td>
</tr>
<tr>
<td></td>
<td>(atmospheric pressure and intake air pressure)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>Intake air temperature</td>
<td>Displays the intake air temperature.</td>
<td>Compare the actually measured intake air temperature with the meter display value.</td>
</tr>
<tr>
<td>07</td>
<td>Vehicle speed pulse</td>
<td>0–999</td>
<td>Check that the number increase when the rear wheel is rotated. The number is cumulative and does not reset each time the wheel is stopped.</td>
</tr>
<tr>
<td>08</td>
<td>Lean angle sensor</td>
<td>0.4–1.4V</td>
<td>Remove the lean angle sensor and incline the vehicle more than 65 degrees.</td>
</tr>
<tr>
<td></td>
<td>● Upright</td>
<td>3.7–4.4V</td>
<td></td>
</tr>
<tr>
<td>09</td>
<td>Fuel system voltage (battery voltage)</td>
<td>Approximately 12.0</td>
<td>Turn the engine stop switch “☑”, and compare to battery voltage (recharge if battery voltage is low).</td>
</tr>
<tr>
<td>11</td>
<td>Engine temperature</td>
<td>Engine temperature display</td>
<td>Compare displayed value to ambient temperature.</td>
</tr>
<tr>
<td>20</td>
<td>Sidestand switch</td>
<td>ON</td>
<td>Set ON/OFF the Sidestand switch. (with the transmission in gear)</td>
</tr>
<tr>
<td></td>
<td>● Stand retracted</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Stand extended</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Neutral switch</td>
<td>ON</td>
<td>Shift the transmission</td>
</tr>
<tr>
<td></td>
<td>● Neutral</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● In gear</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Meter display</th>
<th>Checking method</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>EEPROM fault cylinder display</td>
<td></td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>● No history</td>
<td>00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● History exists</td>
<td>01–04 (display defective cylinder number)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● (If more than one cylinder is defective, the display alternates every two seconds to show all the detected cylinder numbers. When all cylinder numbers are shown, the display repeats the same process.)</td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>Malfunction history code display</td>
<td></td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>● No history</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● History exists</td>
<td>12–70 (Fault detection code)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● If more than one code number is defective, the display alternates every two seconds to show all the detected cylinder numbers. When all code numbers are shown, the display repeats the same process.)</td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>Malfunction history code erasure</td>
<td></td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>● No history</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● History exists</td>
<td>0–28</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Displays the total number of malfunctions, including the current malfunction, that have occurred since the history was last erased. (For example, if there have been three malfunctions, “03” is displayed.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>To erase the history, set the engine stop switch from “熄火” to “点火” .</td>
<td></td>
</tr>
</tbody>
</table>
### Actuator operation table

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>Item</th>
<th>Actuation</th>
<th>Checking method</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Ignition coil (#1 and #4)</td>
<td>Actuates the ignition coil five times at one-second intervals. Illuminates the engine trouble warning light.</td>
<td>Check the spark five times.  ● Connect an ignition checker.</td>
</tr>
<tr>
<td>31</td>
<td>Ignition coil (#2 and #3)</td>
<td>Actuates the ignition coil five times at one-second intervals. Illuminates the engine trouble warning light.</td>
<td>Check the spark five times.  ● Connect an ignition checker.</td>
</tr>
<tr>
<td>36</td>
<td>Injector (#1)</td>
<td>Actuates the injector five times at one-second intervals. Illuminates the engine trouble warning light.</td>
<td>Check the operating sound of the injector five times.</td>
</tr>
<tr>
<td>37</td>
<td>Injector (#2)</td>
<td>Actuates the injector five times at one-second intervals. Illuminates the engine trouble warning light.</td>
<td>Check the operating sound of the injector five times.</td>
</tr>
<tr>
<td>38</td>
<td>Injector (#3)</td>
<td>Actuates the injector five times at one-second intervals. Illuminates the engine trouble warning light.</td>
<td>Check the operating sound of the injector five times.</td>
</tr>
<tr>
<td>39</td>
<td>Injector (#4)</td>
<td>Actuates the injector five times at one-second intervals. Illuminates the engine trouble warning light.</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>48</td>
<td>Air induction system solenoid</td>
<td>Actuates the air induction system solenoid five times at one-second intervals. Illuminates the engine trouble warning light light. (Light OFF: Air induction system solenoid “ON” Light ON: Air induction system solenoid “OFF”)</td>
<td>Check the operating sound of the air induction system solenoid five times.</td>
</tr>
<tr>
<td>50</td>
<td>Fuel injection system relay</td>
<td>Actuates the fuel pump relay five times at one-second intervals. Illuminates the engine trouble warning light. (The engine trouble warning light is OFF when the relay is ON, and the engine trouble warning light is ON when the relay is OFF).</td>
<td>Check the operating sound of the relay five times.</td>
</tr>
<tr>
<td>52</td>
<td>Headlight relay</td>
<td>Actuates the headlight relay (on/off) for five cycles of five seconds. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light and headlight.</td>
<td>Check the operating sound of the headlight relay five times.</td>
</tr>
<tr>
<td>53</td>
<td>EXUP servomotor</td>
<td>Turn the servo motor once in the open direction and then in the close direction. Illuminates the engine trouble warning light.</td>
<td>Check the operating sound of the EXUP servo motor.</td>
</tr>
<tr>
<td>54</td>
<td>ISC (idle speed control) valve</td>
<td>When the ISC (idle speed control) valve fully closes, and then it opens until it is at the standby opening position when the engine is started. This operation takes approximately 12 seconds until it is completed.</td>
<td>Motor drive noise during ISC (Idle Speed Control) valve operation.</td>
</tr>
<tr>
<td>56</td>
<td>Sub-throttle servo motor</td>
<td>Turn servo motor towards close and open. Engine warning light goes on during servo motor operation.</td>
<td>Check the operating sound of the sub-throttle servo motor.</td>
</tr>
</tbody>
</table>
TROUBLESHOOTING DETAILS
This section describes the measures per fault code number displayed on the meter. Carry out check and maintenance on items or components that could be a cause of malfunction in accordance with the order.

When the check and maintenance of malfunctioned part is completed, restore the meter display according to the "Reinstatement method".

Fault code No.
Fault code number displayed on the meter when the engine failed to work normally. Refer to "DIAGNOSTIC MONITORING MODE" on page 7-32.

Diagnostic monitoring code No.: Code number to be used when the diagnostic monitoring mode is operated. Refer to "DIAGNOSTIC MONITORING MODE" on page 7-32.

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>12</th>
<th>Symptom</th>
<th>No normal signals are received from the crankshaft position sensor.</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>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  
* 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 it securely. | |
| 3     | Open or short circuit in wire harness. |  
* Repair or replace if there is an open or short circuit.  
* Between crankshaft position sensor coupler and ECU coupler.  
  (Gray–Gray)  
  (Black/Blue–Black/Blue) | |
| 4     | Installed condition of crankshaft position sensor. |  
* Replace if defective.  
Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 7-94. | |
### FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>13</th>
<th>Symptom</th>
<th>Intake air pressure sensor 1 open or short circuit detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>03</td>
<td>Intake air pressure sensor 1</td>
<td></td>
</tr>
<tr>
<td><strong>Order</strong></td>
<td><strong>Item/components and probable cause</strong></td>
<td><strong>Check or maintenance job</strong></td>
<td><strong>Reinstatement method</strong></td>
</tr>
<tr>
<td>When error code Nos. 13 and 14 are displayed simultaneously, first check and repair No.13.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1 | Connections.  
● Intake air pressure sensor 1 coupler  
● Wire harness ECU coupler  
● Sub-wire harness 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 it securely. | Set the main switch to “ON”. |
| 2 | Open or short circuit in wire harness and/or sub-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/White–Pink/White)  
(Blue–Blue) | |
| 3 | Defective intake air pressure sensor 1. | • Execute the diagnostic mode.  
(Code No.03)  
• Replace if defective.  
Refer to “CHECKING INTAKE AIR PRESSURE SENSORS 1 AND 2” on page 7-98. | |
<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>14</th>
<th>Symptom</th>
<th>Intake air pressure sensor 1 hose system malfunction (clogged or detached hose).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>03</td>
<td>Intake air pressure sensor 1</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>Intake air pressure sensor hose.</td>
<td>Check the intake air pressure sensor 1 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 malfunc-</td>
<td>Check and repair the connec-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>tion at intermediate electrical potential.</td>
<td>tion.</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 1 coupler</td>
<td>Check the locking condition of the coupler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wire harness ECU coupler</td>
<td>If there is a malfunction, repair it and connect it securely.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Sub-wire harness coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Defective intake air pressure sensor 1</td>
<td>Execute the diagnostic mode. (Code No.03)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace if defective.</td>
<td>Refer to “THROTTLE BODIES” on page 6-4.</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.&lt;br&gt;● Check that is installed in the specified position.</td>
<td>Set the main switch to “ON”.</td>
</tr>
<tr>
<td>2</td>
<td>Connections.&lt;br&gt;● Throttle position sensor coupler&lt;br&gt;● Wire harness ECU coupler&lt;br&gt;● Sub-wire harness coupler</td>
<td>● Check the coupler for any pins that may have pulled out.&lt;br&gt;● Check the locking condition of the coupler.&lt;br&gt;● If there is a malfunction, repair it and connect it securely.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Open or short circuit in wire harness and/or sub-wire harness.</td>
<td>● Repair or replace if there is an open or short circuit.&lt;br&gt;● Between throttle position sensor coupler and ECU coupler.&lt;br&gt;(Black/Blue–Black/Blue)&lt;br&gt;(Yellow–Yellow)&lt;br&gt;(Blue–Blue)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Throttle position sensor lead, output voltage.</td>
<td>● Check for output voltage and replace the throttle position sensor.&lt;br&gt;(Black/Blue–Yellow/Blue)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Open circuit item</td>
<td>Output voltage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ground wire open circuit</td>
<td>5 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Open circuit on signal line</td>
<td>0 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Power supply wire open circuit</td>
<td>0 V</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Defective throttle position sensor.</td>
<td>● Execute the diagnostic mode.&lt;br&gt;(Code No.01)&lt;br&gt;● Replace if defective.&lt;br&gt;Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 7-97</td>
<td></td>
</tr>
</tbody>
</table>
### FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>16</th>
<th>Symptom</th>
<th>Stuck throttle position sensor detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>01</td>
<td>Throttle position sensor</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
</table>
|       | • When error code Nos. 15 and 16 are displayed simultaneously, first check and repair No.15.  
• When error code Nos. 16 and 37 are displayed simultaneously, first check and repair No.16. |                        |                      |
| 1     | Installed condition of throttle position sensor. | • Check for looseness or pinching.  
• Check that is installed in the specified position. | Reinstated by starting the engine, operating it at idle. And then racing it. |
| 2     | Defective throttle position sensor. | • Execute the diagnostic mode. (Code No.01)  
• Replace if defective.  
Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 7-97. |                      |

