Fix it like a Pro
How to use this Service Manual

In the bookmarks to the left you will find different segments of this manual:

**Service Manual**
This is the standard manual for this vehicle. Use this segment as your major point of reference and information.

**Supplementary Service Manual** (if available)
These segments are updates and additions to the standard service manual. They are added as needed when certain changes are made to the model. Be sure to check these for additional information that may be lacking from the regular service manual.
HOW TO USE THIS MANUAL

MANUAL ORGANIZATION
This manual consists of chapters for the main categories of subjects. (See “Illustrated symbols”)

1st title ①: This is the title of the chapter with its symbol in the upper right corner of each page.

2nd title ②: This title indicates the section of the chapter and only appears on the first page of each section. It is located in the upper right corner of the page.

3rd title ③: This title indicates a sub-section that is followed by step-by-step procedures accompanied by corresponding illustrations.

EXPLODED DIAGRAMS
To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.

1. An easy-to-see exploded diagram ④ is provided for removal and disassembly jobs.

2. Numbers ⑤ are given in the order of the jobs in the exploded diagram. A number that is enclosed by a circle indicates a disassembly step.

3. An explanation of jobs and notes is presented in an easy-to-read way by the use of symbol marks ⑥. The meanings of the symbol marks are given on the next page.

4. A job instruction chart ⑦ accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.

5. For jobs requiring more information, the step-by-step format supplements ⑧ are given in addition to the exploded diagram and the job instruction chart.
ILLUSTRATED SYMBOLS

The following symbols are not relevant to every vehicle. Symbols 1 to 8 indicate the subject of each chapter.
1. General information
2. Specifications
3. Periodic checks and adjustments
4. Engine
5. Carburator
6. Chassis
7. Electrical system
8. Troubleshooting

Symbols 9 to 16 indicate the following:
9. Serviceable with engine mounted
10. Filling fluid
11. Lubricant
12. Special tool
13. Tightening torque
14. Wear limit, clearance
15. Engine speed
16. Electrical data

Symbols 17 to 22 in the exploded diagrams indicate the types of lubricants and lubrication points.
17. Engine oil
18. Gear oil
19. Molybdenum disulfide oil
20. Wheel bearing grease
21. Lithium soap base grease
22. Molybdenum disulfide grease

Symbols 23 to 24 in the exploded diagrams indicate the following:
23. Apply locking agent (LOCTITE®)
24. Replace the part
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CHAPTER 1.
GENERAL INFORMATION

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VEHICLE IDENTIFICATION NUMBER
The vehicle identification number ① is stamped into the right side of the steering head.

MODEL LABEL
The model label ① is affixed to the frame. This information will be needed to order spare parts.
IMPORTANT INFORMATION
PREPARATION FOR REMOVAL PROCEDURES
1. Remove all dirt, mud, dust and foreign material before removal and disassembly.

2. Use proper tools and cleaning equipment. Refer to the “SPECIAL TOOLS” section.
3. When disassembling the machine, 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 machine disassembly, clean all 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
1. 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. Replace all gaskets, seals and O-rings when overhauling the engine. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. Properly oil all mating parts and bearings during reassembly. Apply grease to the oil seal lips.
**LOCK WASHERS/PLATES AND COTTER PINS**

1. Replace all lock washers/plates and cotter pins after removal. Bend lock tabs along the bolt or nut flats after the bolt or nut has been tightened to specification.

**BEARINGS AND OIL SEALS**

1. Install bearings and oil seals so that the manufacturer’s marks or numbers are visible. When installing oil seals, apply a light coating of lightweight lithium base grease to the seal lips. Oil bearings liberally when installing, if appropriate.

**CAUTION:**

Do not use compressed air to spin the bearings dry. This will damage the bearing surfaces.

**CIRCLIPS**

1. Check all circlips carefully before reassembly. Always replace piston pin clips after one use. Replace distorted circlips. When installing a circlip, make sure that the sharp-edged corner is positioned opposite the thrust it receives. See sectional view.
CHECKING OF CONNECTIONS

Check the connectors for stains, rust, moisture, etc.

1. Disconnect:
   - Connector

2. Check:
   - Connector
     - Moisture → Dry each terminal with an air blower.
     - Stains/rust → Connect and disconnect the terminals several times.

3. Check:
   - Connector leads
     - Looseness → Bend up the pin ① and connect the terminals.

4. Connect:
   - Connector terminals

   **NOTE:**
   - The two terminals “click” together.

5. Check:
   - Continuity (using a pocket tester)

   **NOTE:**
   - If there is no continuity, clean the terminals.
   - When checking the wire harness be sure to perform steps 1 to 3.
   - As a quick remedy, use a contact revitalizer available at most part stores.
   - Check the connector with a pocket tester as shown.
**SPECIAL TOOLS**

The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools; this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools may differ by shape and part number from country to country. In such a case, two types are provided.

When placing an order, refer to the list provided below to avoid any mistakes.

P/N. YM-, YU- for US, CAN
YS-, YK-, ACC-
P/N 90890-
Except for US, CAN

<table>
<thead>
<tr>
<th>Tool No.</th>
<th>Tool name/How to use</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>Slide hammer bolt/weight</td>
<td></td>
</tr>
<tr>
<td>YU-1083-3 90890-01084 Bolt YU-1083-2 90890-01085</td>
<td>These tools are used to remove the rocker arm shaft.</td>
<td></td>
</tr>
<tr>
<td>YU-01135-A 90890-01135</td>
<td>Crankcase separating tool</td>
<td></td>
</tr>
<tr>
<td>YM-01229 90890-01229</td>
<td>Coupling gear/Middle shaft tool</td>
<td></td>
</tr>
<tr>
<td>Final gear backlash band YM-01230 90890-01230 Middle gear backlash band YM-01231 90890-01231</td>
<td>Final gear backlash band</td>
<td></td>
</tr>
<tr>
<td>YM-01230 90890-01230 Middle gear backlash band YM-01231 90890-01231</td>
<td>This tool is needed when measuring final gear/middle gear backlash.</td>
<td></td>
</tr>
<tr>
<td>Installer pot YU-90058 90890-01274 Bolt YU-90060 90890-01275 Adaptor YM-4059 90890-04130 Spacer YM-90070 90890-04060</td>
<td>Crankshaft installer pot/bolt/adapter/spacer</td>
<td></td>
</tr>
<tr>
<td>Installer pot YU-90058 90890-01274 Bolt YU-90060 90890-01275 Adaptor YM-4059 90890-04130 Spacer YM-90070 90890-04060</td>
<td>These tools are used to install the crankshaft.</td>
<td></td>
</tr>
<tr>
<td>Tool No.</td>
<td>Tool name/How to use</td>
<td>Illustration</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>YU-01304</td>
<td>Piston pin puller</td>
<td></td>
</tr>
<tr>
<td>90890-01304</td>
<td>This tool is used to remove the piston pin.</td>
<td></td>
</tr>
<tr>
<td>YM-01312-A</td>
<td>Fuel level gauge</td>
<td></td>
</tr>
<tr>
<td>90890-01312</td>
<td>This gauge is used to measure the fuel level in the float chamber.</td>
<td></td>
</tr>
<tr>
<td>T-handle Holder YM-1300-1</td>
<td>T-handle/damper rod holder</td>
<td></td>
</tr>
<tr>
<td>YM-01326</td>
<td>These tools are needed to loosen and tighten the damper rod holding bolt.</td>
<td></td>
</tr>
<tr>
<td>YM-01362</td>
<td>Flywheel puller/adapter</td>
<td></td>
</tr>
<tr>
<td>YM-38145</td>
<td>These tools are needed to remove the rotor.</td>
<td></td>
</tr>
<tr>
<td>YM-38145</td>
<td>Fork seal driver weight/adapter</td>
<td></td>
</tr>
<tr>
<td>90890-01367</td>
<td>These tools are needed when installing the slide metal, oil seal and dust seal into the fork.</td>
<td></td>
</tr>
<tr>
<td>YU-33975</td>
<td>Ring nut wrench/ehaust and steering nut wrench</td>
<td></td>
</tr>
<tr>
<td>90890-01403</td>
<td>This tool is needed to loosen and tighten the steering stem ring nut.</td>
<td></td>
</tr>
<tr>
<td>YU-33975</td>
<td>Sheave holder</td>
<td></td>
</tr>
<tr>
<td>90890-01403</td>
<td>This tool is needed to hold the rotor when removing or installing the rotor bolt.</td>
<td></td>
</tr>
<tr>
<td>YU-33975</td>
<td>Compression gauge set</td>
<td></td>
</tr>
<tr>
<td>90890-03081</td>
<td>These tools are needed to measure engine compression.</td>
<td></td>
</tr>
<tr>
<td>YU-08030-A</td>
<td>Vacuum gauge</td>
<td></td>
</tr>
<tr>
<td>90890-03094</td>
<td>This gauge is needed for carburetor synchronizion.</td>
<td></td>
</tr>
<tr>
<td>Tool No.</td>
<td>Tool name/How to use</td>
<td>Illustration</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>YU-03112 90890-03112</td>
<td>Pocket tester</td>
<td><img src="image" alt="Pocket tester" /></td>
</tr>
<tr>
<td>YU-08036-A 90890-03113</td>
<td>Engine tachometer</td>
<td><img src="image" alt="Engine tachometer" /></td>
</tr>
<tr>
<td>YU-33277-A 90890-03141</td>
<td>Timing light</td>
<td><img src="image" alt="Timing light" /></td>
</tr>
<tr>
<td>YM-01211 90890-01211 Remover YM-01200 90890-01200 Installer YM-01201 90890-04013</td>
<td>Valve guide reamer, remover &amp; installer</td>
<td><img src="image" alt="Valve guide reamer, remover &amp; installer" /></td>
</tr>
<tr>
<td>YM-04019 90890-04019</td>
<td>Valve spring compressor</td>
<td><img src="image" alt="Valve spring compressor" /></td>
</tr>
<tr>
<td>YM-04019 90890-04019</td>
<td>Crankshaft installer bolt adapter/armature shock puller/weight</td>
<td><img src="image" alt="Crankshaft installer bolt adapter/armature shock puller/weight" /></td>
</tr>
<tr>
<td>YM-04137 90890-04137</td>
<td>Bearing retainer wrench</td>
<td><img src="image" alt="Bearing retainer wrench" /></td>
</tr>
<tr>
<td>YM-04178 90890-04178 Holder YM-04055 90890-04055</td>
<td>Middle drive shaft nut wrench/Middle drive shaft holder</td>
<td><img src="image" alt="Middle drive shaft nut wrench/Middle drive shaft holder" /></td>
</tr>
<tr>
<td>YM-04062 90890-04062</td>
<td>Universal joint holder</td>
<td><img src="image" alt="Universal joint holder" /></td>
</tr>
<tr>
<td>Tool No.</td>
<td>Tool name/How to use</td>
<td>Illustration</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>YM-33214</td>
<td>Bearing retainer wrench</td>
<td></td>
</tr>
<tr>
<td>90890-04077</td>
<td>This tool is needed when removing or installing the final drive pinion gear assembly.</td>
<td></td>
</tr>
<tr>
<td>YM-91042</td>
<td>Clutch holding tool</td>
<td></td>
</tr>
<tr>
<td>90890-04086</td>
<td>This tool is needed to hold the clutch when removing or installing the clutch boss nut.</td>
<td></td>
</tr>
<tr>
<td>YM-33286</td>
<td>Damper spring compressor</td>
<td></td>
</tr>
<tr>
<td>90890-04090</td>
<td>This tool is needed when removing or installing the damper spring.</td>
<td></td>
</tr>
<tr>
<td>YM-34487</td>
<td>Dynamic spark tester Ignition checker</td>
<td></td>
</tr>
<tr>
<td>90890-06754</td>
<td>This instrument is necessary for checking the ignition system components.</td>
<td></td>
</tr>
<tr>
<td>ACC-1100-15-01</td>
<td>Quick gasket © Yamaha bond No.1215</td>
<td></td>
</tr>
<tr>
<td>90890-85505</td>
<td>This sealant (bond) is used on crankcase mating surfaces, etc.</td>
<td></td>
</tr>
<tr>
<td>YU-03097</td>
<td>Dial gauge</td>
<td></td>
</tr>
<tr>
<td>90890-03097</td>
<td>This tool is used to measure the middle gear backlash.</td>
<td></td>
</tr>
<tr>
<td>YU-03009</td>
<td>Micrometer (75 √ 100 mm)</td>
<td></td>
</tr>
<tr>
<td>90890-03009</td>
<td>This tool is used to measure the piston skirt diameter.</td>
<td></td>
</tr>
<tr>
<td>YU-03017</td>
<td>Cylinder bore gauge (50 √ 100 mm)</td>
<td></td>
</tr>
<tr>
<td>90890-03017</td>
<td>This tool is used to measure the cylinder bore.</td>
<td></td>
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### General Specifications