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>17</th>
<th>Symptom</th>
<th>EXUP servo motor circuit open or short circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>53</td>
<td>EXUP servo motor</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></td>
<td>When error code Nos. 17 and 18 are displayed simultaneously, first check and repair No.17.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1     | Connections.  
• EXUP servo motor coupler  
• Wire harness ECU coupler  
• Sub-wire harness 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 it securely. | Set the main switch to “ON”. |
| 2     | Open or short circuit in wire harness and/or sub-wire harness. | • Repair or replace if there is an open or short circuit.  
• Between EXUP servo motor coupler and ECU coupler. (Black/Blue–Black/Blue)  
(White/Red–White/Red)  
(Blue–Blue) |                      |
| 3     | Defective EXUP servo motor. | • Execute the diagnostic mode. (Code No.53)  
• Replace if defective. |                      |
<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>18</th>
<th>Symptom</th>
<th>EXUP servo motor is stuck.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>53</td>
<td>EXUP servo motor</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></td>
<td>When error code Nos. 17 and 18 are displayed simultaneously, first check and repair No.17.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Connections.</td>
<td>Check the coupler for any pins that may have pulled out.</td>
<td>Set the main switch to “ON”. And then racing it.</td>
</tr>
<tr>
<td></td>
<td>● EXUP servo motor coupler</td>
<td>Check the locking condition of the coupler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Wire harness ECU coupler</td>
<td>If there is a malfunction, repair it and connect it securely.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Sub-wire harness coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness and/or sub-wire harness.</td>
<td>Repair or replace if there is an open or short circuit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Between EXUP servo motor coupler and ECU coupler. (Black/Red–Black/Red) (Black/Green–Black/Green)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective EXUP servo motor.</td>
<td>Execute the diagnostic mode. (Code No.53)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Defective EXUP valve, pulley and cable.</td>
<td>Replace if defective.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>19</th>
<th>Symptom</th>
<th>Open circuit is detected in the input line from the sidestand switch to the ECU.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>20</td>
<td>Symptom</td>
<td>Sidestand switch</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>Execute the diagnostic monitoring mode. (Code No.20)</td>
<td>If the transmission is in gear, retracting the sidestand. If the transmission is in neutral, reconnecting the wiring.</td>
</tr>
<tr>
<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>(Orange/Red)</td>
<td>Check the locking condition of the coupler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If there is a malfunction, repair it and connect it 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 ECU and starting circuit cut-off relay. (Orange/Red)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective sidestand switch.</td>
<td>Execute the diagnostic mode. (Code No.20)</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 SWITCHES” on page 7-81.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>20</th>
<th>Symptom</th>
<th>Intake air pressure sensor 1 and intake air pressure sensor 2 differ greatly.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>03/04</td>
<td>Symptom</td>
<td>Intake air pressure sensor 1/Intake air pressure sensor 2</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>Defective intake air pressure sensor 1 or intake air pressure sensor 2.</td>
<td>Execute the diagnostic mode. (Code No.03/04)</td>
<td>Set the main switch to “ON”.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace if defective.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refer to “CHECKING INTAKE AIR PRESSURE SENSORS 1 AND 2” on page 7-98.</td>
<td></td>
</tr>
</tbody>
</table>
### Fault code No. 22 - Symptom
Intake air temperature sensor-open or short circuit detected.

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>05</th>
<th>Intake air temperature sensor</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connections.</td>
<td>Check the coupler for any pins that may have pulled out.</td>
<td>Set the main switch to “ON”.</td>
</tr>
<tr>
<td></td>
<td>• Intake air temperature sensor coupler</td>
<td>Check the locking condition of the coupler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wire harness ECU coupler</td>
<td>If there is a malfunction, repair it and connect it 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>• Between intake air temperature sensor coupler and ECU coupler.</td>
<td>(Black/Blue–Black/Blue)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Brown/White–Brown/White)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Installed condition of intake air temperature sensor.</td>
<td>Execute the diagnostic mode. (Code No.05)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace if defective. Refer to “CHECKING THE INTAKE AIR TEMPERATURE SENSOR” on page 7-99.</td>
<td></td>
</tr>
<tr>
<td>Fault code No.</td>
<td>24</td>
<td>Symptom</td>
<td>$O_2$ sensor open or short circuit detected.</td>
</tr>
<tr>
<td>---------------</td>
<td>----</td>
<td>---------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Installed condition of $O_2$ sensor.</td>
<td>• Check for looseness or pinch-ing.</td>
<td>Engine starts and races after warm up. Or reset with diagnosis code 63.</td>
</tr>
<tr>
<td>2</td>
<td>Connections. &lt;br&gt;• $O_2$ sensor coupler &lt;br&gt;• Wire harness ECU coupler</td>
<td>• Check the coupler for any pins that may have pulled out. &lt;br&gt;• Check the locking condition of the coupler. &lt;br&gt;• If there is a malfunction, repair it and connect it 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. &lt;br&gt;• Between $O_2$ sensor coupler and ECU coupler.  &lt;br&gt;  (Black/Blue–Black/Blue) &lt;br&gt;  (Gray/Green–Gray/Green)</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>Check fuel pressure.</td>
<td>Refer to “THROTTLE BODIES” on page 6-4.</td>
<td>—</td>
</tr>
<tr>
<td>5</td>
<td>Defective $O_2$ sensor.</td>
<td>• Replace if defective. &lt;br&gt;Refer to “ENGINE REMOVAL” on page 5-1.</td>
<td>—</td>
</tr>
<tr>
<td>Fault code No.</td>
<td>25</td>
<td>Symptom</td>
<td>Intake air pressure sensor 2 open or short circuit detected.</td>
</tr>
<tr>
<td>---------------</td>
<td>----------</td>
<td>---------------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>04</td>
<td>Intake air pressure sensor 2</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>Set the main switch to “ON”.</td>
</tr>
<tr>
<td></td>
<td>• Intake air pressure sensor 2 coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wire harness ECU coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Sub-wire harness coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Check the coupler for any pins that may have pulled out.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Check the locking condition of the coupler.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If there is a malfunction, repair it and connect it securely.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness and/or sub-wire harness.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective intake air pressure sensor 2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Execute the diagnostic mode. (Code No.04)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Replace if defective. Refer to “CHECKING INTAKE AIR PRESSURE SENSORS 1 AND 2” on page 7-98.</td>
<td></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></td>
<td></td>
<td></td>
<td>When error code Nos. 26 and 37 are displayed simultaneously, first check and repair No.26.</td>
</tr>
</tbody>
</table>
| 1     | Intake air pressure sensor hose.   | ● Check the intake air pressure sensor 2 hose condition.  
● Repair or replace the sensor hose. | Starting the engine and operating it at idle. |
| 2     | Intake air pressure sensor malfunc-
    tion at intermediate electrical poten-
    tial. | ● Check and repair the connec- 
    tion.  
● Replace it if there is a malfunc-
    tion. | |
| 3     | Connections.  
● Intake air pressure sensor 2 coupler  
● Wire harness ECU coupler  
● Sub-wire harness 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 it securely. | |
| 4     | Defective intake air pressure sensor 2. | ● Execute the diagnostic mode.  
(Code No.03)  
● Replace if defective.  
Refer to “THROTTLE BODIES” on page 6-4. | |
### FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>28</th>
<th>Symptom</th>
<th>Engine temperature sensor-open or short circuit detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>11</td>
<td>Engine 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></td>
<td>When error code Nos. 28 and 37 are displayed simultaneously, first check and repair No.28.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Connections. &lt;br&gt; - Engine temperature sensor coupler  &lt;br&gt; - Wire harness ECU coupler  &lt;br&gt; - Sub-wire harness coupler</td>
<td>Check the coupler for any pins that may have pulled out. &lt;br&gt; Check the locking condition of the coupler. &lt;br&gt; If there is a malfunction, repair it and connect it securely.</td>
<td>Set the main switch to “ON”.</td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness and/or sub-wire harness.</td>
<td>Repair or replace if there is an open or short circuit. &lt;br&gt; Between engine temperature sensor coupler and ECU coupler. (Black–Black/Blue) (Yellow–Green/White)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective engine temperature sensor.</td>
<td>Execute the diagnostic mode. (Code No.11) Replace if defective. Refer to “CHECKING THE ENGINE TEMPERATURE SENSOR” on page 7-96.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>30</th>
<th>Symptom</th>
<th>The vehicle has over turned.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>08</td>
<td>Lean angle sensor</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The vehicle has overturned.</td>
<td>Raise the vehicle upright.</td>
<td>Set the main switch ON (However, the engine cannot be restarted unless the main switch is first set to “OFF”).</td>
</tr>
<tr>
<td>2</td>
<td>Installed condition of lean angle sensor.</td>
<td>Check for looseness or pinching.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Connections. &lt;br&gt; - Lean angle sensor coupler  &lt;br&gt; - Wire harness ECU coupler</td>
<td>Check the coupler for any pins that may have pulled out. &lt;br&gt; Check the locking condition of the coupler. &lt;br&gt; If there is a malfunction, repair it and connect it securely.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Defective lean angle sensor.</td>
<td>Execute the diagnostic mode. (Code No.08) Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 7-94.</td>
<td></td>
</tr>
</tbody>
</table>
## FUEL INJECTION SYSTEM

### Fault code No. 33
- **Symptom**: Malfunction detected in the primary lead of the ignition coil (#1 and #4).
- **Diagnostic code No. 30**: Ignition coil (#1 and #4)

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
</table>
| 1     | Connection.  
  - Ignition coil (#1/#4) primary lead coupler (orange)  
  - 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 it securely. | Starting the engine and operating it at idle. |
| 2     | Open circuit in wire harness. |  
  - Repair or replace if there is an open circuit.  
  - Between ignition coil (#1/#4) coupler and ECU coupler. (Orange–Orange) | |
| 3     | Defective ignition coil (#1 and #4). |  
  - Execute the diagnostic mode. (Code No.30)  
  - Test the primary and secondary coils for continuity.  
  - Replace if defective.  
  - Refer to “CHECKING THE IGNITION COIL” on page 7-93. | |

### Fault code No. 34
- **Symptom**: Malfunction detected in the primary lead of the ignition coil (#2 and #3).
- **Diagnostic code No. 31**: Ignition coil (#2 and #3)

<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.  
  - Ignition coil (#2/#3) primary lead coupler (gray/red)  
  - 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 it securely. | Starting the engine and operating it at idle. |
| 2     | Open circuit wire harness. |  
  - Repair or replace if there is an open circuit.  
  - Between ignition coil (#2/#3) coupler and ECU coupler. (Gray/Red–Gray/Red) | |
| 3     | Defective ignition coil (#2 and #3). |  
  - Execute the diagnostic mode. (Code No.31)  
  - Test the primary and secondary coils for continuity.  
  - Replace if defective.  
  - Refer to “CHECKING THE IGNITION COIL” on page 7-93. | |
### FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>Symptom</th>
<th>Diagnostic code No.</th>
<th>ISC (idle speed control) valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>Engine speed is high when the engine is idling.</td>
<td>54</td>
<td></td>
</tr>
</tbody>
</table>

**Order**

<table>
<thead>
<tr>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>● When error code Nos. 15 and 37 are displayed simultaneously, first check and repair No.15.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>● When error code Nos. 16 and 37 are displayed simultaneously, first check and repair No.16.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>● When error code Nos. 22 and 37 are displayed simultaneously, first check and repair No.22.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>● When error code Nos. 25 and 37 are displayed simultaneously, first check and repair No.25.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>● When error code Nos. 26 and 37 are displayed simultaneously, first check and repair No.26.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>● When error code Nos. 28 and 37 are displayed simultaneously, first check and repair No.28.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fault code No.</td>
<td>37</td>
<td>Symptom</td>
</tr>
<tr>
<td>--------------</td>
<td>----</td>
<td>---------</td>
</tr>
<tr>
<td>Diagnostic code No.</td>
<td>54</td>
<td>ISC (idle speed control) valve</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>EFI fuse</td>
<td>• Check the EFI fuse. Refer to “CHECKING THE FUSES” on page 7-86.</td>
<td>Starting the engine and operating it at idle.</td>
</tr>
<tr>
<td>2</td>
<td>Connections.  ● ISC sensor coupler  ● Wire harness ECU coupler  ● Sub-wire harness 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 it securely.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Open circuit in wire harness and/or sub-wire harness.</td>
<td>• Repair or replace if there is an open circuit.  • Between ISC coupler and ECU coupler.  (Orange/White–Orange/White)  (Light green–Light green)  (Light green/White–Light green/White)  (Orange/Green–Orange/Green)  • Between ISC coupler and battery.  (Red–Red)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Throttle valve does not fully close.</td>
<td>• Check the throttle body. Refer to “THROTTLE BODIES” on page 6-4.  • Check the throttle cables. Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-9.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>ISC hose disconnect.  (Abnormally intake noise)</td>
<td>• Check the ISC hose. Refer to “THROTTLE BODIES” on page 6-4.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>ISC (idle speed control) valve stuck fully open.</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>7</td>
<td>ISC (idle speed control) valve is not moving correctly.</td>
<td>• Execute the diagnostic mode. (Code No.54)  • When the ISC (idle speed control) valve fully closes, and then it opens until it is at the standby opening position when the engine is started. This operation takes approximately 12 seconds until it is completed.  • Start the engine. Start the engine. If the error recurs, replace the throttle body assembly.</td>
<td></td>
</tr>
</tbody>
</table>
## FUEL INJECTION SYSTEM

### Fault code No. 39
**Symptom**: Injector-open circuit detected
**Diagnostic code No.**: 36/37/38/39
**Injector**: #1/#2/#3/#4

<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>Start the engine.</td>
</tr>
<tr>
<td></td>
<td>● Fuel injector coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Wire harness ECU coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Sub-wire harness coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Check or maintenance job</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Check the coupler for any pins that may have pulled out.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Check the locking condition of the coupler.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Repair or replace if there is an open or short circuit.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness and/or sub-wire harness.</td>
<td>Repair or replace if there is an open or short circuits.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Between fuel injector coupler and ECU coupler. (Red/Black–Red/Black)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Green/Black–Green/Black)</td>
<td>(Blue/Black–Blue/Black)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Orange/Black–Orange/Black)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective injector.</td>
<td>Execute the diagnosis mode. (Code No.36/37/38/39)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Execute the diagnosis mode.</td>
<td>Replace if defective.</td>
<td></td>
</tr>
</tbody>
</table>

### Fault code No. 41
**Symptom**: Lean angle sensor open or short circuit detected.
**Diagnostic code No.**: 08
**Lean angle sensor**

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connections.</td>
<td></td>
<td>Set the main switch to “ON”.</td>
</tr>
<tr>
<td></td>
<td>● Lean angle sensor coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Wire harness ECU coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Check or maintenance job</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Check the coupler for any pins that may have pulled out.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Check the locking condition of the coupler.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● If there is a malfunction, repair it and connect it securely.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness.</td>
<td>Repair or replace if there is an open or short circuit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Between lean angle sensor coupler and ECU coupler. (Black/Blue–Black/Blue)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Yellow/Green–Yellow/Green)</td>
<td>(Blue–Blue)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective lean angle sensor.</td>
<td>Execute the diagnostic mode. (Code No.08)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Execute the diagnostic mode.</td>
<td>Replace if defective.</td>
<td>Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 7-94.</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>42</td>
<td>A. No normal signals are received from the speed sensor. B. Open or short circuit is detected in the neutral switch.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 07 Speed sensor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B 21 Neutral switch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A-1</td>
<td>Installed condition of speed sensor</td>
<td>Check for looseness or pinching.</td>
<td>Starting the engine, and inputting the vehicle speed signals by operating the vehicle at a low speed of 20–30 km/h.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A-2</td>
<td>Connections.</td>
<td>Check the coupler for any pins that may have pulled out. Check the locking condition of the coupler. If there is a malfunction, repair it and connect it securely.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Speed sensor coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Wire harness ECU coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A-3</td>
<td>Open or short circuit in wire harness.</td>
<td>Repair or replace if there is an open or short circuit. Between sensor coupler and ECU coupler. (Blue–Blue) (White/Yellow–White/Yellow) (Black/Blue–Black/Blue)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A-4</td>
<td>Defective speed sensor.</td>
<td>Execute the diagnostic mode. (Code No.07) Replace if defective. Refer to “CHECKING THE SPEED SENSOR” on page 7-96.</td>
<td></td>
</tr>
</tbody>
</table>

---

**7-57**
### FUEL INJECTION SYSTEM

#### Fault code No. 42

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. No normal signals are received from the speed sensor.</td>
<td></td>
</tr>
<tr>
<td>B. Open or short circuit is detected in the neutral switch.</td>
<td></td>
</tr>
</tbody>
</table>

#### Diagnostic code No.

| A 07 | Speed sensor |
| B 21 | Neutral switch |

#### Order | Item/components and probable cause | Check or maintenance job | Reinstatement method |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B-1</strong></td>
<td>Installed condition of neutral switch</td>
<td>Check for looseness or pinching.</td>
<td>Starting the engine, and inputting the vehicle speed signals by operating the vehicle at a 20 to 30 km/h.</td>
</tr>
</tbody>
</table>
| **B-2** | Connections.  
  • Neutral switch coupler  
  • Wire harness ECU coupler  
  • Sub-wire harness 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 it securely. |  |
| **B-3** | Open or short circuit in wire harness and/or sub-wire harness. | Repair or replace if there is an open or short circuit.  
Between relay unit coupler and ECU coupler.  
(Black/Yellow–Black /Yellow)  
Between neutral switch and relay unit coupler  
(Sky blue–Sky blue) |  |
| **B-4** | Defective neutral switch. | Execute the diagnostic mode.  
(Code No.21)  
Replace if defective.  
Refer to “CHECKING THE SWITCHES” on page 7-81. |  |
| **B-5** | Defective shift drum (neutral position) | Replace if defective.  
Refer to “TRANSMISSION” on page 5-77. |  |
# FUEL INJECTION SYSTEM