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<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model code:</strong></td>
<td>XVS1100 : 5EL5 (For U.S.A)</td>
</tr>
<tr>
<td></td>
<td>5EL6 (For CAL)</td>
</tr>
<tr>
<td></td>
<td>5EL7 (For CAN)</td>
</tr>
<tr>
<td><strong>Dimensions:</strong></td>
<td></td>
</tr>
<tr>
<td>Overall length</td>
<td>2,405 mm (94.7 in)</td>
</tr>
<tr>
<td>Overall width</td>
<td>895 mm (35.2 in)</td>
</tr>
<tr>
<td>Overall height</td>
<td>1,095 mm (43.1 in)</td>
</tr>
<tr>
<td>Seat height</td>
<td>690 mm (27.2 in)</td>
</tr>
<tr>
<td>Wheelbase</td>
<td>1,640 mm (64.6 in)</td>
</tr>
<tr>
<td>Minimum ground clearance</td>
<td>145 mm (5.7 in)</td>
</tr>
<tr>
<td>Minimum turning radius</td>
<td>3,200 mm (126.0 in)</td>
</tr>
<tr>
<td><strong>Basic weight:</strong></td>
<td></td>
</tr>
<tr>
<td>With oil and a full fuel tank</td>
<td>275 kg (606.4 lb)</td>
</tr>
<tr>
<td><strong>Engine:</strong></td>
<td></td>
</tr>
<tr>
<td>Engine type</td>
<td>Air cooled 4-stroke, SOHC</td>
</tr>
<tr>
<td>Cylinder arrangement</td>
<td>V-type 2-cylinder</td>
</tr>
<tr>
<td>Displacement</td>
<td>1,063 L</td>
</tr>
<tr>
<td>Bore x stroke</td>
<td>95 x 75mm (3.74 x 2.95 in)</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>8.3 : 1</td>
</tr>
<tr>
<td>Compression pressure (STD)</td>
<td>1,000 kPa (10 kg/cm², 142 psi) at 400 r/min</td>
</tr>
<tr>
<td>Starting system</td>
<td>Electric starter</td>
</tr>
<tr>
<td><strong>Lubrication system:</strong></td>
<td>Wet sump</td>
</tr>
<tr>
<td><strong>Oil type or grade:</strong></td>
<td></td>
</tr>
<tr>
<td>Engine oil</td>
<td>Yamalube 4 (20W40) or SAE20W40 type SE motor oil (5°C (40°F) or higher)</td>
</tr>
<tr>
<td></td>
<td>Yamalube 4 (10W30) or SAE10W30 type SE motor oil (−10°C (10°F) or higher)</td>
</tr>
<tr>
<td><strong>Final gear oil:</strong></td>
<td>SAE80API “GL-4” Hypoid Gear Oil</td>
</tr>
<tr>
<td><strong>Oil quantity:</strong></td>
<td></td>
</tr>
<tr>
<td>Engine oil</td>
<td>3.0 L (2.6 Imp qt, 3.2 US qt)</td>
</tr>
<tr>
<td>With oil filter replacement</td>
<td>3.1 L (2.7 Imp qt, 3.3 US qt)</td>
</tr>
<tr>
<td>Total amount</td>
<td>3.6 L (3.2 Imp qt, 3.8 US qt)</td>
</tr>
<tr>
<td>Final gear case oil</td>
<td></td>
</tr>
<tr>
<td>Total amount</td>
<td>0.2 L (0.18 Imp qt, 0.21 US qt)</td>
</tr>
<tr>
<td><strong>Air filter:</strong></td>
<td>Dry type element</td>
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<tr>
<td><strong>Fuel:</strong></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Unleaded gasoline</td>
</tr>
<tr>
<td>Fuel tank capacity</td>
<td>17 L (3.7 Imp gal, 4.5 US gal)</td>
</tr>
<tr>
<td>Fuel reserve amount</td>
<td>4.5 L (1.0 Imp gal, 1.2 US gal)</td>
</tr>
<tr>
<td>Item</td>
<td>Standard</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Carburetor:</td>
<td></td>
</tr>
<tr>
<td>Type/quantity</td>
<td>BSR37/2</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>MIKUNI</td>
</tr>
<tr>
<td>Spark plug:</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>BPR7ES/W22EPRI-U</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>NGK/DENSO</td>
</tr>
<tr>
<td>Spark plug gap</td>
<td>0.7 ~ 0.8 mm (0.028 ~ 0.031 in)</td>
</tr>
<tr>
<td>Clutch type:</td>
<td>Wet, multiple-disc</td>
</tr>
<tr>
<td>Transmission:</td>
<td></td>
</tr>
<tr>
<td>Primary reduction system</td>
<td>Spur gear</td>
</tr>
<tr>
<td>Primary reduction ratio</td>
<td>78/47 (1.660)</td>
</tr>
<tr>
<td>Secondary reduction system</td>
<td>Shaft drive</td>
</tr>
<tr>
<td>Secondary reduction ratio</td>
<td>44/47 ~ 19/18 ~ 32/11 (2.875)</td>
</tr>
<tr>
<td>Transmission type</td>
<td>Constant mesh 5-speed</td>
</tr>
<tr>
<td>Operation</td>
<td>Left foot operation</td>
</tr>
<tr>
<td>Gear ratio</td>
<td>1st 40/17 (2.353)</td>
</tr>
<tr>
<td></td>
<td>2nd 40/24 (1.667)</td>
</tr>
<tr>
<td></td>
<td>3rd 36/28 (1.286)</td>
</tr>
<tr>
<td></td>
<td>4th 32/31 (1.032)</td>
</tr>
<tr>
<td></td>
<td>5th 29/34 (0.853)</td>
</tr>
<tr>
<td>Chassis:</td>
<td>Double cradle</td>
</tr>
<tr>
<td>Frame type</td>
<td></td>
</tr>
<tr>
<td>Caster angle</td>
<td>33°</td>
</tr>
<tr>
<td>Trail</td>
<td>136 mm (5.4 in)</td>
</tr>
<tr>
<td>Tire:</td>
<td>With tube</td>
</tr>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>front 110/90-18 61S</td>
</tr>
<tr>
<td></td>
<td>rear 170/80-15M/C 77S</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>front BRIDGESTONE/DUNLOP</td>
</tr>
<tr>
<td></td>
<td>rear BRIDGESTONE/DUNLOP</td>
</tr>
<tr>
<td>Type</td>
<td>front EXEDRA L309/K555F</td>
</tr>
<tr>
<td></td>
<td>rear EXEDRA G546G/K555</td>
</tr>
<tr>
<td>Maximum load-except motorcycle:</td>
<td>200 kg (441 lb)</td>
</tr>
<tr>
<td>Tire pressure (cold tire):</td>
<td></td>
</tr>
<tr>
<td>0 ~ 90 kg (0 ~ 198 lb) load *</td>
<td>200 kPa (2.00 kg/cm², 28.5 psi)</td>
</tr>
<tr>
<td></td>
<td>front 225 kPa (2.25 kg/cm², 32.0 psi)</td>
</tr>
<tr>
<td></td>
<td>rear 225 kPa (2.25 kg/cm², 32.0 psi)</td>
</tr>
<tr>
<td>90 kg (198 lb) ~ Maximum load *</td>
<td>250 kPa (2.50 kg/cm², 35.6 psi)</td>
</tr>
<tr>
<td></td>
<td>front 250 kPa (2.50 kg/cm², 35.6 psi)</td>
</tr>
<tr>
<td></td>
<td>rear 250 kPa (2.50 kg/cm², 35.6 psi)</td>
</tr>
<tr>
<td>* Load is the total weight of the cargo, rider, passenger and accessories.</td>
<td></td>
</tr>
<tr>
<td>Brake:</td>
<td>Dual disc brake</td>
</tr>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>Front brake type</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Right hand operation</td>
</tr>
<tr>
<td>Rear brake type</td>
<td>Single disc brake</td>
</tr>
<tr>
<td>Operation</td>
<td>Right foot operation</td>
</tr>
<tr>
<td>Item</td>
<td>Standard</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>Suspension:</td>
<td></td>
</tr>
<tr>
<td>Front suspension</td>
<td>Telescopic fork</td>
</tr>
<tr>
<td>Rear suspension</td>
<td>Swingarm (link suspension)</td>
</tr>
<tr>
<td>Shock absorber:</td>
<td></td>
</tr>
<tr>
<td>Front shock absorber</td>
<td>Coil spring/Oil damper</td>
</tr>
<tr>
<td>Rear shock absorber</td>
<td>Coil spring/Gas-oil damper</td>
</tr>
<tr>
<td>Wheel travel:</td>
<td></td>
</tr>
<tr>
<td>Front wheel travel</td>
<td>140 mm (5.5 in)</td>
</tr>
<tr>
<td>Rear wheel travel</td>
<td>113 mm (4.4 in)</td>
</tr>
<tr>
<td>Electrical:</td>
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</tr>
<tr>
<td>Ignition system</td>
<td>T.C.I. (digital)</td>
</tr>
<tr>
<td>Generator system</td>
<td>A.C. magneto</td>
</tr>
<tr>
<td>Battery type</td>
<td>GT14B-4</td>
</tr>
<tr>
<td>Battery capacity</td>
<td>12 V 12 AH</td>
</tr>
<tr>
<td>Headlight type:</td>
<td>Bulb type (halogen)</td>
</tr>
<tr>
<td>Bulb wattage / quantity:</td>
<td></td>
</tr>
<tr>
<td>Headlight</td>
<td>12 V 60 W/55 W / 1</td>
</tr>
<tr>
<td>Tail/brake light</td>
<td>12 V 27 W/8 W / 1</td>
</tr>
<tr>
<td>Front turn signal/position light</td>
<td>12 V 27 W/8 W / 2</td>
</tr>
<tr>
<td>Rear turn signal light</td>
<td>12 V 27 W / 2</td>
</tr>
<tr>
<td>Licence light</td>
<td>12 V 8 W / 1</td>
</tr>
<tr>
<td>Meter light</td>
<td>14 V 1.4 W / 2</td>
</tr>
<tr>
<td>Neutral indicator light</td>
<td>12 V 1.7 W / 1</td>
</tr>
<tr>
<td>High beam indicator light</td>
<td>12 V 1.7 W / 1</td>
</tr>
<tr>
<td>Turn indicator light</td>
<td>12 V 1.7 W / 1</td>
</tr>
<tr>
<td>Oil level caution light</td>
<td>12 V 1.7 W / 1</td>
</tr>
<tr>
<td>Engine warning light</td>
<td>12 V 1.7 W / 1</td>
</tr>
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</table>
## MAINTENANCE SPECIFICATIONS