## Fault code No. 43
**Symptom:** Supplied power to the fuel injector and fuel pump is not normal.

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>09</th>
<th><strong>Symptom</strong></th>
<th><strong>Supplied power to the fuel injector and fuel pump is not normal.</strong></th>
</tr>
</thead>
</table>

### Order | Item/components and probable cause | Check or maintenance job | Reinstatement method |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connections.</td>
<td></td>
<td>Starting the engine and operating it at idle.</td>
</tr>
<tr>
<td></td>
<td>● Starting circuit cut-off relay coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Fuel pump coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Injector coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Wire harness ECU coupler</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Check the coupler for any pins that may have pulled out.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Check the locking condition of the coupler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● If there is a malfunction, repair it and connect it securely.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Repair or replace if there is an open or short circuit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Between relay unit and ECU coupler. (Red/Blue–Red/Blue)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Between battery and relay unit (Red–Red)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective unit (fuel pump relay).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Execute the diagnostic mode. (Code No. 09)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Replace if defective. Refer to “CHECKING THE RELAYS” on page 7-90.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● If there is no malfunction with the relay unit (fuel pump relay), replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>

## Fault code No. 44
**Symptom:** Error is detected while reading or writing on EEPROM. (CO adjustment value)

<table>
<thead>
<tr>
<th>Diagnostic code No.</th>
<th>60</th>
<th><strong>Symptom</strong></th>
<th><strong>Error is detected while reading or writing on EEPROM. (CO adjustment value)</strong></th>
</tr>
</thead>
</table>

### Order | Item/components and probable cause | Check or maintenance job | Reinstatement method |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Malfunction in ECU.</td>
<td></td>
<td>Set the main switch to “ON”. Volume after it is reinstated. Readjust the exhaust gas.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Set the faulty cylinder’s exhaust gas volume.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Execute the diagnostic mode (Code No. 60) to check the faulty cylinder number. (If multiple cylinders are defective, the numbers of the faulty cylinders are displayed alternately at 2-second intervals.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Execute the CO adjustment mode and set the exhaust gas volume of the faulty cylinder to “0”. Refer to “ADJUSTING THE EXHAUST GAS VOLUME” on page 3-8.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Replace the ECU if it does not recover from the malfunction.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### FUEL INJECTION SYSTEM

<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. ● 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 it securely.</td>
<td>Starting the engine and operating it at idle.</td>
</tr>
<tr>
<td>2</td>
<td>Faulty battery.</td>
<td>● Replace or change the battery Refer to “CHECKING AND CHARGING THE BATTERY” on page 7-87.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective generator.</td>
<td>● Replace if defective. ● Check the output voltage of generator. Refer to “CHARGING SYSTEM” on page 7-11.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Open or short circuit in wire harness.</td>
<td>Repair or replace if there is an open or short circuit. ● Between battery and main switch. (Red–Red) ● Between main switch and fuse (ignition). (Brown/Blue–Brown/Blue) ● Between Fuse (ignition) and ECU. (Red/White–Red/White)</td>
<td></td>
</tr>
</tbody>
</table>
**FUEL INJECTION SYSTEM**

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>47</th>
<th>Symptom</th>
<th>Sub-throttle position sensor-open or short circuit detected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>56</td>
<td>Sub-throttle servo motor</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></td>
<td>When error code Nos. 47 and 48 are displayed simultaneously, first check and repair No.47.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1     | Installed condition of sub-throttle position sensor. | ● Check for looseness or pinching.  
       |                                                   | ● Check that is installed in the specified position. | Set the main switch to “ON”. |
| 2     | Connections.  
       | ● Sub-throttle position sensor coupler  
       | ● Wire harness ECU coupler  
       | ● Sub-wire harness 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 it securely. |                      |
| 3     | Open or short circuit in wire harness and/or sub-wire harness. | ● Repair or replace if there is an open or short circuit.  
       |                                                   | ● Between sub-throttle position sensor coupler and ECU coupler.  
       |                                                   | (Black/Blue–Black/Blue)  
       |                                                   | (Gray/Black–Gray/Black)  
       |                                                   | (Blue–Blue) |                      |
| 4     | Installed condition of sub-throttle position sensor. | ● Execute the diagnostic mode.  
       |                                                   | (Code No.56)  
       |                                                   | ● Replace if defective.  
       |                                                   | Refer to “CHECKING AND ADJUSTING THE SUB-THROTTLE POSITION SENSOR” on page 6-8. |                      |
### FUEL INJECTION SYSTEM

<table>
<thead>
<tr>
<th>Fault code No.</th>
<th>48</th>
<th>Symptom</th>
<th>Sub-throttle servo motor is stuck.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic code No.</td>
<td>56</td>
<td>Sub-throttle servo motor</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></td>
<td>When error code Nos. 47 and 48 are displayed simultaneously, first check and repair No. 47.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Connections.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Sub-throttle position sensor coupler</td>
<td>Check the coupler for any pins that may have pulled out.</td>
<td>Set the main switch to “ON”.</td>
</tr>
<tr>
<td></td>
<td>● Wire harness ECU coupler</td>
<td>● Check the locking condition of the coupler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Sub-wire harness coupler</td>
<td>● If there is a malfunction, repair it and connect it securely.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness and/or sub-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 sub-throttle position sensor coupler and ECU coupler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Yellow/Red–Yellow/Red)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Yellow/White–Yellow/White)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Defective sub-throttle servo motor</td>
<td>Execute the diagnostic mode. (Code No. 56)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When the abnormality is detected at diagnostic mode (Code No. 56), inspect. Refer to “CHECKING THE SUB-THROTTLE SERVO MOTOR” on page 6-10.</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.</td>
<td>Set the main switch to “ON”.</td>
</tr>
</tbody>
</table>
## Fault code No. Er-1

**Symptom:** No signals are received from the ECU.

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connections. ● Wire harness ECU coupler</td>
<td>✓ Check the coupler for any pins that may have pulled out. ● Check the locking condition of the coupler. ● Repair or replace if there is an open or short circuit.</td>
<td>Reinstated automatically when it receives a normal signal.</td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness.</td>
<td>● Repair or replace if there is an open or short circuit. ● Between meter coupler and ECU coupler (Yellow/Blue–Yellow/Blue)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Malfunction in meter unit.</td>
<td>Replace the meter unit.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ECU is defective</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>

## Fault code No. Er-2

**Symptom:** Not within the specified signal time from the ECU

<table>
<thead>
<tr>
<th>Order</th>
<th>Item/components and probable cause</th>
<th>Check or maintenance job</th>
<th>Reinstatement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connections. ● 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 it securely.</td>
<td>Reinstated automatically when it receives a normal signal.</td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness.</td>
<td>● Repair or replace if there is an open or short circuit. ● Between meter coupler and ECU coupler (Yellow/Blue–Yellow/Blue)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Malfunction in meter unit.</td>
<td>Replace the meter unit.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>
### FUEL INJECTION SYSTEM

#### Fault code No. Er-3

<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. ● 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 it securely.</td>
<td>Reinstated automatically when it receives a normal signal.</td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness.</td>
<td>● Repair or replace if there is an open or short circuit. ● Between meter coupler and ECU coupler. (Yellow/Blue–Yellow/Blue)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Malfunction in meter unit.</td>
<td>Replace the meter unit.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>

#### Fault code No. Er-4

<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. ● 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 it securely.</td>
<td>Reinstated automatically when it receives a normal signal.</td>
</tr>
<tr>
<td>2</td>
<td>Open or short circuit in wire harness.</td>
<td>● Repair or replace if there is an open or short circuit. ● Between meter coupler and ECU coupler. (Yellow/Blue–Yellow/Blue)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Malfunction in meter unit.</td>
<td>Replace the meter unit.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Malfunction in ECU.</td>
<td>Replace the ECU.</td>
<td></td>
</tr>
</tbody>
</table>
2. Main switch
3. Ignition fuse
4. Main fuse
5. EFI fuse
7. Battery
13. Engine stop switch
15. Relay unit
18. Fuel pump
38. ECU
### TROUBLESHOOTING

The fuel pump fails to operate.

**NOTE:**

Before troubleshooting, remove the following part(s):

1. Seat
2. Side cover (right)
3. Headlight unit

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuse (Main fuse, ignition fuse, EFI fuse) Refer to “CHECKING THE FUSES” on page 7-86.</td>
<td>NG→ Replace the fuse(s).</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 7-87.</td>
<td>NG→ Clean the battery terminals. Recharge or replace the battery.</td>
<td>OK↓</td>
</tr>
<tr>
<td>3.</td>
<td>Check the main switch. Refer to “CHECKING THE SWITCHES” on page 7-81.</td>
<td>NG→ Replace the main switch.</td>
<td>OK↓</td>
</tr>
<tr>
<td>4.</td>
<td>Check the engine stop switch. Refer to “CHECKING THE SWITCHES” on page 7-81.</td>
<td>NG→ Replace the right handlebar switch.</td>
<td>OK↓</td>
</tr>
<tr>
<td>5.</td>
<td>Check the relay unit (fuel pump relay). Refer to “CHECKING THE SWITCHES” on page 7-81.</td>
<td>NG→ Replace relay unit (fuel pump relay)</td>
<td>OK↓</td>
</tr>
<tr>
<td>6.</td>
<td>Check fuel pressure Refer to “CHECKING THE PRESSURE REGULATOR” on page 6-7.</td>
<td>NG→ Replace the fuel pump.</td>
<td>OK↓</td>
</tr>
<tr>
<td>7.</td>
<td>Check the fuel pump system wire harness connections. Refer to “CIRCUIT DIAGRAM” on page 7-65.</td>
<td>NG→ Properly connect or repair the fuel pump system’s wiring.</td>
<td>OK↓</td>
</tr>
</tbody>
</table>

Replace the ECU.
2. Main switch
3. Ignition fuse
4. Main fuse
5. Backup fuse
7. Battery
38. ECU
40. Immobilizer system warning light
44. Multi-function display
71. Immobilizer unit
GENERAL INFORMATION
This vehicle is equipped with an immobilizer system to help prevent theft by re-registering codes in the standard keys. This system consists of the following:
- a code re-registering key (with a red bow)
- two standard keys (with a black bow) that can be re-registered with new codes
- a transponder (installed in the red key bow)
- an immobilizer unit
- the ECU
- an immobilizer system indicator light

The key with the red bow is used to register codes in each standard key. Do not use the key with the red bow for driving. It should only be used for re-registering new codes in the standard keys. The immobilizer system cannot be operated with a new key until the key registered with a code. If you lose the code re-registering key, the ECU and main switch (equipped with the immobilizer unit) need to be replaced.

Therefore, always use a standard key for driving. (See caution below.)

NOTE:
Each standard key is registered during production, therefore re-registering at purchase is not necessary.

CAUTION:
- DO NOT LOSE THE CODE RE-REGISTERING KEY! If the code re-registering key is lost, registering new codes in the standard keys is impossible. The standard keys can still be used to start the vehicle. However, if code re-registering is required (e.g., if a new standard key is made or all keys are lost) the entire immobilizer system must be replaced. Therefore, it is highly recommended to use either standard key for driving, and to keep the code re-registering key in a safe place.
- Do not submerse the keys in water.
- Do not expose the keys to excessively high temperatures.
- Do not place the keys close to magnets (this includes, but is not limited to, products such as speakers, etc.).
- Do not place heavy items on the keys.
- Do not grind the keys or alter their shape.
- Do not disassemble the key bows.
- Do not put two keys of any immobilizer system on the same key ring.
- Keep the standard keys as well as other immobilizer system keys away from the code re-registering key.
- Keep other immobilizer system keys away from the main switch as they may cause signal interference.

PART REPLACEMENT AND KEY CODE REGISTRATION REQUIREMENTS
In the course of use, you may encounter the following cases where replacement of parts and registration of code re-registering/standard keys are required.

NOTE:
Each standard key is registered during production, therefore re-registering at purchase is not necessary.
## IMMOBILIZER SYSTEM

<table>
<thead>
<tr>
<th>Parts to be replaced</th>
<th>Key registration requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main switch/ immobilizer unit</strong></td>
<td><strong>Standard key</strong></td>
</tr>
<tr>
<td>Main switch</td>
<td>Immobilizer unit</td>
</tr>
<tr>
<td>Standard key is lost</td>
<td>✓</td>
</tr>
<tr>
<td>All keys have been lost (including code re-registering key)</td>
<td>✓</td>
</tr>
<tr>
<td>ECU is defective</td>
<td></td>
</tr>
<tr>
<td>Immobilizer unit is defective</td>
<td></td>
</tr>
<tr>
<td>Main switch is defective</td>
<td>✓</td>
</tr>
<tr>
<td>Accessory lock* is defective</td>
<td></td>
</tr>
</tbody>
</table>

* Accessory locks mean the seat lock and fuel tank cap.

### Code re-registering key registration:

When the immobilizer unit or ECU is replaced, the code re-registering key must be registered to the unit.

To register a code re-registering key:

1. Turn the main switch to “ON” with the code re-registering key.

**NOTE:**

Check that the immobilizer system indicator light comes on for one second, then goes off. When the immobilizer system indicator light goes off, the code re-registering key has been registered.

2. Check that the engine can be started.
3. Register the standard key, following the instructions in the section below.

### Standby mode:

To enable the immobilizer system, turn the ignition key to “OFF”. 30 seconds later, the indicator light will start flashing continuously in the standby flashing mode pattern for up to 24 hours. After that time, the indicator light will stop flashing, but the immobilizer system is still enabled.
Standby mode:

1. Check that the immobilizer system indicator light signals the standby mode.
2. Using the code re-registering key, turn the main switch to "ON", then "OFF", and then remove the key within 5 seconds.
3. Insert the first standard key to be registered into the main switch, then turn the key to "ON" within 5 seconds to activate the key registration mode.
   **NOTE:**
   The existing standard key code is erased from the memory when the key registration mode is activated.
4. While the indicator light is flashing, turn the main switch to "OFF", remove the key, and within 5 seconds, insert the second standard key to be registered into the main switch.
   **NOTE:**
   If the immobilizer system indicator light stops flashing 5 seconds after the first standard key is registered, the registration mode is deactivated. If this occurs, the second standard key cannot be registered, and steps 2 to 4 need to be repeated to register both standard keys.
5. Turn the main switch to "ON".
   **NOTE:**
   When the indicator light goes off, the registration is complete.
6. Check that the engine can be started with the two registered standard keys.

---

**Standard key registration:**
Standard key registration is required when a standard key is lost and needs to be replaced, or when the code re-registering key is re-registered after the immobilizer unit or ECU are replaced.

**NOTE:**
Do not start the engine with a standard key that has not been registered. If the main switch is turned "ON" with a standard key that has not been registered, the immobilizer system indicator light flashes to indicate fault code "52". (Refer to "SELF-DIAGNOSIS FAULT CODE INDICATION" on page 7-76).

1. Check that the immobilizer system indicator light signals the standby mode.
2. Using the code re-registering key, turn the main switch to "ON", then "OFF", and then remove the key within 5 seconds.
3. Insert the first standard key to be registered into the main switch, then turn the key to "ON" within 5 seconds to activate the key registration mode.
   **NOTE:**
   The existing standard key code is erased from the memory when the key registration mode is activated.
4. While the indicator light is flashing, turn the main switch to "OFF", remove the key, and within 5 seconds, insert the second standard key to be registered into the main switch.
   **NOTE:**
   If the immobilizer system indicator light stops flashing 5 seconds after the first standard key is registered, the registration mode is deactivated. If this occurs, the second standard key cannot be registered, and steps 2 to 4 need to be repeated to register both standard keys.
5. Turn the main switch to "ON".
   **NOTE:**
   When the indicator light goes off, the registration is complete.
6. Check that the engine can be started with the two registered standard keys.
Standard key registration

- Main switch “ON”.
- Main switch “OFF”.
- LED lights
- LED goes off
- Within 5 seconds
- Code re-registering key
- Standard key (1st)

A. Standard key (2nd) registration complete
B. When the 2nd standard key registration is completed, immobilizer light stops flashing.

Voiding the standard key code:
If a standard key has been lost, it is possible to disable its use by re-registering the remaining standard key. Standard key registration erases the stored standard key code from the memory, thus disabling the lost standard key. To re-register, refer to “Standard key registration”.

Standard key code voiding method

A. After five seconds has elapsed since registration of the 1st standard key, when the immobilizer light stops flashing, registration of the 2nd key is not possible.
TROUBLE SHOOTING

When the main switch is turned “ON”, the immobilizer system light goes on or flashes.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>NG→</th>
<th>OK↓</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check the fuse (Main, ignition and back up) Refer to “CHECKING THE FUSES” on page 7-86.</td>
<td>Replace the fuse.</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 7-87.</td>
<td>Clean the battery terminals. Recharge or replace the battery.</td>
<td>-</td>
</tr>
<tr>
<td>3.</td>
<td>Check the main switch. Refer to “CHECKING THE SWITCHES” on page 7-81.</td>
<td>Replace the main switch/immobilizer unit.</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Check the entire immobilizer system wiring. Refer to “CIRCUIT DIAGRAM” on page 7-69.</td>
<td>Properly connect or repair the immobilizer system’s wiring.</td>
<td>-</td>
</tr>
</tbody>
</table>

- Check the condition of the each immobilizer system’s circuits.
- Refer to “SELF-DIAGNOSIS FAULT CODE INDICATION” on page 7-76.
SELF-DIAGNOSIS FAULT CODE INDICATION
When a system failure occurs, the error code number is indicated in the LCD display of meter and the immobilizer system indicator light blinks at the same time. The pattern of blinking also shows the error code.

<table>
<thead>
<tr>
<th>Fault code</th>
<th>Part</th>
<th>Symptom</th>
<th>Cause</th>
<th>Action</th>
</tr>
</thead>
</table>
| 51         | IMMOBILIZER UNIT | Code cannot be transmitted between the key and immobilizer unit. | - Radio wave interference caused by objects around the keys and antennas.  
- Immobilizer unit malfunction.  
- Key malfunction. | - Keep magnets, metal objects, and other immobilizer system keys away from the keys and antennas.  
- Replace the main switch/immobilizer unit.  
- Replace the key. |
| 52         | IMMOBILIZER UNIT | Codes between the key and immobilizer unit do not match. | - Signal received from other transponder (failed to recognize code after ten consecutive attempts).  
- Signal received from unregistered standard key. | - Place the immobilizer unit at least 50 mm away from the transponder of other vehicles.  
- Register the standard key. |
| 53         | IMMOBILIZER UNIT | Codes cannot be transmitted between the ECU and the immobilizer unit. | - Noise interference or disconnected lead/cable.  
- Interference due to radio wave noise.  
- Disconnected communication harness.  
- Immobilizer unit malfunction.  
- ECU malfunction. | - Check the wire harness and connector.  
- Replace the main switch/immobilizer unit.  
- Replace the ECU. |
| 54         | IMMOBILIZER UNIT | Codes transmitted between the ECU and the immobilizer unit do not match. | - Noise interference or disconnected lead/cable.  
- Interference due to radio wave noise.  
- Disconnected communication harness.  
- Immobilizer unit malfunction.  
- ECU failure.  
- (The ECU or immobilizer unit was replaced with a used unit from another vehicle.) | - Register the code re-registering key.  
- Check the wire harness and connector.  
- Replace the main switch/immobilizer unit.  
- Replace the ECU. |
### IMMOBILIZER SYSTEM

<table>
<thead>
<tr>
<th>Fault code</th>
<th>Part</th>
<th>Symptom</th>
<th>Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>IMMOBILIZER UNIT</td>
<td>Key code registration malfunction.</td>
<td>Same standard key was attempted to be registered two consecutive times.</td>
<td>Register another standard key.</td>
</tr>
<tr>
<td>56</td>
<td>ECU</td>
<td>Undefinition code is received.</td>
<td>Noise interference or disconnected lead/cable.</td>
<td>• Check the wire harness and connector.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Replace the main switch/immobilizer unit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Replace the ECU.</td>
</tr>
</tbody>
</table>

**Immobilizer system indicator light fault code indication**

- Digit of 10: Cycles of 1 sec. ON and 1.5 sec. OFF.
- Digit of 1: Cycles of 0.5 sec. ON and 0.5 sec. OFF.