### ENGINE

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinder head:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warp limit*</td>
<td>***</td>
<td>0.03 mm (0.0012 in)</td>
</tr>
<tr>
<td>Cylinder:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bore size</td>
<td>95.00 ~ 95.01 mm (3.7402 ~ 3.7405 in)</td>
<td>95.1 mm (3.7441 in)</td>
</tr>
<tr>
<td>Measuring point*</td>
<td>40 mm (1.57 in)</td>
<td></td>
</tr>
<tr>
<td>Camshaft:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive method</td>
<td>Chain drive (left &amp; right)</td>
<td>***</td>
</tr>
<tr>
<td>Cam cap inside diameter</td>
<td>25.00 ~ 25.021 mm (0.9843 ~ 0.9851 in)</td>
<td>***</td>
</tr>
<tr>
<td>Camshaft outside diameter</td>
<td>24.96 ~ 24.98 mm (0.9827 ~ 0.9835 in)</td>
<td>***</td>
</tr>
<tr>
<td>Shaft-to-cap clearance</td>
<td>0.020 ~ 0.061 mm (0.0008 ~ 0.0024 in)</td>
<td>***</td>
</tr>
<tr>
<td>Cam dimensions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake “A”</td>
<td>39.112 ~ 39.212 mm (1.5398 ~ 1.5438 in)</td>
<td>39.012 mm (1.5359 in)</td>
</tr>
<tr>
<td>“B”</td>
<td>#1: 32.093 ~ 32.193 mm (1.2635 ~ 1.2674 in)</td>
<td>#1: 31.993 mm (1.2596 in)</td>
</tr>
<tr>
<td></td>
<td>#2: 32.127 ~ 32.227 mm (1.2648 ~ 1.2688 in)</td>
<td>#2: 32.027 mm (1.2609 in)</td>
</tr>
<tr>
<td>“C”</td>
<td>7.162 mm (0.2820 in)</td>
<td>7.012 mm (0.2761 in)</td>
</tr>
<tr>
<td>Exhaust “A”</td>
<td>39.145 ~ 39.245 mm (1.5411 ~ 1.5451 in)</td>
<td>39.045 mm (1.5372 in)</td>
</tr>
<tr>
<td>“B”</td>
<td>32.200 ~ 32.300 mm (1.2677 ~ 1.2717 in)</td>
<td>32.100 mm (1.2638 in)</td>
</tr>
<tr>
<td>“C”</td>
<td>7.195 mm (0.2833 in)</td>
<td>7.045 mm (0.2774 in)</td>
</tr>
<tr>
<td>Camshaft runout limit</td>
<td>***</td>
<td>0.03 mm (0.0012 in)</td>
</tr>
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</table>
## MAINTENANCE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timing chain:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timing chain type/No. of links</td>
<td>SILENT CHAIN/98L</td>
<td></td>
</tr>
<tr>
<td>Timing chain adjustment method</td>
<td>Automatic</td>
<td></td>
</tr>
<tr>
<td>Rocker arm/rocker arm shaft:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bearing inside diameter</td>
<td>14.000 ~ 14.018 mm</td>
<td>14.036 mm</td>
</tr>
<tr>
<td></td>
<td>(0.0512 ~ 0.5519 in)</td>
<td>(0.5526 in)</td>
</tr>
<tr>
<td>Shaft outside diameter</td>
<td>13.985 ~ 13.991 mm</td>
<td>13.95 mm</td>
</tr>
<tr>
<td></td>
<td>(0.5506 ~ 0.5508 in)</td>
<td>(0.5492 in)</td>
</tr>
<tr>
<td>Arm-to-shaft clearance</td>
<td>0.009 ~ 0.033 mm</td>
<td>0.086 mm</td>
</tr>
<tr>
<td></td>
<td>(0.0006 ~ 0.0013 in)</td>
<td>(0.0034 in)</td>
</tr>
<tr>
<td>Valve, valve seat, valve guide:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valve clearance (cold) IN</td>
<td>0.07 ~ 0.12 mm (0.0028 ~ 0.0047 in)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.12 ~ 0.17 mm (0.0047 ~ 0.0067 in)</td>
<td></td>
</tr>
<tr>
<td>Valve dimensions:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;A&quot; head diameter IN</td>
<td>47.0 ~ 47.2 mm (1.850 ~ 1.858 in)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>39.0 ~ 39.2 mm (1.535 ~ 1.543 in)</td>
<td></td>
</tr>
<tr>
<td>&quot;B&quot; face width IN</td>
<td>2.1 mm (0.083 in)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.1 mm (0.083 in)</td>
<td></td>
</tr>
<tr>
<td>&quot;C&quot; seat width IN</td>
<td>1.2 ~ 1.4 mm</td>
<td>1.8 mm</td>
</tr>
<tr>
<td></td>
<td>(0.047 ~ 0.055 in)</td>
<td>(0.071 in)</td>
</tr>
<tr>
<td></td>
<td>1.2 ~ 1.4 mm</td>
<td>1.8 mm</td>
</tr>
<tr>
<td></td>
<td>(0.047 ~ 0.055 in)</td>
<td>(0.071 in)</td>
</tr>
<tr>
<td>&quot;D&quot; margin thickness IN</td>
<td>1.1 ~ 1.5 mm</td>
<td>0.8 mm</td>
</tr>
<tr>
<td></td>
<td>(0.043 ~ 0.060 in)</td>
<td>(0.031 in)</td>
</tr>
<tr>
<td></td>
<td>1.1 ~ 1.5 mm</td>
<td>0.8 mm</td>
</tr>
<tr>
<td></td>
<td>(0.043 ~ 0.060 in)</td>
<td>(0.031 in)</td>
</tr>
<tr>
<td>Stem outside diameter IN</td>
<td>7.975 ~ 7.990 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.3140 ~ 0.3146 in)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.960 ~ 7.975 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.3134 ~ 0.3140 in)</td>
<td></td>
</tr>
<tr>
<td>Guide inside diameter IN</td>
<td>8.000 ~ 8.012 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.3150 ~ 0.3154 in)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.000 ~ 8.012 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.3150 ~ 0.3154 in)</td>
<td></td>
</tr>
<tr>
<td>Stem-to-guide clearance IN</td>
<td>0.010 ~ 0.037 mm</td>
<td>0.08 mm</td>
</tr>
<tr>
<td></td>
<td>(0.0004 ~ 0.0015 in)</td>
<td>(0.0031 in)</td>
</tr>
<tr>
<td></td>
<td>0.025 ~ 0.052 mm</td>
<td>0.10 mm</td>
</tr>
<tr>
<td></td>
<td>(0.0010 ~ 0.0020 in)</td>
<td>(0.0040 in)</td>
</tr>
<tr>
<td>Item</td>
<td>Standard</td>
<td>Limit</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------</td>
<td>------------------</td>
</tr>
<tr>
<td><strong>Stem runout limit</strong></td>
<td></td>
<td>0.03 mm (0.0012 in)</td>
</tr>
<tr>
<td>Valve seat width</td>
<td>IN 1.2 ~ 1.4 mm (0.047 ~ 0.055 in)</td>
<td>2.0 mm (0.079 in)</td>
</tr>
<tr>
<td></td>
<td>EX 1.2 ~ 1.4 mm (0.047 ~ 0.055 in)</td>
<td>2.0 mm (0.079 in)</td>
</tr>
<tr>
<td><strong>Valve spring:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free length</td>
<td>IN 44.6 mm (1.76 in)</td>
<td>43.5 mm (1.71 in)</td>
</tr>
<tr>
<td></td>
<td>EX 44.6 mm (1.76 in)</td>
<td>43.5 mm (1.71 in)</td>
</tr>
<tr>
<td>Set length (valve closed)</td>
<td>IN 40 mm (1.57 in)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EX 40 mm (1.57 in)</td>
<td></td>
</tr>
<tr>
<td>Compressed pressure (installed)</td>
<td>IN 160.7 N (16.4 kg, 36.16 lb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EX 160.7 N (16.4 kg, 36.16 lb)</td>
<td></td>
</tr>
<tr>
<td>Tilt limit *</td>
<td>IN ***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EX ***</td>
<td></td>
</tr>
<tr>
<td>Direction of winding (top view)</td>
<td>IN Clockwise</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EX Clockwise</td>
<td></td>
</tr>
<tr>
<td>Piston:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piston to cylinder clearance</td>
<td>0.025 ~ 0.050 mm (0.0010 ~ 0.0020 in)</td>
<td>0.15 mm (0.0060 in)</td>
</tr>
<tr>
<td>Piston size “D”</td>
<td>94.960 ~ 94.975 mm (3.7386 ~ 3.7392 in)</td>
<td></td>
</tr>
<tr>
<td>Measuring point “H”</td>
<td>5 mm (0.197 in)</td>
<td></td>
</tr>
<tr>
<td>Piston off-set</td>
<td>0 mm (0.00 in)</td>
<td></td>
</tr>
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</table>
# Maintenance Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piston pin bore inside diameter</td>
<td>22.004 ~ 22.015 mm</td>
<td></td>
</tr>
<tr>
<td>Piston pin outside diameter</td>
<td>(0.8663 ~ 0.8667 in)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21.991 ~ 22.000 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.8658 ~ 0.8661 in)</td>
<td></td>
</tr>
</tbody>
</table>

## Piston rings:

### Top ring:

- **Type**: Plain
- **Dimensions (B / T)**: 1.5 / 3.8 mm (0.059 / 0.150 in)
- **End gap (installed)**: 0.3 ~ 0.5 mm (0.012 ~ 0.020 in)
- **Side clearance (installed)**: 0.04 ~ 0.08 mm (0.002 ~ 0.003 in)

### 2nd ring:

- **Type**: Taper
- **Dimensions (B / T)**: 1.2 / 3.8 mm (0.047 / 0.150 in)
- **End gap (installed)**: 0.30 ~ 0.45 mm (0.012 ~ 0.018 in)
- **Side clearance**: 0.03 ~ 0.07 mm (0.001 ~ 0.003 in)

### Oil ring:

- **Dimensions (B / T)**: 2.5 / 3.4 mm (0.098 / 0.134 in)
- **End gap (installed)**: 0.2 ~ 0.7 mm (0.008 ~ 0.03 in)

## Connecting rod:

- **Oil clearance**: 0.044 ~ 0.073 mm (0.0017 ~ 0.0029 in)
- **Color code (corresponding size)**: ①Blue ②Black ③Brown ④Green ⑤Yellow

## Crankshaft:

- **Crank width “A”**: 101.95 ~ 102.00 mm (4.014 ~ 4.016 in)
- **Runout limit “C”**: 0.02 mm (0.009 in)
- **Big end side clearance “D”**: 0.320 ~ 0.474 mm (0.0126 ~ 0.0187 in)
## Clutch:

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friction plate thickness</td>
<td>2.9 ~ 3.1 mm (0.114 ~ 0.122 in)</td>
<td>2.8 mm (0.11 in)</td>
</tr>
<tr>
<td>Quantity</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Clutch plate thickness/Warp limit</td>
<td>2.5 ~ 2.7 mm (0.098 ~ 0.106 in)</td>
<td>0.1 mm (0.004 in)</td>
</tr>
<tr>
<td>Quantity</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Clutch plate thickness/Warp limit</td>
<td>1.9 ~ 2.1 mm (0.075 ~ 0.083 in)</td>
<td>0.1 mm (0.004 in)</td>
</tr>
<tr>
<td>Quantity</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Clutch spring free length</td>
<td>7.2 mm (0.283 in)</td>
<td>6.5 mm (0.256 in)</td>
</tr>
<tr>
<td>Quantity</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Clutch housing thrust clearance</td>
<td>0.05 ~ 0.40 mm (0.002 ~ 0.016 in)</td>
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<tr>
<td>Clutch housing radial clearance</td>
<td>0.010 ~ 0.044 mm (0.0004 ~ 0.0017 in)</td>
<td></td>
</tr>
<tr>
<td>Clutch release method</td>
<td>Inner push, screw push</td>
<td></td>
</tr>
<tr>
<td>Push rod bending limit</td>
<td>2.8 mm (0.11 in)</td>
<td>0.5 mm (0.02 in)</td>
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## Transmission:

<table>
<thead>
<tr>
<th>Item</th>
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<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main axle deflection limit</td>
<td></td>
<td>0.08 mm (0.003 in)</td>
</tr>
<tr>
<td>Drive axle deflection limit</td>
<td></td>
<td>0.08 mm (0.003 in)</td>
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</table>

## Shifter:

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
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</thead>
<tbody>
<tr>
<td>Shifter type</td>
<td>Guide bar</td>
</tr>
<tr>
<td>Shift fork thickness</td>
<td>5.76 ~ 5.89 mm (0.227 ~ 0.232 in)</td>
</tr>
</tbody>
</table>

## Carburetor:

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. D. mark</td>
<td>5EL5 20 (USA, CAN)</td>
</tr>
<tr>
<td>Main jet</td>
<td>#1: #110, #2: #112.5</td>
</tr>
<tr>
<td>Main air jet</td>
<td>#55</td>
</tr>
<tr>
<td>Jet needle</td>
<td>#1, 2: 5DL 43-53-1</td>
</tr>
<tr>
<td>Needle jet</td>
<td>P-0M</td>
</tr>
<tr>
<td>Pilot air jet</td>
<td>#63.8</td>
</tr>
<tr>
<td>Pilot outlet</td>
<td>1.0</td>
</tr>
<tr>
<td>Pilot jet</td>
<td>#17.5</td>
</tr>
<tr>
<td>Bypass 1</td>
<td>0.8</td>
</tr>
<tr>
<td>Bypass 2</td>
<td>0.8</td>
</tr>
<tr>
<td>Bypass 3</td>
<td>0.8</td>
</tr>
<tr>
<td>Valve seat size</td>
<td>1.2</td>
</tr>
<tr>
<td>Starter jet</td>
<td>#42.5</td>
</tr>
<tr>
<td>Starter jet</td>
<td>0.8</td>
</tr>
<tr>
<td>Throttle valve size</td>
<td>#125</td>
</tr>
<tr>
<td>Fuel level (above the line on the float chamber)</td>
<td>4 ~ 5 mm (0.16 ~ 0.20 in)</td>
</tr>
<tr>
<td>Engine idle speed</td>
<td>950 ~ 1,050 r/min</td>
</tr>
<tr>
<td>Intake vacuum</td>
<td>34.7 ~ 37.3 kPa (260 ~ 280 mmHg)</td>
</tr>
<tr>
<td>Engine oil temperature</td>
<td>75 ~ 85°C (167 ~ 185°F)</td>
</tr>
</tbody>
</table>