Example: fault code 52

- a. Remains on
- b. Light goes off

![Diagram](attachment:image.png)
1. Main switch
2. Fuel pump
3. Headlight relay
4. Starting circuit cut-off relay
5. Starter relay
6. ECU
7. Negative battery lead
8. Battery
9. Turn signal relay
10. Neutral switch
11. Neutral switch lead
12. Sidestand switch
13. Rear brake switch
14. Oil level gauge
15. Spark plug cap
16. Ignition coil
17. Horn
18. Horn
CHECKING THE SWITCHES
1. Main switch
2. Front brake switch
3. Engine stop switch
4. Starter switch
5. Rear brake switch
6. Fuse
7. Clutch switch
8. Horn switch
9. Dimmer switch
10. Pass switch
11. Turn signal switch
12. Hazard switch
13. Sidestand switch
14. Neutral 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.

**CAUTION:**

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

---

**Pocket tester**

90890-03112

Analog pocket tester

YU-03112-C

---

**NOTE:**

- 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 terminal connections for switches (e.g., main switch, engine stop switch) are shown in an illustration similar to the one on the left. The switch positions “a” are shown in the far left column and the switch lead colors “b” are shown in the top row in the switch illustration.

**NOTE:**

“ ○—○” indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

**The example illustration on the left shows that:**

There is continuity between black and black/white when the switch is set to “OFF”.

There is continuity between red and brown when the switch is set to “ON”.

---

7-83
CHECKING THE BULBS AND BULB SOCKETS

NOTE: 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 on the left.

- Bulbs “A” and “B” are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.

- Bulbs “C” is used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.

- Bulbs “D” and “E” are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.

Checking the condition of the bulbs

The following procedure applies to all of the bulbs.

1. Remove:
   - Bulb

WARNING

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

CAUTION:

- When removing the bulb, hold the socket. Do not pull the lead as this may result in disconnection of the lead inside the socket. Never pull the lead; otherwise it may be pulled out of the terminal in the coupler.

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

2. Check:
   - Bulb (for continuity)
     (with the pocket tester)
     No continuity → Replace.

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

NOTE:
Before checking for continuity, set the pocket tester to “0” and to the “Ω x 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.

   **NOTE:**
   Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.
   a. Install a good bulb into the bulb socket.
   b. Connect the pocket tester probes to the respective leads of the bulb socket.
   c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

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

CHECKING THE FUSES
The following procedure applies to all of the fuses.

**CAUTION:**
To avoid a short circuit, always set the main switch to “OFF” when checking or replacing a fuse.

1. Remove:
   - SEAT
     Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
   - Fuse

   **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, causing the lighting and ignition systems to malfunction and could possibly cause a fire.
ELECTRICAL COMPONENTS

4. Install:
   • SEAT
   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.

CAUTION:
- This is a sealed 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 an MF battery are different from those of conventional batteries. The MF battery should be charged as explained in the charging method illustrations. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

NOTE:
Since MF 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:
   • SEAT
   Refer to “GENERAL CHASSIS” on page 4-1.

2. Disconnect:
   • Battery leads
   (from the battery terminals)

CAUTION:
First, disconnect the negative battery lead “1”, and then positive battery lead “2”.

3. Remove:
   • Battery

4. Check:
   • Battery terminal voltage

a. Connect a pocket tester to the battery terminals.

   Positive tester probe → positive battery terminal
   Negative tester probe → negative battery terminal

NOTE:
- The charge state of an MF 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.

---

5. Charge:
   • Battery (refer to the appropriate charging method illustration)

   **WARNING**
   Do not quick charge a battery.

   **CAUTION:**
   - Never remove the MF battery sealing caps.
   - 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 shorts. 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 an MF battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.

---

Charging method using a variable-current (voltage) charger

a. Measure the open-circuit voltage prior to charging.

   **NOTE:**
   Voltage should be measured 30 minutes after the machine is stopped.

b. Connect a charged and AMP meter to the battery and start charging.
NOTE:
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.

NOTE:
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. If the current is lower than the standard charging current written on the battery, this type of battery charger cannot charge the MF battery. A variable voltage charger is recommended.

d. Charge the battery until the battery’s charging voltage is 15 V.

NOTE:
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.

Reach the standard charging current
Battery is good.
Does not reach the standard charging current
Replace the battery.

NOTE:
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.

NOTE:
Set the charging time at 20 hours (maximum).

f. Set the time according to the charging time suitable for the open-circuit voltage. Refer to “Battery condition checking steps”.

g. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

7. Install:
• Battery

8. Connect:
• Battery leads
  (to the battery terminals)

CAUTION:
First, connect the positive battery lead “1”, and then the negative battery lead “2”.

9. Lubricate:
• Battery terminals

Recommended lubricant
Terminal grease

10. Install:
• SEAT
  Refer to “GENERAL CHASSIS” on page 4-1.
CHECKING THE RELAYS

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, replace the relay.

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

1. Disconnect the relay from the wire harness.
2. Connect the pocket tester (Ω×1) and battery (12 V) to the relay terminal as shown.
   Check the relay operation.
   Rough movement → Replace the defective part(s).

Starter relay

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Headlight relay

1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

CHECKING THE TURN SIGNAL RELAY

1. Check:
   - Flasher relay input voltage
     Off specification → Repair wire harness connection failure from main switch to flasher relay coupler.
Flasher relay input voltage
DC 12V

a. Connect the pocket tester (DC 20 V) to the flasher relay terminal.

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

Positive tester probe →
Blue/Red “1”
Negative tester probe →
Ground

b. Set the main switch to “ON”.
c. Measure flasher relay applied voltage.

CHECKING THE DIODE
1. Check:
   ● Diode
     Out of specification → Replace the relay unit.

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

NOTE:
Checking method using pocket tester (analog tester).

Flasher relay output voltage
DC 12V

a. Connect the pocket tester (DC 20 V) to the flasher relay terminal.

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

Positive tester probe →
Brown/White terminals “1”
Negative tester probe →
Ground
ELECTRICAL COMPONENTS

a. Disconnect the starting circuit cut-off relay from the wire harness.
b. Connect the pocket tester \((\Omega \times 1)\) to the relay unit coupler as shown.
c. Check whether the diode for continuity.
d. Check whether the diode for not continuity.

CHECKING THE IGNITION SPARK GAP

1. Check:
   - Ignition spark gap
     Out of specification→Follow the ignition system troubleshooting procedure from step 5. Refer to “TROUBLE SHOOTING” on page 7-3.

   Minimum ignition spark gap
   6.0 mm (0.24 in)

   NOTE:
   If the spark gap is within specification, the ignition system operates normally.

   a. Disconnect the spark plug cap from the spark plug.
b. Connect the ignition checker/dynamic spark tester “1” as shown.

   Ignition checker
   90890-06754
   Opama pet-4000 spark checker
   YM-34487

   a. Disconnect the starting circuit cut-off relay from the wire harness.
b. Connect the pocket tester \((\Omega \times 1)\) to the relay unit coupler as shown.
c. Check whether the diode for continuity.
d. Check whether the diode for not continuity.

   Continuity
   Positive tester lead → Sky blue “1”
   Negative tester lead → Sky blue/White “2”

   Continuity
   Positive tester lead → Blue/Black “3”
   Negative tester lead → Orange/Red “4”

   Continuity
   Positive tester lead → Black/Yellow “5”
   Negative tester lead → Sky blue “1”

   Continuity
   Positive tester lead → Red/Black “6”
   Negative tester lead → Blue/Yellow “7”

   Continuity
   Positive tester lead → Red/Black “6”
   Negative tester lead → Black/Yellow “5”

   a. Disconnect the starting circuit cut-off relay from the wire harness.
b. Connect the pocket tester \((\Omega \times 1)\) to the relay unit coupler as shown.
c. Check whether the diode for continuity.
d. Check whether the diode for not continuity.

   Continuity
   Positive tester lead → Sky blue “1”
   Negative tester lead → Sky blue/White “2”

   Continuity
   Positive tester lead → Blue/Black “3”
   Negative tester lead → Orange/Red “4”

   Continuity
   Positive tester lead → Orange/Red “4”
   Negative tester lead → Blue/Black “1”

   Continuity
   Positive tester lead → Sky blue “1”
   Negative tester lead → Orange/Red “4”

   Continuity
   Positive tester lead → Blue/Yellow “5”
   Negative tester lead → Sky blue “1”

   Continuity
   Positive tester lead → Black/Yellow “5”
   Negative tester lead → Sky blue “1”

   Continuity
   Positive tester lead → Black/Yellow “5”
   Negative tester lead → Sky blue “1”

   Continuity
   Positive tester lead → Red/Black “6”
   Negative tester lead → Blue/Yellow “7”

   Continuity
   Positive tester lead → Red/Black “6”
   Negative tester lead → Black/Yellow “5”

   Continuity
   Positive tester lead → Black/Yellow “5”
   Negative tester lead → Red/Black “6”

   Continuity
   Positive tester lead → Red/Black “6”
   Negative tester lead → Black/Yellow “5”

   Continuity
   Positive tester lead → Black/Yellow “5”
   Negative tester lead → Red/Black “6”
1. Ignition checker
2. Spark plug cap

c. Turn the main switch to “ON” and set the engine stop switch to “O”.
d. Measure the ignition spark gap “a”.
e. Crank the engine by pushing the start switch gradually increase the spark gap until a misfire occurs.