## Fuel pump:

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Electrical type</td>
</tr>
<tr>
<td>Model/manufacturer</td>
<td>UC-Z6M/MITSUBISHI</td>
</tr>
<tr>
<td>Consumption amperage &lt;max&gt;</td>
<td>0.8 A</td>
</tr>
<tr>
<td>Output pressure</td>
<td>12 kPa (0.12 kg/cm², 2 psi)</td>
</tr>
</tbody>
</table>
## MAINTENANCE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
<th>Limit</th>
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<tbody>
<tr>
<td><strong>Lubrication system:</strong></td>
<td></td>
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</tr>
<tr>
<td>Oil filter type</td>
<td>Paper type</td>
<td></td>
</tr>
<tr>
<td>Oil pump type</td>
<td>Trochoid type</td>
<td></td>
</tr>
<tr>
<td>Tip clearance “A” or “B”</td>
<td>0.03 ~ 0.09 mm</td>
<td>0.15 mm (0.006 in)</td>
</tr>
<tr>
<td></td>
<td>(0.001 ~ 0.004 in)</td>
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</tr>
<tr>
<td>Side clearance</td>
<td>0.03 ~ 0.08 mm</td>
<td>0.15 mm (0.006 in)</td>
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<tr>
<td></td>
<td>(0.001 ~ 0.003 in)</td>
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<tr>
<td>Relief valve operating pressure</td>
<td>450 ~ 550 kPa</td>
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</tr>
<tr>
<td></td>
<td>(4.5 ~ 5.5 kg/cm², 64.0 ~ 78.2 psi)</td>
<td></td>
</tr>
<tr>
<td><strong>Shaft drive:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle gear backlash</td>
<td>0.1 ~ 0.2 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.004 ~ 0.008 in)</td>
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</tr>
<tr>
<td>Final gear backlash</td>
<td>0.1 ~ 0.2 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.004 ~ 0.008 in)</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Standard</td>
<td></td>
</tr>
<tr>
<td>------</td>
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Lubrication chart:

- Pressure feed
- Splashed
- Orifice

Diagram of lubrication system:

- Oil pan
- Oil pump
- Relief valve
- Oil filter
- Connecting rod big end
- Crankshaft
- Main axle
- Drive axle
- Pinion drive
- Middle driveshaft
- Rocker arm (EX)
- Camshaft (EX)
- Rocker arm (IN)
- Camshaft (IN)
Cylinder head tightening sequence:

Crankcase tightening sequence:

Left crankcase

Right crankcase
MAINTENANCE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Part to be tightened</th>
<th>Part name</th>
<th>Thread size</th>
<th>Q'ty</th>
<th>Tightening torque</th>
<th>Remarks</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Nm</td>
<td>m•kg</td>
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<tr>
<td>Cylinder head</td>
<td>Nut</td>
<td>M12</td>
<td>8</td>
<td>50</td>
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<tr>
<td>Cylinder head</td>
<td>Nut</td>
<td>M10</td>
<td>2</td>
<td>35</td>
<td>3.5</td>
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<tr>
<td>Plate</td>
<td>Bolt</td>
<td>M8</td>
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<td>20</td>
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<tr>
<td>Cylinder head cover</td>
<td>Screw</td>
<td>M6</td>
<td>4</td>
<td>4</td>
<td>0.4</td>
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<tr>
<td>Cylinder head (exhaust pipe)</td>
<td>Stud bolt</td>
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<td>4</td>
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<tr>
<td>Rocker arm shaft</td>
<td>Union bolt</td>
<td>M16</td>
<td>2</td>
<td>37.5</td>
<td>3.75</td>
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<td>Camshaft sprocket cover</td>
<td>Bolt</td>
<td>M6</td>
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<td>Tappet cover</td>
<td>Bolt</td>
<td>M6</td>
<td>8</td>
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<td>Rocker arm shaft (oil passage)</td>
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<td>M16</td>
<td>4</td>
<td>38</td>
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<td>Stopper plate (camshaft)</td>
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<td>M8</td>
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<td>Bolt</td>
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<td>Lower cylinder head cover</td>
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<td>Upper cylinder head cover</td>
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<td>M10</td>
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<td>Timing chain tensioner</td>
<td>Bolt</td>
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<td>1.0</td>
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<tr>
<td>Timing chain tensioner cap</td>
<td>Bolt</td>
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<td>0.8</td>
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<td>Timing chain guide</td>
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<td>Oil pump</td>
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<tr>
<td>Oil strainer cover</td>
<td>Bolt</td>
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<td>10</td>
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<tr>
<td>Oil filter cover</td>
<td>Bolt</td>
<td>M6</td>
<td>5</td>
<td>10</td>
<td>1.0</td>
</tr>
<tr>
<td>Oil pump gear</td>
<td>Bolt</td>
<td>M6</td>
<td>1</td>
<td>12</td>
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<tr>
<td>Oil pump cap</td>
<td>Bolt</td>
<td>M6</td>
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<td>10</td>
<td>1.0</td>
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<td>Oil delivery pipe (cylinder head)</td>
<td>Union bolt</td>
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<td>Drain bolt</td>
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<td>Bolt</td>
<td>M5</td>
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<td>7</td>
<td>0.7</td>
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<tr>
<td>Air filter case stay</td>
<td>Bolt</td>
<td>M6</td>
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<td>10</td>
<td>1.0</td>
</tr>
<tr>
<td>Air filter case assembly</td>
<td>Bolt</td>
<td>M5</td>
<td>3</td>
<td>2</td>
<td>0.2</td>
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<tr>
<td>Exhaust pipe joint and cylinder head</td>
<td>Nut</td>
<td>M8</td>
<td>4</td>
<td>20</td>
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<tr>
<td>Exhaust pipe joint and muffler</td>
<td>Bolt</td>
<td>M8</td>
<td>2</td>
<td>20</td>
<td>2.0</td>
</tr>
<tr>
<td>Muffler</td>
<td>Bolt</td>
<td>M10</td>
<td>2</td>
<td>25</td>
<td>2.5</td>
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<tr>
<td>Crankcase (cylinder)</td>
<td>Stud bolt</td>
<td>M12</td>
<td>8</td>
<td>24</td>
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<tr>
<td>Crankcase (cylinder)</td>
<td>Stud bolt</td>
<td>M10</td>
<td>2</td>
<td>20</td>
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<td>Bolt</td>
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<tr>
<td>Bearing retainer (middle drive pinion gear)</td>
<td>Bolt</td>
<td>M8</td>
<td>3</td>
<td>25</td>
<td>2.5</td>
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<tr>
<td>Crankcase cover (left)</td>
<td>Bolt</td>
<td>M6</td>
<td>13</td>
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<tr>
<td>Crankcase cover (right)</td>
<td>Bolt</td>
<td>M6</td>
<td>11</td>
<td>10</td>
<td>1.0</td>
</tr>
<tr>
<td>Clamp</td>
<td>Bolt</td>
<td>M6</td>
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<td>10</td>
<td>1.0</td>
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<tr>
<td>One-way clutch</td>
<td>Bolt</td>
<td>M6</td>
<td>8</td>
<td>12</td>
<td>1.2</td>
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<tr>
<td>Primary drive gear</td>
<td>Nut</td>
<td>M20</td>
<td>1</td>
<td>110</td>
<td>11.0</td>
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</table>

*Use lock washer*
<table>
<thead>
<tr>
<th>Part to be tightened</th>
<th>Part name</th>
<th>Thread size</th>
<th>Q’ty</th>
<th>Tightening torque</th>
<th>Remarks</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Nm</td>
<td>m·kg</td>
</tr>
<tr>
<td>Clutch spring</td>
<td>Bolt</td>
<td>M6</td>
<td>6</td>
<td>8</td>
<td>0.8</td>
</tr>
<tr>
<td>Clutch adjuster</td>
<td>Nut</td>
<td>M8</td>
<td>1</td>
<td>12</td>
<td>1.2</td>
</tr>
<tr>
<td>Clutch boss</td>
<td>Nut</td>
<td>M20</td>
<td>1</td>
<td>70</td>
<td>7.0</td>
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<tr>
<td>Push lever axle</td>
<td>Screw</td>
<td>M8</td>
<td>1</td>
<td>12</td>
<td>1.2</td>
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<tr>
<td>Middle drive pinion gear</td>
<td>Nut</td>
<td>M44</td>
<td>1</td>
<td>110</td>
<td>11.0</td>
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<tr>
<td>Bearing retainer (middle driven shaft)</td>
<td>Nut</td>
<td>M88</td>
<td>1</td>
<td>110</td>
<td>11.0</td>
</tr>
<tr>
<td>Yoke (middle driven shaft)</td>
<td>Nut</td>
<td>M14</td>
<td>1</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Bearing housing (middle drive shaft)</td>
<td>Bolt</td>
<td>M8</td>
<td>4</td>
<td>25</td>
<td>2.5</td>
</tr>
<tr>
<td>Shift lever stopper</td>
<td>Bolt</td>
<td>M8</td>
<td>1</td>
<td>22</td>
<td>2.2</td>
</tr>
<tr>
<td>Guide bar stopper</td>
<td>Screw</td>
<td>M6</td>
<td>2</td>
<td>7</td>
<td>0.7</td>
</tr>
<tr>
<td>Shift dram segment</td>
<td>Screw</td>
<td>M5</td>
<td>1</td>
<td>4</td>
<td>0.4</td>
</tr>
<tr>
<td>Shift arm</td>
<td>Bolt</td>
<td>M6</td>
<td>1</td>
<td>10</td>
<td>1.0</td>
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<tr>
<td>Shift pedal adjuster</td>
<td>Nut</td>
<td>M6</td>
<td>2</td>
<td>10</td>
<td>1.0</td>
</tr>
<tr>
<td>Stator coil</td>
<td>Screw</td>
<td>M6</td>
<td>3</td>
<td>10</td>
<td>1.0</td>
</tr>
<tr>
<td>Pickup coil</td>
<td>Screw</td>
<td>M5</td>
<td>2</td>
<td>7</td>
<td>0.7</td>
</tr>
<tr>
<td>Starter motor</td>
<td>Bolt</td>
<td>M6</td>
<td>2</td>
<td>10</td>
<td>1.0</td>
</tr>
<tr>
<td>Neutral switch</td>
<td>—</td>
<td>M10</td>
<td>1</td>
<td>20</td>
<td>2.0</td>
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<tr>
<td>Ignition coil</td>
<td>Screw</td>
<td>M5</td>
<td>4</td>
<td>2.5</td>
<td>0.25</td>
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<tr>
<td>Speed sensor</td>
<td>Bolt</td>
<td>M6</td>
<td>1</td>
<td>7</td>
<td>0.7</td>
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</table>

- Use lock washer
- Stake
- 1 of 2 has LH thread
# CHASSIS

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Steering system:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steering bearing type</td>
<td>Angular bearing</td>
<td></td>
</tr>
<tr>
<td><strong>Front suspension:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front fork travel</td>
<td>140 mm (5.51 in)</td>
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</tr>
<tr>
<td>Fork spring free length</td>
<td>356.9 mm</td>
<td>350 mm (13.78 in)</td>
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<tr>
<td>Fitting length</td>
<td>319.4 mm (12.57 in)</td>
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<tr>
<td>Collar length</td>
<td>183 mm (7.20 in)</td>
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<tr>
<td>Spring rate (K1)</td>
<td>8.8 N/mm (0.9 kg/mm, 50.40 lb/in)</td>
<td></td>
</tr>
<tr>
<td>Stroke (K1)</td>
<td>0 ~ 77.5 mm (0 ~ 3.05 in)</td>
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<tr>
<td>Optional spring</td>
<td>No</td>
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<tr>
<td>Oil capacity</td>
<td>0.464 L (464 cm³, 16.4 Imp OZ, 15.7 US OZ)</td>
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<tr>
<td>Oil level</td>
<td>108 mm (4.25 in)</td>
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<tr>
<td>Oil grade</td>
<td>Fork oil 10W or equivalent</td>
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<tr>
<td><strong>Rear suspension:</strong></td>
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<tr>
<td>Shock absorber travel</td>
<td>113 mm (4.45 in)</td>
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<tr>
<td>Spring free length</td>
<td>179.5 mm (7.07 in)</td>
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<td>Fitting length</td>
<td>163 mm (6.42 in)</td>
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<tr>
<td>Spring rate (K1)</td>
<td>117.7 N/mm (12 kg/mm, 672 lb/in)</td>
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<tr>
<td>Stroke (K1)</td>
<td>0 ~ 50 mm (0 ~ 1.97 in)</td>
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<td>Optional spring</td>
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<td><strong>Swingarm:</strong></td>
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<tr>
<td>Free play limit end</td>
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<td><strong>Front wheel:</strong></td>
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<td></td>
</tr>
<tr>
<td>Type</td>
<td>Spoke wheel</td>
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<tr>
<td>Rim size</td>
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<td>Rim material</td>
<td>Steel</td>
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<tr>
<td>Rim runout limit radial</td>
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<td>1.0 mm (0.04 in)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5 mm (0.02 in)</td>
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<tr>
<td>Rim runout limit lateral</td>
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<td></td>
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<tr>
<td><strong>Rear wheel:</strong></td>
<td></td>
<td></td>
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<tr>
<td>Type</td>
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<tr>
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<td>Steel</td>
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<tr>
<td>Rim runout limit radial</td>
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<td>1.0 mm (0.04 in)</td>
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<tr>
<td></td>
<td></td>
<td>0.5 mm (0.02 in)</td>
</tr>
<tr>
<td>Rim runout limit lateral</td>
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## MAINTENANCE SPECIFICATIONS

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<tr>
<th>Item</th>
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<th>Limit</th>
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<tbody>
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<tr>
<td>Type</td>
<td>Dual disc</td>
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<td>Disc outside diameter / thickness</td>
<td>298 / 5 mm</td>
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<td></td>
<td>(11.7 / 0.20 in)</td>
<td>(0.18 in)</td>
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<td>Disc deflection limit</td>
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<td>0.15 mm</td>
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<tr>
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<td>(0.006 in)</td>
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<td>Pad thickness inner</td>
<td>6.2 mm</td>
<td>0.8 mm</td>
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<tr>
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<td>(0.244 in)</td>
<td>(0.031 in)</td>
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<tr>
<td>Pad thickness outer</td>
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</tr>
<tr>
<td></td>
<td>(0.244 in)</td>
<td>(0.031 in)</td>
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<tr>
<td>Master cylinder inside diameter</td>
<td>14.0 mm (0.55 in)</td>
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<tr>
<td>Caliper cylinder inside diameter</td>
<td>25.4 mm (0.99 in)</td>
<td>***</td>
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<tr>
<td>Caliper cylinder inside diameter</td>
<td>30.1 mm (1.19 in)</td>
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<td>Brake fluid type</td>
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<td>***</td>
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<tr>
<td>Type</td>
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<tr>
<td>Disc outside diameter / thickness</td>
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<tr>
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NOTE:

1. First, tighten the ring nut approximately 52 Nm (5.2 m•kg, 38 ft•lb) by using the torque wrench, then loosen the ring nut completely.
2. Retighten the ring nut to specification.
## ELECTRICAL

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CONVERSION TABLE

All specification data in this manual are listed in SI and METRIC UNITS. Use this table to convert METRIC unit data to IMPERIAL unit data.

Ex.

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CONVERSION TABLE

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<td>mi</td>
</tr>
<tr>
<td></td>
<td>m</td>
<td>3.281</td>
<td>ft</td>
</tr>
<tr>
<td></td>
<td>cm</td>
<td>1.094</td>
<td>yd</td>
</tr>
<tr>
<td></td>
<td>mm</td>
<td>0.3937</td>
<td>in</td>
</tr>
<tr>
<td>Volume/Capacity</td>
<td>cc (cm³)</td>
<td>0.03527</td>
<td>oz (IMP liq.)</td>
</tr>
<tr>
<td></td>
<td>cc (cm³)</td>
<td>0.06102</td>
<td>cu in</td>
</tr>
<tr>
<td></td>
<td>lt (liter)</td>
<td>0.8799</td>
<td>qt (IMP liq.)</td>
</tr>
<tr>
<td></td>
<td>lt (liter)</td>
<td>0.2199</td>
<td>gal (IMP liq.)</td>
</tr>
<tr>
<td>Misc.</td>
<td>kg/mm</td>
<td>55.997</td>
<td>lb/in</td>
</tr>
<tr>
<td></td>
<td>kg/cm²</td>
<td>14.2234</td>
<td>psi (lb/in²)</td>
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<tr>
<td></td>
<td>Centigrade</td>
<td>( \frac{9}{5} ) (°C) + 32</td>
<td>Fahrenheit (°F)</td>
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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 torque specifications</th>
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<tr>
<td></td>
<td></td>
<td>Nm</td>
</tr>
<tr>
<td>10 mm</td>
<td>6 mm</td>
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<tr>
<td>12 mm</td>
<td>8 mm</td>
<td>15</td>
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<tr>
<td>14 mm</td>
<td>10 mm</td>
<td>30</td>
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<tr>
<td>17 mm</td>
<td>12 mm</td>
<td>55</td>
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<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>
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A: Distance between flats
B: Outside thread diameter
# LUBRICATION POINTS AND LUBRICANT TYPES

## ENGINE

<table>
<thead>
<tr>
<th>Lubrication point</th>
<th>Symbol</th>
</tr>
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<tr>
<td>Oil seal lips</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>O-ring</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Bearing</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Connecting rod bolt/nut</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Connecting rod small end and big end</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Crankshaft pin</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Crankshaft journal/big end</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Piston surface</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Piston pin</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Camshaft cam lobe/journal</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Rocker arm shaft</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Valve stem (IN, EX)</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Valve stem end (IN, EX)</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Timing chain drive gear shafts/sprokets</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Oil pump rotor (inner/outer), housing</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Idle gear surface</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Starter idle gear</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Starter idle gear shaft</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Starter oneway cam</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Middle drive gear</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Primary driven gear</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Push rod 1, 2</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Transmission gear (wheel/pinion)</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Shift cam</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Shift fork/guide bar</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Shift shaft assembly</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Push rod ball</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Push lever assembly</td>
<td>![Symbol]</td>
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## CHASSIS

<table>
<thead>
<tr>
<th>Lubrication point</th>
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<tbody>
<tr>
<td>Steering head pipe (upper/lower), bearing</td>
<td>🛠️</td>
</tr>
<tr>
<td>Steering head pipe, bearing cover lip</td>
<td>🛠️</td>
</tr>
<tr>
<td>Steering head pipe, oil seal lip</td>
<td>🛠️</td>
</tr>
<tr>
<td>Front wheel oil seal lip (right/left)</td>
<td>🛠️</td>
</tr>
<tr>
<td>Rear wheel oil seal lip</td>
<td>🛠️</td>
</tr>
<tr>
<td>Clutch hub fitting area</td>
<td>🛠️</td>
</tr>
<tr>
<td>Rear brake pedal shaft</td>
<td>🛠️</td>
</tr>
<tr>
<td>Shift pedal shaft</td>
<td>🛠️</td>
</tr>
<tr>
<td>Sidestand bolt, sidestand sliding surface</td>
<td>🛠️</td>
</tr>
<tr>
<td>Tube guide (throttle grip) inner surface</td>
<td>🛠️</td>
</tr>
<tr>
<td>Brake lever pivot bolt, contact surface</td>
<td>🛠️</td>
</tr>
<tr>
<td>Clutch lever pivot bolt, contact surface</td>
<td>🛠️</td>
</tr>
<tr>
<td>Rear shock absorber (lower) oil seal lip</td>
<td>🛠️</td>
</tr>
<tr>
<td>Swingarm pivot bearing inner surface</td>
<td>🛠️</td>
</tr>
<tr>
<td>Swingarm pivot oil seal lip</td>
<td>🛠️</td>
</tr>
<tr>
<td>Relay arm bearing, collar and oil seal</td>
<td>🛠️</td>
</tr>
<tr>
<td>Drive shaft spline</td>
<td>🛠️</td>
</tr>
<tr>
<td>Drive shaft dust cover</td>
<td>🛠️</td>
</tr>
</tbody>
</table>
LUBRICATION DIAGRAMS

1. Rocker arm shaft (intake)
2. Rocker arm shaft (exhaust)
3. Oil filter
4. Oil pump
5. Drive axle
6. Middle drive shaft
LUBRICATION DIAGRAMS

1. Oil pump
2. Releaf valve
3. Oil filter
4. Middle drive shaft
1. Camshaft
2. Crankshaft
3. Main axle
4. Middle drive shaft
5. Drive axle
6. Connecting rod big end
EB26600

CABLE ROUTING

1. Clutch cable
2. Starter cable
3. Handlebar switch lead (left)
4. Handlebar switch lead (right)
5. High tension code
6. Throttle cable
7. Fuel hose (fuel cock-filter)
8. Fuel breather hose (fuel tank-roll over valve) (for CAL)
9. Fuse box
10. Alarm connector
11. Fuel pump lead
12. Speed sensor lead
13. Sidestand switch lead
14. Neutral switch lead
15. Pickup coil lead
16. To engine
17. A.C. magneto lead
18. Ventilation hose
19. Sensing hose (AIS-carburetor joint)
20. Fuel hose (carburetor-fuel pump)
21. Clip
22. Brake hose
23. Heat protector
24. Speed meter lead
25. Wireharness
26. Purge hose (carburetor-sole-noid valve) (for CAL)
27. Fitting plate
28. Fuel hose (inlet) (fuel filter-fuel pump)
29. Fuel hose (outlet) (carburetor-fuel pump)
30. Alarm connector lead
31. Wireharness

Diagram with labeled parts corresponding to the list above.
A Fasten the handlebar switch lead (left and right) to the handlebar with plastic locking tie and cut the end of tie.
B Position the throttle cable and starter cable as shown and clamp them with holder.
C Clamp the wire harness with the hook of frame side.
D When installing the pipe of throttle cable press it inside.
E Clamp the fuel hoses to the frame with the clamp.
F Change the fuel hose (fuel cock side) and fuel hose (carburetor side) between guide of frame and clamp. (carburetor side is upper)
G When connecting the sensing hose (carburetor joint-AIS) with a nozzle.
H Push the wire harness inside of the side cover.
I Push the sensing hose inside of the LID and not bend the sensing hose.
J Through the wireharness of solenoid valve between AIS duct and fuel hose (for CAL).
K Fasten the alarm lead with a plastic band on the LID.
L Fasten the sidestand switch lead to the bracket of LID with plastic locking tie.
M Fasten the lead with locking tie near the side cover.
N Position the all connectors inside of the connector cover.
O Route the clutch cable through the cable guide.
P Fasten the handlebar switch leads (left and right) under the handle crown with a plastic band. Set the band at four notches and install it no slacking.
Q Route the each hoses through the frame guide and do not pinch it.
R When installing the fitting plate, do not pinch the each hoses and wireharness.
S Wher install the AIS push the wireharness to space of rearside.
33 Flasher relay  
34 Handlebar switch lead (left)  
35 Silencer  
36 Throttle position sensor lead  
37 Carburetor heater lead  
38 Thermo switch lead  
39 Starting circuit cut-off relay  
40 Horn  
41 Rectifier/regulator and light (reduce relay) lead

A Clamp the battery positive (+) lead to the battery with battery band.  
B Connect the battery negative (–) lead and push it in to the space between battery box and battery.  
C Push the wireharness into the space between frame and starter motor relay.  
D Route the rectifier/regulator lead, wireharness and starter motor positive (+) lead through the out of frame bracket and fasten them to the frame with a plastic locking tie. The place to fix must be between 0 mm (0 in) and 10 mm (0.4 in) from the top of the diverging point of the lead on the harness side which connected the battery negative (–) lead.
E Connect the purge hose (carburetor side-solenoid valve side) with joint, knob is out side of frame.
F Route the front turn signal/position light lead and headlight lead through the rear of headlight body hole.
G Connect the ignition coil lead at red tape to the right side.
H Knob of clip is rear side of body.
I Fasten the rear brake switch lead to the rear brake switch bracket with a plastic locking tie and cut of the end, inside of frame.
J Fasten the wireharness, starter motor positive (+) lead and battery negative (−) lead to the frame with a plastic locking tie.
K From the engine.
L About 70 mm (2.8 in)
M Fasten the rear brake switch lead and master cylinder reservoir hose to the down tube with a plastic locking tie, and cut the end of locking tie and position is inside of frame.
N About 20 mm (0.8 in) from bead end.
O Locate the band to forward of down tube.
P Route the rectifier/regulator lead and carburetor heater lead through inside of battery box hole to outside it and connect them.
CABLE ROUTING SPEC

Q  To rear brake.
R  Fasten the rear brake switch lead with a band to down tube. (four point)
S  Cutting part at the edge of the band.
T  About $30^\circ$ / $45^\circ$

U  Fasten the oil level sensor lead with a locking tie to battery box. Fix to the battery box with the band. To fix, align the band to the bottom of the box’s hole while fixing the lead to the back of the box (inside the body). The cutting part at the edge of the band comes to the front side of the body.

V  Clamp the handlebar switch lead (right) to the frame with a holder. The part to open and shut is outside of the body.

W  Arrange the throttle position sensor connector, carburetor heater connector and thermo switch connector between the starting circuit cut off relay and high tension code.

X  Put the light reduce relay lead, carburetor heater lead into the bottom of the groove.
1. Brake hose
2. Throttle cable
3. Master cylinder reservoir hose
4. High tension code
5. Purge hose (carburetor-solenoid valve) (for CAL)
6. Rear brake switch lead
7. Fuel hose (carburetor-fuel pump)
8. Delay relay
9. Battery negative (–) lead
10. Battery negative (–) lead connector
11. Battery
12. Battery positive (+) lead
13. Taillight lead
14. Starter relay
15. Starter motor positive (+) lead
16. Fuel tank breather hose (fuel tank-roll over valve) (for CAL)
17. Outlet
18. Inlet
19. Ventilation hose
20. Starter cable
21. Sensing hose (AIS-carburetor joint)
22. Fuel hose (fuel cock-fuel filter)
23. Throttle position sensor lead
24. Carburetor heater lead
25. Tappet cover
26. Clutch cable
27. Thermo switch lead
28. Wireharness
29. Frame
30. Igniter unit
31. LID. 2
32. Mud guard
33. Fuel filter
34. LID.
35. Ignitor unit lead
36. Speed unit lead connector
A Clamp the throttle cables with the holder. Position the end of clip downward.

B Route the rear brake switch lead under the master cylinder reservoir hose.

C Position the band end of right side bracket.