CHECKING THE SPARK PLUG CAPS
The following procedure applies to all of the spark plug caps.

1. Check:
   • Spark plug cap resistance
     Out of specification → Replace.

     | Spark plug cap resistance |
     |---------------------------|
     | 10.0 kΩ                   |

2. Check:
   • Secondary coil resistance
     Out of specification → Replace.

     | Secondary coil resistance |
     |---------------------------|
     | 9.52–14.28 kΩ            |

a. Remove the spark plug cap from the spark plug lead.
b. Connect the pocket tester (Ω × 1k) to the spark plug cap as shown.
c. Measure the primary coil resistance.

EAS28070

CHECKING THE IGNITION COIL
The following checking procedure applies to all of the ignition coils.

1. Check:
   • Primary coil resistance
     Out of specification → Replace.

     | Primary coil resistance |
     |-------------------------|
     | 1.92–2.88 Ω            |

a. Disconnect the ignition coil from wire harness.
b. Connect the pocket tester (Ω × 1) to the ignition coil as shown.
c. Measure the primary coil resistance.
ELECTRICAL COMPONENTS

tion coil.
b. Connect the pocket tester (Ω × 1k) to the ignition coil as shown.

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

Negative tester probe →
High tension code “1”
Positive tester probe →
High tension code “2”

b. Measure the secondary coil resistance.

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.

Crankshaft position sensor resistance
248–372 Ω

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 (from the bracket.)
2. Check:
   • Lean angle sensor output voltage
     Out of specification → Replace.

Lean angle sensor output voltage
Less than 65° “a”: 0.4 – 1.4V
More than 65° “b”: 3.7 – 4.4V

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 →
Blue “1”
Negative tester probe →
Yellow/Green “2”
**ELECTRICAL COMPONENTS**

c. Turn the lean angle sensor to 65°.
d. Measure the lean angle sensor output voltage.

**CHECKING THE HORN**

1. Check:
   - Horn resistance value
     
     Out of specification → Replace.

   **Coil resistance**
   
   1.15 – 1.25 Ω

2. a. Disconnect the horn leads from the horn terminal.
   b. Connect the pocket tester (Ω x 1) to the horn terminals.

   **Pocket tester**
   
   90890-03132

   **Positive tester probe** →
   Horn terminal “1”

   **Negative tester probe** →
   Horn terminal “2”

3. a. Connect a battery (12 V) to the horn.
   b. Turn the adjusting screw in direction “a” or “b” until the specified horn sound is obtained.

**CHECKING THE ENGINE OIL LEVEL GAUGE**

1. Drain:
   - Engine oil

2. Remove:
   - Engine oil level gauge
     (from the oil pan)

3. Check:
   - Oil level switch continuity
     Out of specification → Replace.

   **Engine oil level gauge**
   
   Minimum level position “A”
   No continuity
   Maximum level position “B”
   Continuity

4. a. Connect the pocket tester (Ω x 1) to the engine oil level gauge terminals as shown.

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

   **Positive tester probe** →
   Connector “1”

   **Negative tester probe** →
   Body ground “2”

   c. Measure the horn resistance.
b. Measure the oil level gauge resistance.

CHECKING THE ENGINE TEMPERATURE SENSOR

1. Remove:
   - Engine temperature sensor
     (From intake manifold)

   **WARNING**
   - Handle the engine temperature sensor with special care.
   - Never subject the engine temperature sensor to strong shocks. If the engine temperature sensor is dropped, replace it.

2. Check:
   - Engine temperature sensor resistance
     Out of specification → Replace.

   **Engine temperature sensor resistance**
   - 9–11 kΩ (25°C)
   - 0.898–1.098 kΩ (100°C)

3. Install:
   - Engine temperature sensor

CHECKING THE SPEED SENSOR

1. Check:
   - Speed sensor output voltage
     Out of specification → Replace.

   **Output voltage reading cycle**
   - 0 V → 5 V → 0 V → 5 V → 0 V

2. Connect the pocket tester (DC 20 V) to the speed sensor coupler (wire harness side) as shown.

   **Pocket tester**
   - 90890-03112
   - Analog pocket tester
     YU-03112-C
b. Set the main switch to “ON”.
c. Elevate the rear wheel and slowly rotate it.
d. Measure the voltage (5 V) of White and Black/Blue. With the rear wheel slowly rotating, voltage alternates between 0 V and 5 V.

CHECKING THE THROTTLE POSITION SENSOR
1. Remove:
   - Throttle position sensor (from the throttle body)
2. Check:
   - Throttle position sensor

a. Connect the pocket tester to the throttle position sensor as shown.

Positive tester probe →
White/Yellow “1”
Negative tester probe →
Black/blue “2”

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

b. Check the throttle position sensor resistance.
Out of specification → Replace the throttle position sensor.

| Resistance | 4.0–6.0 kΩ |

CHECKING THE FUEL SENDER
1. Disconnect:
   - Fuel pump coupler
   - Fuel sender coupler
2. Remove:
   - Fuel tank
3. Remove:
   - Fuel pump
4. Check:
   - Fuel sender resistance
     Out of specification → Replace the fuel pump.

| Fuel sender resistance | 19.0–21.0Ω |
|                        | 139.0–141.0Ω |

a. Connect the pocket tester (Ω × 10) to the terminals of the fuel sender.

Positive tester probe →
Blue “1”
Negative tester probe →
Black/Blue “3”

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

Positive tester probe →
Green/white “1”
Negative tester probe →
Black “2”
b. Move the fuel sender float to the empty “3” and full “4” positions.

c. Measure the fuel sender resistances.

CHECKING THE AI SYSTEM SOLENOID

1. Check:
   - AI system solenoid resistance
     Out of specification → Replace.

   | Solenoid resistance | 20.5 – 23.5Ω |

a. Remove the AI system solenoid coupler from the wire harness.
b. Connect the pocket tester (Ω x 1) to the AI system solenoid terminal as shown.

c. Measure the AI system solenoid resistance.

CHECKING INTAKE AIR PRESSURE SENSORS 1 AND 2

1. Check:
   - Intake air pressure sensor output voltage
     Out of specification → Replace.

   | Intake air pressure sensor output voltage | 3.75 – 4.25V |

a. Connect the pocket tester (DC 20 V) to the intake air pressure sensor coupler (wire harness side) as shown.

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

   | Intake air pressure sensor 1 |
   Positive tester probe → Pink/White “1”
   Negative tester probe → black/blue “2”

   | Intake air pressure sensor 2 |
   Positive tester probe → Gray/White “3”
   Negative tester probe → black/blue “4”

Positive tester probe → Brown/Black “1”
Negative tester probe → Red/White “2”
ELECTRICAL COMPONENTS

A. Intake air pressure sensor 1
B. Intake air pressure sensor 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 headlight stay)

   WARNING
   • Handle the intake air temperature sensor with special care.
   • Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.

2. Check:
   • Intake air temperature sensor resistance
     Out of specification → Replace.

   Intake air temperature sensor resistance
   5.4 – 6.6kΩ (0°C)
   0.29 – 0.39kΩ (80°C)

   a. Connect the pocket tester (Ω × 1k) to the intake air temperature sensor terminal as shown.

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

Positive tester probe →
Brown/white “1”
Negative tester probe →
Black/blue “2”

b. Measure the intake air temperature sensor resistance.

3. Install:
   • Intake air temperature sensor
TROUBLESHOOTING

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**TROUBLESHOOTING**

**GENERAL INFORMATION**

**NOTE:**

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(s) and cylinder head(s)
   - 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
   - Valve timing deviation
   - Faulty valve spring
   - Seized valve

2. Piston(s) and piston ring(s)
   - Improperly installed piston ring
   - Damaged, worn or fatigued piston ring
   - Seized piston ring
   - Seized or damaged piston

3. Air filter
   - Improperly installed air filter
   - Clogged air filter element

4. Crankcase and crankshaft
   - Improperly assembled crankcase
   - Seized crankshaft

**Fuel system**

1. Fuel tank
   - Empty fuel tank
   - Clogged fuel tank breather hose
   - Clogged rollover valve
   - Clogged rollover valve hose
   - Deteriorated or contaminated fuel

2. Fuel pump
   - Faulty fuel pump

3. Fuel hoses
   - Clogged or damaged fuel hose

4. Throttle bodies
   - Clogged pilot air passage

**Electrical system**

1. Battery
   - Discharged battery
   - Faulty battery

2. Fuses
   - 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
   - Insulator damage
   - Faulty spark plug cap

4. Ignition coil
   - Cracked or broken ignition coil
   - Broken or shorted primary or secondary coils
   - Faulty spark plug lead

5. Ignition system
   - Faulty ECU.
   - Faulty crankshaft position sensor
   - Broken generator rotor woodruff key

6. Switches and wiring
   - Defective lean angle sensor
   - Faulty main switch
   - Faulty engine stop switch
   - Open or short circuit of lead or harness
   - Faulty neutral switch
   - Faulty start switch
   - Faulty sidestand switch
   - Faulty clutch switch
   - Improperly grounded circuit
   - Loose coupler and/or connector connections
   - Defective oil level gauge

7. Starting system
   - Faulty starter motor
   - Faulty starter relay
   - Defective starting circuit cut-off relay
   - Faulty starter clutch

---

**INCORRECT ENGINE IDLING SPEED**

**Engine**

1. Cylinder(s) and cylinder head(s)
   - Incorrect valve clearance
   - Damaged valve train components

2. Air filter
   - Clogged air filter element

**Fuel system**

1. Throttle bodies
   - Air intake in throttle body joint
   - Defective throttle bodies synchronization
   - Improper throttle cable free play
   - Defective air induction system

**Electrical system**

1. Battery
TROUBLESHOOTING

- Discharged battery
- Faulty battery
2. Spark plug
  - Incorrect spark plug gap
  - Incorrect spark plug heat range
  - Fouled spark plug
  - Worn or damaged electrode
  - Insulator damage
- Faulty spark plug cap
3. Ignition coil
  - Faulty spark plug lead
  - Cracked or broken ignition coil
4. IGNITION SYSTEM
  - Faulty ECU.
  - Faulty crankshaft position sensor

POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE
Refer to “STARTING FAILURES” on page 8-1.