D Position the steel band end to forward.

E Position the steel band end to right side.

F Eliminate the clamp.

G Route the battery positive (+) lead through the slit of the battery box.

H Clamp the igniter unit lead to the frame with a holder.

I To the rear fender.

J Connect the wire harness to the igniter unit through the hole of LID. 2.

K Route the fuel tank breather hose under the fuel filter and connect it (fuel tank sideroll over valve side) with a joint. Position the end of clip outside.
L Fasten the wireharness with a band on the tool box plate.
M Fasten the wireharness to the frame with a plastic locking tie. Position the locking tie front of the holder.
N Route the wireharness outside of the guide on the frame.
O Clamp the clutch cable and starter cable with a holder. Position the end of holder down side.
P Route the igniter lead through the igniter plate hole to the wireharness.
Q To the wireharness.
R Clamp the taillight lead with mud guard clamp.
S Clamp the taillight lead with a holder on the mud guard.
T Position the locking tie upward.
U The front direction of the level body.
Route the handlebar switch lead (right) rear side of the throttle cable.
# CHAPTER 3
PERIODIC CHECKS AND ADJUSTMENTS

## INTRODUCTION

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<th>Description</th>
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<td>3-31</td>
<td>ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY</td>
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<td>3-36</td>
<td>CHECKING AND LUBRICATING THE CABLES</td>
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PERIODIC CHECKS AND ADJUSTMENTS

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

PERIODIC MAINTENANCE CHART FOR EMISSION CONTROL SYSTEM

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<tr>
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<th>ITEM</th>
<th>REMARKS</th>
<th>INITIAL</th>
<th>ODOMETER READINGS</th>
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<td></td>
<td></td>
<td></td>
<td>600 mi</td>
<td>4,000 mi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1,000 km)</td>
<td>(7,000 km)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>or 1 month</td>
<td>or 6 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6,000 mi</td>
<td>12,000 mi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(13,000 km)</td>
<td>(19,000 km)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>or 12 months</td>
<td>or 18 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16,000 mi</td>
<td>20,000 mi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(25,000 km)</td>
<td>(31,000 km)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>or 24 months</td>
<td>or 30 months</td>
</tr>
<tr>
<td>1</td>
<td>Valve clearance</td>
<td>* Check and adjust valve clearance when engine is cold.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>Spark plugs</td>
<td>* Check condition.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Adjust gap and clean.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Replace at 8,000 mi (13,000 km) or 12 months and thereafter every 8,000 mi (12,000 km) or 12 months.</td>
<td>✓</td>
<td>Replace ✓ Replace ✓</td>
</tr>
<tr>
<td>3</td>
<td>Crankcase ventilation system</td>
<td>* Check ventilation hose for cracks or damage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Replace if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fuel line</td>
<td>* Check fuel hose for cracks or damage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Replace if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fuel filter</td>
<td>* Replace initial 20,000 mi (31,000 km) and thereafter every 20,000 mi (30,000 km).</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>6</td>
<td>Exhaust system</td>
<td>* Check for leakage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Retighten if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Replace gasket(s) if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Carburetor synchronization</td>
<td>* Adjust synchronization of carburetors.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>8</td>
<td>Idle speed</td>
<td>* Check and adjust engine idle speed.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Adjust throttle cable free play.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Evaporative emission control system*</td>
<td>* Check control system for damage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Replace if necessary.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Since these items require special tools, data and technical skills, they should be serviced by a Yamaha dealer.
** California only.

GENERAL MAINTENANCE AND LUBRICATION CHART

<table>
<thead>
<tr>
<th>No.</th>
<th>ITEM</th>
<th>REMARKS</th>
<th>INITIAL</th>
<th>ODOMETER READINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>600 mi</td>
<td>4,000 mi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1,000 km)</td>
<td>(7,000 km)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>or 1 month</td>
<td>or 7 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8,000 mi</td>
<td>12,000 mi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(13,000 km)</td>
<td>(19,000 km)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>or 13 months</td>
<td>or 18 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16,000 mi</td>
<td>20,000 mi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(25,000 km)</td>
<td>(31,000 km)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>or 25 months</td>
<td>or 31 months</td>
</tr>
<tr>
<td>1</td>
<td>Engine oil</td>
<td>* Replace. Warm engine before draining.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Engine oil filter</td>
<td>* Replace.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Air filter</td>
<td>* Clean.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Clean or replace if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake system</td>
<td>* Check operation, fluid level, and fluid leakage.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Correct accordingly. Replace pads if necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Clutch</td>
<td>* Adjust or replace cable.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### GENERAL MAINTENANCE AND LUBRICATION CHART

<table>
<thead>
<tr>
<th>No.</th>
<th>ITEM</th>
<th>REMARKS</th>
</tr>
</thead>
</table>
| 6   | Final gear oil | * Check oil level and leakage.  
* Replace at initial 600 mi (1,000 km) or 1 month and thereafter every 16,000 mi (24,000 km) or 24 months.  
* SAE 80 API “GL-4” hypoid gear oil.  
Replace  
Check  
√ |
| 7   | Control and meter cable | * Apply chain lube thoroughly.  
* Yamaha chain and cable lube or SAE 10W-30 motor oil.  
√  
√  
√  
√  
√  
√ |
| 8   | Swing arm pivot bearing | * Check swing arm pivot for play.  
* Correct if necessary.  
* Moderately repack every 16,000 mi (24,000 km) or 24 months.  
* Lithium soap base grease.  
Repack |
| 9   | Brake / Clutch lever pivot shaft | * Apply chain lube thoroughly.  
* Yamaha chain and cable lube or SAE 10W-30 motor oil.  
√  
√  
√  
√  
√  
√ |
| 10  | Brake pedal and shift pedal shaft | * Apply chain lube thoroughly.  
* Yamaha chain and cable lube or SAE 10W-30 motor oil.  
√  
√  
√  
√  
√  
√ |
| 11  | Side-stand pivots | * Check operation.  
* Lubricate and repair if necessary.  
* Yamaha chain and cable lube or SAE 10W-30 motor oil.  
√  
√  
√  
√  
√  
√ |
| 12  | Front fork | * Check operation and for oil leakage.  
* Correct accordingly.  
√  
√  
√  
√  
√  
√ |
| 13  | Steering bearings | * Check bearing play and steering for smooth operation.  
* Correct if necessary.  
* Moderately repack every 16,000 mi (24,000 km) or 24 months.  
* Lithium soap base grease.  
√  
√  
√  
Repack  
√ |
| 14  | Wheel bearings | * Check bearings for looseness and damage.  
* Replace if necessary.  
√  
√  
√  
√  
√  
√ |
| 15  | Wheels | * Check balance, runout, spoke tightness and for damage.  
* Tighten spokes and rebalance or replace if necessary.  
√  
√  
√  
√  
√  
√ |
| 16  | Sidestand switch | * Check operation.  
* Replace if necessary.  
√  
√  
√  
√  
√  
√ |
| 17  | Tires | * Check tire tread wear and for damage.  
* Replace if necessary.  
√  
√  
√  
√  
√  
√ |
| 18  | Rear shock absorber | * Check operation and for oil leakage.  
* Replace if necessary.  
√  
√  
√  
√  
√  
√ |
| 19  | Chassis fasteners | * Check all nuts, bolts, and screws for tightness.  
* Tighten if necessary.  
√  
√  
√  
√  
√  
√ |

* Since these items require special tools, data and technical skills, they should be serviced by a Yamaha dealer.

**NOTE:**

For odometer readings or time periods higher than 20,000 mi (31,000 km) or 31 months, repeat the same maintenance as listed in the chart from the 4,000 mi (7,000 km) or 7 month interval.

**NOTE:**

* The air filter needs more frequent service if you are riding in unusually wet or dusty areas.
* Brake fluid replacement.
  1. When disassembling the master cylinder or caliper cylinder, always replace the brake fluid. Check the brake fluid level regularly and fill as required.
  2. Replace the oil seals on the inner parts of the master cylinder and caliper cylinder every two years.
  3. Replace the brake hoses every four years or if cracked or damaged.
## Fuel Tank and Seats Removal

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Passenger seat</td>
<td>1</td>
<td><strong>Remove the parts in the order below.</strong></td>
</tr>
<tr>
<td>2</td>
<td>Seat bracket</td>
<td>1</td>
<td><strong>NOTE:</strong> <strong>Set the fuel cock to “OFF” before disconnecting the fuel hose.</strong></td>
</tr>
<tr>
<td>3</td>
<td>Rider’s seat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fuel hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ignitor plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Mud guard</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Meter lead couper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Fuel tank assembly</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- **23Nm (2.3m·kg, 17 ft·lb)**
- **7 Nm (0.7m·kg, 5.1 ft·lb)**
**REMOVAL**

1. Remove:
   - Ignitor plate

**NOTE:**
To remove the quick fastener, push its center in with a screwdriver, then pull the fastener out.

---

**INSTALLATION**

1. Install:
   - Ignitor plate

**NOTE:**
To install the quick fastener, push its pin so that it protrudes from the fastener head, then insert the fastener into the cowling and push the pin \( \oplus \) in with a screwdriver. Make sure that the pin is flush with the fastener’s head.
ENGINE
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:
° rider’s seat
° fuel tank
   Refer to “FUEL TANK AND SEATS”.
2. Disconnect:
° spark plug caps
3. Remove:
° spark plugs
4. Remove:
° air intake box ①
5. Remove:
° cylinder head cover (rear cylinder) ①
° cylinder head cover (front cylinder)
6. Remove:
   • tappet covers

7. Remove:
   • camshaft sprocket cover (rear cylinder)
   • camshaft sprocket cover (front cylinder)

8. Remove:
   • timing plug
   • straight plug

9. Measure:
   • valve clearance
   Out of specification → Adjust.

**Valve clearance (cold):**

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake valve</td>
<td>0.07 / 0.12 mm (0.0028 / 0.0047 in)</td>
</tr>
<tr>
<td>Exhaust valve</td>
<td>0.12 / 0.17 mm (0.0028 / 0.0047 in)</td>
</tr>
</tbody>
</table>
ADJUSTING THE VALVE CLEARANCE

a. Turn the crankshaft clockwise.
b. When the piston is at TDC on the compression stroke, align either the camshaft sprocket plate hole (a) with the stationary pointer (b) on the cylinder head. When the camshaft sprocket plate hole or camshaft sprocket punch mark is aligned with the stationary pointer, the piston is at top dead center (TDC).
c. Align the TDC mark (c) on the generator rotor with the stationary pointer (d) on the crankcase.

A Rear cylinder ("TI" mark)  
B Front cylinder ("I" mark)

d. Measure the valve clearance with a thickness gauge (1).
e. Turn the crankshaft clockwise 290°, and then measure the front cylinder.

10. Adjust valve clearance

a. Loosen the locknut (1).
b. Insert a thickness gauge between the end of the adjusting screw and the valve tip.
c. Turn the adjusting screw (2) in direction (a) or (b) until the specified valve clearance is obtained.

<table>
<thead>
<tr>
<th>Direction</th>
<th>Valve clearance is decreased.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction</td>
<td>Valve clearance is increased.</td>
</tr>
</tbody>
</table>

d. Hold the adjusting screw to prevent it from moving and tighten the locknut to specification.
ADJUSTING THE VALVE CLEARANCE/
SYNCHRONIZING THE CARBURETORS

Locknut:
27 Nm (2.7 m\(^2\)kg, 20 ft\(^2\)lb)

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

11. Install:
° all removed parts

NOTE: Install all removed parts in the reverse order of their disassembly. Note the following points.

° camshaft sprocket covers
  10 Nm (1.0 m\(^2\)kg, 7.2 ft\(^2\)lb)
° tappet covers
  10 Nm (1.0 m\(^2\)kg, 7.2 ft\(^2\)lb)
° spark plugs
  20 Nm (2.0 m\(^2\)kg, 14 ft\(^2\)lb)

SYNCHRONIZING THE CARBURETORS

NOTE: Prior to synchronizing the carburetors, the valve clearance and the engine idling speed should be properly adjusted and the ignition timing should be checked.

1. Stand the motorcycle on a level surface.

NOTE: Place the motorcycle on a suitable stand.

2. Remove:
° rider’s seat
° fuel tank
  Refer to “FUEL TANK AND SEATS”.
3. Remove:
° air duct ①

4. Remove:
° vacuum plugs ①
5. Install:
- vacuum gauge ①
- engine tachometer ②
  (to the spark plug lead of cyl. #2)

Vacuum gauge:  
YU-08030-A, 90890-03094
Engine tachometer:  
YU-08036-A, 90890-03113

6. Start the engine and let it warm up for several minutes.
7. Check:
- engine idling speed
  Out of specification → Adjust.
  Refer to “ADJUSTING THE ENGINE IDLING SPEED”.

Engine idling speed:  
950 / 1,050 r/min

8. Adjust:
- Carburetor synchronization

a. Synchronize carburetor #1 to carburetor #2
   by turning the synchronizing screw ① in either direction until both gauges read the same.

b. Rev the engine two or three times, each time for less than a second, and check the synchronization again.

Vacuum pressure at idle speed:  
34.7 / 37.3 kPa (260 / 280 mmHg)

NOTE:  
The difference between the two carburetors should not exceed 1.33 kPa (10 mmHg).

9. Check:
- engine idling speed
  Out of specification → Adjust.

10. Stop the engine and remove the measuring equipment.
11. Adjust:
- throttle cable free play
  Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY”.
ADJUSTING THE ENGINE IDLING SPEED

**NOTE:**
Prior to adjusting the engine idling speed, the carburetor synchronization should be adjusted properly, the air filter should be clean, and the engine should have adequate compression.

1. Start the engine and let it warm up for several minutes.
2. Remove:
   - cylinder head cover ①
3. Install:
   - engine tachometer
     (to the spark plug lead of cyl. #1)
4. Check:
   - engine idling speed
     Out of specification → Adjust.
5. Adjust:
   - engine idling speed
     a. Turn the throttle stop screw ① in direction ② or ⑤ until the specified engine idling speed is obtained.

<table>
<thead>
<tr>
<th>Direction</th>
<th>Engine idling speed is increased.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction</td>
<td>Engine idling speed is decreased.</td>
</tr>
</tbody>
</table>
6. Adjust:
   "throttle cable free play
   Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY".

   Throttle cable free play (at the flange of the throttle grip)
   4 \[ \sim \] 6 mm (0.16 \[ \sim \] 0.24 in)

---

**ADJUSTING THE THROTTLE CABLE FREE PLAY**

**NOTE:**
Prior to adjusting the throttle cable free play, the engine idling speed should be adjusted.

1. Check:
   "throttle cable free play a
   Out of specification → Adjust.

   Throttle cable free play (at the flange of the throttle grip)
   4 \[ \sim \] 6 mm (0.16 \[ \sim \] 0.24 in)

2. Remove:
   ° rider’s seat
   ° fuel tank
   Refer to "FUEL TANK AND SEATS".

3. Adjust:
   ° throttle cable free play

   **NOTE:**
   When the motorcycle is accelerating, the accelerator cable 1 is pulled.

   **Carburetor side**
   a. Loosen the locknut 2 on the accelerator cable.
   b. Turn the adjusting nut 3 in direction ③ or ⑥ until the specified throttle cable free play is obtained.

<table>
<thead>
<tr>
<th>Direction ③</th>
<th>Throttle cable free play is decreased.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction ⑥</td>
<td>Throttle cable free play is increased.</td>
</tr>
</tbody>
</table>

c. Tighten the locknuts.

**NOTE:**
If the specified throttle cable free play cannot be obtained on the carburetor side of the cable, use the adjusting nut on the handlebar side.
ADJUSTING THE THROTTLE CABLE FREE PLAY/
CHECKING THE SPARK PLUGS

Handlebar side
a. Loosen the locknut ①.
b. Turn the adjusting nut ② in direction ③ or ⑤ until the specified throttle cable free play is obtained.

c. Tighten the locknut.

\[ \text{WARNING} \]

After adjusting the throttle cable free play, 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. Remove:
   ° cylinder head covers ①
2. Disconnect:
   ° spark plug cap
3. Remove:
   ° spark plug

\[ \text{CAUTION:} \]

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.

4. Check:
   ° spark plug type
   Incorrect → Change.

Spark plug type (manufacturer)
BPR7ES (NGK)
W22EPR-U (DENSO)

5. Check:
   ° electrode ①
   Damage/wear → Replace the spark plug.
   ° insulator ②
   Abnormal color → Replace the spark plug.
   Normal color is a medium-to-light tan color.

6. Clean:
   ° spark plug
   (with a spark plug cleaner or wire brush)
7. Measure:
   °spark plug gap ①
   (with a wire gauge)
   Out of specification → Regap.

   Spark plug gap
   0.7 / 0.8 mm
   (0.0028 / 0.031 in)

8. Install:
   °spark plug  
   \[20 \text{ Nm (2.0 m\text{\textperiodcentered}kg, 14 ft\text{\textperiodcentered}lb)}\]

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

9. Connect:
   °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 that all connections are tight and free of corrosion.

---

1. Remove:
   °timing plug ①

2. Install:
   °timing light ①
   °engine tachometer ②
   (to the spark plug lead of cyl. #1)

Timing light:
YU-33277-A, 90890-03141

Engine tachometer:
YU-08036-A, 90890-03113
3. Check:
- Ignition timing

![Diagram of generator rotor with pointers]

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

<table>
<thead>
<tr>
<th>Engine idling speed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>950 / 1,050 r/min</td>
</tr>
</tbody>
</table>

b. Check that the stationary pointer (a) is within the firing range (b) on the generator rotor. Incorrect firing range → Check the ignition system.

**NOTE:**
The ignition timing is not adjustable.

4. Install:
- Timing plug ①

---

**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. Check:
   - Valve clearance
     Out of specification → Adjust.
     Refer to "ADJUSTING THE VALVE CLEARANCE".
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Disconnect:
   - Spark plug cap
4. Remove:
   - Spark plug
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

6. Measure:
°compression pressure

   Above the maximum pressure → Inspect the cylinder head, valve surfaces, and piston crown for carbon deposits.
   Below the minimum pressure → Squirt a few drops of oil into the affected cylinder and measure again.

°Refer to the following table.

<table>
<thead>
<tr>
<th>Compression pressure (with oil applied in the cylinder)</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher than without oil</td>
<td>Piston wear or damage → Repair.</td>
</tr>
<tr>
<td>Same as without oil</td>
<td>Piston ring(-s), valves, cylinder head gasket or piston possibly defective → Repair.</td>
</tr>
</tbody>
</table>

Compresssion pressure (at sea level)

- Standard:
  1,000 kPa (10 kg/cm², 142 psi)
  Minimum:
  900 kPa (9 kg/cm², 128 psi)
  Maximum:
  1,100 kPa (11 kg/cm², 156 psi)

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

⚠️ WARNING

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

NOTE:
The difference in compression pressure between cylinders should not exceed 100 kPa (1 kg/cm², 14 psi).
CHECKING THE ENGINE OIL LEVEL

1. Stand the motorcycle on a level surface.

**NOTE:**
- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.

2. Let the engine idle for a few minutes.

3. Check:
   - engine oil level
   The engine oil level should be between the minimum level marks (a) and maximum level marks (b).
   Below the minimum level mark → Add the recommended engine oil to the proper level.

   **Recommended oil:**
   - At \(-10^\circ C\) (\(10^\circ F\)) or higher \[A\]: Yamalube 4 (10W–30) or SAE 10W–30 type SE motor oil
   - At \(5^\circ C\) (\(40^\circ F\)) or higher \[B\]: Yamalube 4 (20W–40) or SAE 20W–40 type SE motor oil

**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.
- Do not allow foreign materials to enter the crankcase.

**NOTE:**
- API Service “SE”, “SF” and “SG” type or equivalent (e.g., “SF-SE”, “SF-SE-CC”, “SF-SE-SD”)
CHECKING THE ENGINE OIL LEVEL
CHANGING THE ENGINE OIL

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 filler cap ①
   - o-ring
   - engine oil drain bolt ②
   - gasket
4. Drain:
   - engine oil (completely from the crankcase)
5. If the oil filter element is also to be replaced, perform the following procedure.

Oil filter element replacement should be made cold exhaust pipe and muffler, at room temperature.

a. Remove the muffler ①, rear brake reservoir tank ②, element cover ③ and exhaust pipe (front cylinder) ④.
b. Remove the oil filter element cover plate ⑤, element cover ⑥ and oil filter element ⑦.
c. Check the O-ring ⑧ and replace it if it is cracked or damaged.
d. Install the new oil filter element and the element cover.

Oil filter element cover bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)
e. Install the exhaust pipe (front cylinder), element cover plate, rear brake reservoir tank and muffler. Refer to “ENGINE” in chapter 4.

6. Check:
   - engine oil drain bolt gasket
   Damage → Replace.
7. Install:
   - gasket
   - engine oil drain bolt

8. Fill:
   - crankcase
   (with the specified amount of the recommended engine oil)
CHANGING THE ENGINE OIL/ADJUSTING THE CLUTCH CABLE FREE PLAY

Quantity
Total amount
3.6 L (3.2 lmp qt, 3.8 US qt)
Without oil filter element replacement
3.0 L (2.6 lmp qt, 3.2 US qt)
With oil filter element replacement
3.1 L (2.7 lmp qt, 3.3 US qt)

9. Install:
° o-ring
° engine oil filter cap

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

11. Check:
° engine
(for engine oil leaks)

12. Check:
° engine oil level
Refer to “CHECKING THE ENGINE OIL LEVEL”.

ADJUSTING THE CLUTCH CABLE FREE PLAY

1. Check:
° clutch cable free play
Out of specification → Adjust.

Clutch cable free play (at the end of the clutch lever)
5 / 10 mm (0.2 / 0.39 in)

2. Adjust:
° clutch cable free play

Handlebar side
a. Loosen the locknut ①.
b. Turn the adjusting screw ② in direction ⑤ or ⑥ until the specified clutch cable free play is obtained.

c. Tighten the locknut.

NOTE:
If the specified clutch cable free play cannot be obtained as described above, perform the mechanism adjustment procedure described below.

3. Remove:
° left side cover ①
° clutch adjusting cover ②
ADJUSTING THE CLUTCH CABLE FREE PLAY/
CLEANING THE AIR FILTER ELEMENT

4. Adjust:
   °clutch mechanism

Engine side
a. Loosen the locknut ①.
b. Turn in the adjusting screw ② until it is lightly
   seated.
c. Turn the adjusting screw out 1/4 of a turn.
d. Tighten the locknut.
e. Check the clutch cable free play again and
   adjust it if necessary.

CLEANING THE AIR FILTER ELEMENT
1. Remove:
   °air filter case cover ①
   °air filter element ②

2. Clean:
   °air filter element
   Apply compressed air to the outer surface of
   the air filter element.

3. Check:
   °air filter element
   Damage → Replace.
4. Install:
   °air filter element
   °air filter case cover
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 turning, leading to poor engine performance and possible overheating.

NOTE:

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

CHECKING THE CARBURETOR JOINT AND INTAKE MANIFOLD

1. Check:
   - carburetor joint
     Cracks/damage → Replace.
     Refer to “CARBURETOR” in chapter 6.

CHECKING THE BREATHER HOSE

1. Remove:
   - cylinder head cover
2. Check:
   - cylinder head breather hose
     Cracks/damage → Replace.
     Loose connection → Connect properly.

CAUTION:

Make sure that the cylinder head breather hose is routed correctly.
CHECKING THE EXHAUST SYSTEM

The following procedure applies to all of the exhaust pipes, mufflers and gaskets.

1. Check:
   - exhaust pipes ①
   - muffler ②
     Cracks/damage → Replace.
   - gaskets ③
     Exhaust gas leaks → Replace.

2. Check:
   - tightening torque

<table>
<thead>
<tr>
<th>Component</th>
<th>Torque Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust pipe nut ④</td>
<td>20 Nm (2.0 m(^2)kg, 14 ft(^{\prime})lb)</td>
</tr>
<tr>
<td>Exhaust pipe and muffler bolt ⑤</td>
<td>20 Nm (2.0 m(^2)kg, 14 ft(^{\prime})lb)</td>
</tr>
<tr>
<td>Muffler and muffler bracket bolt ⑥</td>
<td>25 Nm (2.5 m(^2)kg, 18 ft(^{\prime})lb)</td>
</tr>
<tr>
<td>Exhaust pipe bolts ⑦</td>
<td>20 Nm (2.0 m(^2)kg, 14 ft(^{\prime})lb)</td>
</tr>
</tbody>
</table>
CHASSIS
ADJUSTING THE FRONT BRAKE
1. Check:
  ° brake lever free play ③
  Out of specification → Adjust.

Brake lever free play (at the end of the brake lever)
5 / 8 mm (0.20 / 0.31 in)

2. Adjust:
  ° brake lever free play

a. Loosen the locknut ①.
b. Turn the adjusting bolt ② in direction ③ or ④ until the specified brake lever free play is obtained.

c. Tighten the locknut.

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 and could result in loss of control and possibly an accident. Therefore, inspect and, if necessary, bleed the brake system.

CAUTION:
After adjusting the brake lever free play, make sure that there is no brake drag.
ADJUSTING THE REAR BRAKE

1. Check:
   ° brake pedal position
   (distance \( \mathbf{a} \) from the top of the rider footrest to the top of the brake pedal)
   Out of specification → Adjust.

   \[
   \text{Brake pedal position (below the top of the rider footrest)} \quad 81.8 \text{ mm (3.22 in)}
   \]

2. Adjust:
   ° brake pedal position

   \[\begin{align*}
   \text{Loosen the locknut} & \quad \mathbf{1} \\
   \text{Turn the adjusting bolt} & \quad \mathbf{2} \quad \text{in direction} \quad \mathbf{b} \quad \text{or} \quad \mathbf{c} \\
   \text{until the specified brake pedal position is obtained.}
   \end{align*}\]

   Direction \( \mathbf{b} \) → Brake pedal is raised.
   Direction \( \mathbf{c} \) → Brake pedal is lowered.