ENGINE
1. Air filter
  - Clogged air filter element
Fuel system
1. Fuel pump
  - Faulty fuel pump
2. Throttle bodies
  - Defective throttle body
3. ECU
  - Faulty ECU.

FAULTY GEAR SHIFTING
Shifting is difficult
Refer to “Clutch drags”.

SHIFT PEDAL DOES NOT MOVE
Shift shaft
  - Improperly adjusted shift rod
  - Bent shift shaft.
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 shaft
  - Incorrect shift pedal position
  - Improperly returned stopper lever
Shift forks
  - Worn shift fork
Shift drum
  - Incorrect axial play
  - Worn shift drum groove
Transmission
  - Worn gear dog

FAULTY CLUTCH
Clutch slips
1. Clutch
  - Improperly assembled clutch
  - Improperly assembled clutch master cylinder
  - Improperly assembled clutch release cylinder
  - Incorrect clutch fluid level
  - Damaged clutch hose
  - Loose or fatigued clutch spring
  - Loose union bolt
  - Worn friction plate
  - Worn clutch plate
  - Damaged clutch release cylinder
2. Engine oil
  - Incorrect oil level
  - Incorrect oil viscosity (low)
  - Deteriorated oil

Clutch drags
1. Clutch
  - Air in hydraulic clutch system
  - Unevenly tensioned clutch springs
  - Warped pressure plate
  - Bent clutch plate
  - Swollen friction plate
  - Bent clutch push rod
  - Damaged clutch boss
  - Burnt primary driven gear
  - Damaged clutch release cylinder
2. Engine oil
  - Incorrect oil level
  - Incorrect oil viscosity (high)
  - Deteriorated oil

OVERHEATING
Engine
1. Cylinder head(s) and piston(s)
  - Heavy carbon buildup
2. Engine oil
  - Incorrect oil level
  - Incorrect oil viscosity
  - Inferior oil quality
Fuel system
1. Throttle bodies
  - Air intake in throttle body joint
2. Air filter
   - Clogged air filter element
Chassis
1. Brake
   - Dragging brake
Electrical system
1. Spark plug
   - Incorrect spark plug gap
   - Incorrect spark plug heat range
2. Ignition system
   - Faulty ECU.

POOR BRAKING PERFORMANCE
- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Defective master cylinder kit
- Faulty brake caliper kit
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

FAULTY FRONT FORK LEGS
Leaking oil
- Bent, damaged or rusty inner tube
- Cracked or damaged outer tube
- Improperly installed oil seal
- Damaged oil seal lip
- Incorrect oil level (high)
- Loose damper rod assembly bolt
- Damaged damper rod assembly bolt copper washer
- Cracked or damaged cap bolt O-ring
Malfunction
- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Slide metal wear, damage
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

FAULTY LIGHTING OR SIGNALING SYSTEM
Headlight does not come on
- Fuse open circuit
- Wrong headlight bulb
- Too many electrical accessories
- Hard charging

Headlight bulb burnt out
- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Headlight bulb life expired

Tail/brake light does not come on
- Fuse open circuit
- Too many electrical accessories
- Incorrect connection

Turn signal does not come on
- Fuse open circuit
- Faulty turn signal switch
- Faulty turn signal relay
- Burnt-out turn signal bulb
- Incorrect connection
- Damaged or faulty wire harness
- Improperly grounded circuit
- Faulty battery
- Blown, damaged or incorrect fuse

Turn signal blinks slowly
- Faulty turn signal relay
- Faulty main switch
- Faulty turn signal switch
- Incorrect turn signal bulb

Turn signal remains lit
- Faulty turn signal relay
- Burnt-out turn signal bulb

Turn signal blinks quickly
- Incorrect turn signal bulb
- Faulty turn signal relay
- Burnt-out turn signal bulb

Horn does not sound
- Fuse open circuit
- Improperly adjusted horn
- Damaged or faulty horn
- Faulty main switch
- Faulty horn switch
- Faulty battery
- Blown, damaged or incorrect fuse
- Faulty wire harness
<table>
<thead>
<tr>
<th>Number</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Generator</td>
</tr>
<tr>
<td>2</td>
<td>Main switch</td>
</tr>
<tr>
<td>3</td>
<td>Ignition fuse</td>
</tr>
<tr>
<td>4</td>
<td>Main fuse</td>
</tr>
<tr>
<td>5</td>
<td>Backup fuse</td>
</tr>
<tr>
<td>6</td>
<td>EFI fuse</td>
</tr>
<tr>
<td>7</td>
<td>Battery</td>
</tr>
<tr>
<td>8</td>
<td>Starter relay</td>
</tr>
<tr>
<td>9</td>
<td>Starter motor</td>
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<tr>
<td>10</td>
<td>Alarm</td>
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<tr>
<td>11</td>
<td>Right handlebar switch</td>
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<tr>
<td>12</td>
<td>Front brake switch</td>
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<tr>
<td>13</td>
<td>Engine stop switch</td>
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<tr>
<td>14</td>
<td>Start switch</td>
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<tr>
<td>15</td>
<td>Relay unit</td>
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<tr>
<td>16</td>
<td>Neutral switch</td>
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<tr>
<td>17</td>
<td>Sidestand switch</td>
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<tr>
<td>18</td>
<td>Fuel pump</td>
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<tr>
<td>19</td>
<td>Ignition coil (#1 and #4)</td>
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<tr>
<td>20</td>
<td>Ignition coil (#2 and #3)</td>
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<tr>
<td>21</td>
<td>Injector 1</td>
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<tr>
<td>22</td>
<td>Injector 2</td>
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<tr>
<td>23</td>
<td>Injector 3</td>
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<td>24</td>
<td>Injector 4</td>
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<td>25</td>
<td>AI solenoid</td>
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<tr>
<td>26</td>
<td>ISC (idle speed control) valve</td>
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<tr>
<td>27</td>
<td>Sub throttle servo motor</td>
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<tr>
<td>28</td>
<td>EXUP servo motor</td>
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<tr>
<td>29</td>
<td>Crankshaft position sensor</td>
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<tr>
<td>30</td>
<td>Lean angle sensor</td>
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<td>31</td>
<td>Speed sensor</td>
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<td>32</td>
<td>$O_2$ sensor</td>
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<td>33</td>
<td>Intake air temperature sensor</td>
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<tr>
<td>34</td>
<td>Engine temperature sensor</td>
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<tr>
<td>35</td>
<td>Throttle position sensor</td>
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<tr>
<td>36</td>
<td>Intake air pressure sensor 1</td>
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<tr>
<td>37</td>
<td>Intake air pressure sensor 2</td>
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<td>38</td>
<td>ECU</td>
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<tr>
<td>39</td>
<td>Meter</td>
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<tr>
<td>40</td>
<td>Immobilizer system warning light</td>
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<tr>
<td>41</td>
<td>Meter light</td>
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<tr>
<td>42</td>
<td>Speedometer</td>
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<td>43</td>
<td>Tachometer</td>
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<td>Multi-function display</td>
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<td>45</td>
<td>Oil level warning light</td>
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<tr>
<td>46</td>
<td>Engine trouble warning light</td>
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<tr>
<td>47</td>
<td>Neutral indicator light</td>
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<tr>
<td>48</td>
<td>Right turn signal indicator light</td>
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<tr>
<td>49</td>
<td>Left turn signal indicator light</td>
</tr>
<tr>
<td>50</td>
<td>High beam indicator</td>
</tr>
</tbody>
</table>

**COLOR CODE**

- B: Black
- Br: Brown
- Ch: Chocolate
- Dg: Dark green
- G: Green
- Gy: Gray
- L: Blue
- O: Orange
- P: Pink
- R: Red
- Sb: Sky blue
- W: White
- Y: Yellow

For other combinations:

- B/G: Black/Green
- B/L: Black/Blue
- B/R: Black/Red
- B/W: Black/White
- B/Y: Black/Yellow
- Br/G: Brown/Green
- Br/L: Brown/Blue
- Br/R: Brown/Red
- Br/W: Brown/White
- G/B: Green/Black
- G/R: Green/Red
- G/W: Green/White
- G/Y: Green/Yellow
- Gy/G: Gray/Green
- Gy/R: Gray/Red
- L/B: Blue/Black
- L/R: Blue/Red
- L/W: Blue/White
- L/Y: Blue/Yellow
- O/B: Orange/Black
- P/W: Pink/White
- R/B: Red/Black
- R/G: Red/Green
- R/L: Red/Blue
- R/W: Red/White
- R/Y: Red/Yellow
- Sb/W: Sky blue/White
- W/B: White/Black
- W/R: White/Red
- W/Y: White/Yellow
- Y/B: Yellow/Black
- Y/G: Yellow/Green
- Y/L: Yellow/Blue
- Y/R: Yellow/Red