3. Adjust:
   ° rear brake light switch
   Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH”.
CHECKING THE BRAKE FLUID LEVEL

1. Stand the motorcycle on a level surface.

NOTE:
° Place the motorcycle on a suitable stand.
° Make sure that the motorcycle is upright.

2. Check:
° brake fluid level
   Below the minimum level mark (a) → Add the recommended brake fluid to the proper level.

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

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 reaction, leading to poor brake performance.
° When refilling, be careful that water does not enter the 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 spilled brake fluid immediately.

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

<table>
<thead>
<tr>
<th>Direction (a)</th>
<th>Brake light comes on sooner.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction (b)</td>
<td>Brake light comes on later.</td>
</tr>
</tbody>
</table>

CHECKING THE BRAKE HOSES

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

1. Check:
   ○ Brake hose
     Cracks/damage/wear → Replace.
2. Check:
   ○ Brake hose clamp
     Loose connection → Tighten.
3. Hold the motorcycle upright and apply the brake.
4. Check:
   ○ Brake hose
     Activate the brake several times.
     Brake fluid leakage → Replace the damaged hose.
     Refer to “FRONT AND REAR BRAKES” in chapter 7.
BLEEDING THE HYDRAULIC BRAKE SYSTEM

WARNING

Bleed the hydraulic brake system whenever:
- the system was disassembled,
- a brake hose was loosened or removed,
- 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 or brake fluid reservoir to overflow.
- When bleeding the hydraulic brake system, make sure that there is always enough brake fluid before applying the brake. Ignoring this precaution could allow air to enter the hydraulic brake system, considerably lengthening the bleeding procedure.
- If bleeding is difficult, it may be necessary to let the brake fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the hose have disappeared.

1. Stand the motorcycle on a level surface.

NOTE:
- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.

2. Bleed:
- hydraulic brake system

a. Add the recommended brake fluid to the proper level.
b. Install the diaphragm (brake master cylinder reservoir or brake fluid reservoir).
c. Connect a clear plastic hose 1 tightly to the bleed screw 2.
d. Place the other end of the hose into a container.
e. Slowly apply the brake several times.
f. Fully squeeze the brake lever or fully depress the brake pedal and hold it in position.
g. Loosen the bleed screw.
   This will release the tension 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.

**Bleed screw**

6 Nm (0.6 m·kg, 4.3 ft·lb)

k. Fill the reservoir to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL”.

**WARNING**

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

---

**ADJUSTING THE SHIFT PEDAL**

**NOTE:**

The shift pedal position is determined by the adjusting bolt length (iii).

1. Measure:

   ° adjusting the length (iii)

   Incorrect → Adjust.

2. Adjust:

   ° adjusting bolt length (iii)

   a. Loosen both locknuts (i)
   b. Turn the adjusting bolt (ii) in direction (b) or (c) to obtain the correct shift pedal position.

   **Direction (b) → shift pedal is raised.**
   **Direction (c) → shift pedal is lowered.**
CHECKING THE FINAL DRIVE OIL LEVEL

1. Stand the motorcycle on a level surface.

**NOTE:**
- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.

2. Remove:
   - final drive housing oil filler bolt

3. Check:
   - final drive oil level
   The final drive oil level should be to the bottom brim of the filler hole.
   Below the bottom brim → Add the recommended final drive oil to the proper level.

**Recommended final drive oil**
- SAE 80 hypoid gear oil graded “GL-4”, “GL-5” or “GL-6”
- or multi-purpose SAE 80W90 hypoid gear oil

4. Install:
   - final drive housing oil filler bolt

CHANGING THE FINAL DRIVE OIL

1. Place a container under the final drive housing.

2. Remove:
   - final drive housing oil filler bolt
   - final drive housing oil drain bolt
   Completely drain the final drive housing of its oil.

3. Check:
   - final drive housing oil drain bolt gasket
   Damage → Replace.

4. Install:
   - final drive housing oil drain bolt

5. Fill:
   - final drive housing
   (with the specified amount of the recommended final drive oil)
**WARNING**

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

**NOTE:**
Place the motorcycle 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.
     Looseness or binding → Adjust the steering head.

3. Remove:
   - upper bracket pinch bolt ①
   - steering stem nut ②
   - upper bracket ③

4. Adjust:
   - steering head
     a. Remove the lock washer ①, the upper ring nut ②, and the rubber washer ③.
b. Loosen the lower ring nut ④ and then tighten it to specification with a ring nut wrench ⑤.

NOTE:
Set the torque wrench at a right angle to the ring nut wrench.

Ring nut wrench
YU-33975, 90890-01403

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

c. Loosen the lower ring nut ④ completely, then tighten it to specification.

WARNING
Do not overtighten the lower ring nut.

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

d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and inspect the upper and lower bearings.
Refer to “STEERING HEAD AND HANDLEBAR” in chapter 7.
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 that the lock washer tabs ① sit correctly in the ring nut slots ⑤.

5. Install:
° upper bracket
° steering stem nut
110 Nm (11.0 m·kg, 80 ft·lb)
° upper bracket pinch bolt
20 Nm (2.0 m·kg, 14 ft·lb)
CHECKING THE FRONT FORK

1. Stand the motorcycle on a level surface.

**WARNING**

Securely support the motorcycle 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 motorcycle upright and apply the front brake.

4. Check:
   - operation
     Push down hard on the handlebar several times and check if the front fork rebounds smoothly.
     Unsmooth operation → Repair.
     Refer to “FRONT FORK” in chapter 7.

ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

**WARNING**

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

**CAUTION:**

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   - spring preload
ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY/ CHECKING THE TIRES

Ring nut wrench
One of owner’s tool KIT
(IHX-28135-00)

a. Turn the adjusting knob ① in direction ① or ②.

| Direction ① → Spring preload is increased (suspension is harder). |
| Direction ② → Spring preload is decreased (suspension is softer). |

Adjusting position
Standard: 3
Minimum: 1 (soft)
Maximum: 7 (hard)

CHECKING THE TIRES
The following procedure applies to both of the tires.
1. Measure:
   ° 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 motorcycle could cause tire damage, an accident or an injury.
NEVER OVERLOAD THE MOTORCYCLE.
CHECKING THE TIRES

<table>
<thead>
<tr>
<th>Basic weight: (with oil and full fuel tank)</th>
<th>275 kg (606.4 lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum load**:</td>
<td>200 kg (441 lb)</td>
</tr>
<tr>
<td>Cold tire pressure:</td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td>Rear</td>
</tr>
<tr>
<td>Up to 90 kg (198 lb) load*</td>
<td>200 kPa (2.00 kg/cm², 28.5 psi)</td>
</tr>
<tr>
<td></td>
<td>225 kPa (2.25 kg/cm², 32.0 psi)</td>
</tr>
<tr>
<td>90 kg (198 lb) / maximum load*</td>
<td>225 kPa (2.25 kg/cm², 32.0 psi)</td>
</tr>
<tr>
<td></td>
<td>250 kPa (2.50 kg/cm², 35.6 psi)</td>
</tr>
<tr>
<td>High speed riding</td>
<td>225 kPa (2.25 kg/cm², 32.0 psi)</td>
</tr>
<tr>
<td></td>
<td>250 kPa (2.50 kg/cm², 35.6 psi)</td>
</tr>
</tbody>
</table>

*: total of cargo, rider, passenger and accessories

**WARNING**

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

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

 minimalist tire tread depth
1.6 mm (0.06 in)

- Tire tread depth
- Side wall
- 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 that the wheel rim band and tube are centered in the wheel groove.
CHECKING THE TIRES

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.

<table>
<thead>
<tr>
<th>Tube wheel</th>
<th>Tubeless wheel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube tire only</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. Then 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 motorcycle.

Front tire:

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRIDGESTONE</td>
<td>110/90-18 61S</td>
<td>EXEDRA L309</td>
</tr>
<tr>
<td>DUNLOP</td>
<td>110/90-18 61S</td>
<td>K555F</td>
</tr>
</tbody>
</table>

Rear tire:

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRIDGESTONE</td>
<td>170/80-15 M/C 77S</td>
<td>EXEDRA G546G</td>
</tr>
<tr>
<td>DUNLOP</td>
<td>170/80-15 M/C 77S</td>
<td>K555</td>
</tr>
</tbody>
</table>

**WARNING**

New tires have a relatively low grip on the road surface until they have been slightly worn.

Therefore, approximately 100 km (62.4 mi) should be traveled at normal speed before any highspeed riding is done.
CHECKING THE TIRES/CHECKING AND TIGHTENING THE SPOKES

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.

CHECKING AND TIGHTENING THE SPOKES
The following procedure applies to all of the spokes.
1. Check:
   ° spoke ①
     Bends/damage → Replace.
     Loose → Tighten.
     Tap the spokes with a screwdriver.

   NOTE: A tight spoke will emit a clear, ringing tone; a loose spoke will sound flat.

2. Tighten:
   ° spoke ② (with a spoke wrench ②)
   3 Nm (0.3 m·kg, 2.2 ft·lb)

   NOTE: Be sure to tighten the spokes before and after break-in.
CHECKING AND LUBRICATING THE CABLES

The following procedure applies to all of the cable sheaths and cables.

![WARNING](image)

**WARNING**

Damaged cable sheaths may cause the cable to corrode and interfere with its movement. Replace damaged cable sheaths and cables as soon as possible.

1. Check:
   - **Cable sheath**
     - Damage → Replace.
2. Check:
   - **Cable operation**
     - Unsmooth operation → Lubricate.

![Recommended lubricant](image)

**Recommended lubricant**

- Engine oil or a suitable cable lubricant

**NOTE:**

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

---

LUBRICATING THE LEVERS AND PEDALS

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

![Recommended lubricant](image)

**Recommended lubricant**

- Engine oil

---

LUBRICATING THE SIDESTAND

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

![Recommended lubricant](image)

**Recommended lubricant**

- Engine oil

---

LUBRICATING THE REAR SUSPENSION

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

![Recommended lubricant](image)

**Recommended lubricant**

- Molybdenum disulfide grease
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 a 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.
CHECKING AND 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:
   - battery cover ①

2. Disconnect:
   - battery leads
     (from the battery terminals)

CAUTION:

First, disconnect the negative lead ①, then the positive lead ②.

3. Remove:
   - battery

4. Check:
   - battery charge

    a. Connect a pocket tester to the battery terminals.

    | Tester positive lead → battery positive terminal |
    | Tester negative lead → battery negative terminal |

    NOTE:

    - The charge state of a MF battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive 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

    c. Open-circuit voltage = 12.0 V
    d. Charging time = 6.5 hours
    e. Charge of the battery = 20 / 30 %

    5. Charge:
       - battery
       (refer to the appropriate charging method illustration)
**WARNING**

Do not quick charge a battery.

**CAUTION:**

- Make sure that the battery breather hose and battery vent are free of obstructions.
- Never remove the MF battery sealing caps.
- Do not use a high-rate battery charger. They force 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 motorcycle. (If charging has to be done with the battery mounted on the motorcycle, disconnect the negative 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 that the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.
- If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!
- As shown in the following illustration, the open-circuit voltage of a 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.
Measure the open-circuit voltage prior to charging.

Connect a charger and AMP meter to the battery and start charging.

Make sure the current is higher than the standard charging current written on the battery.

By turning the charging voltage adjust dial, set the charging voltage at 20 V.

Adjust the voltage so that current is at standard charging level.

Set the timer according to the charging time suitable for the open-circuit voltage. Refer to “Battery condition checking steps.”

In case that charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours. If there is any charge in the amperage, readjust the voltage to obtain the standard charging current.

Measure the battery open-circuit voltage after having left 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.
CHECKING AND CHARGING THE BATTERY

Charging method using a constant-voltage type charger

Measure the open-circuit voltage prior to charging.

Connect a charger and AMP meter to the battery and start charging.

NOTE:
Voltage should be measured 30 minutes after the machine is stopped.

Make sure the current is higher than the standard charging current written on the battery.

YES

Charge the battery until the battery's charging voltage is 15 V.

NOTE:
Set the charging time at 20 hours (maximum).

NO

This type of battery charger cannot charge the MF battery. A variable voltage charger is recommended.

Measure the battery open-circuit voltage after having left 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.

Charging method using a constant-current type charger
This type of battery charger cannot charge the MF battery.
CHECKING AND CHARGING THE BATTERY

6. Check:
   - battery vent
     Obstruction → Clean.

7. Connect:
   - battery leads
     (to the battery terminals)

**CAUTION:**

First, connect the positive lead ①, then the negative lead ②.

8. Check:
   - battery terminals
     Dirt → Clean with a wire brush.
     Loose connection → Connect properly.

9. Lubricate:
   - battery terminals

   **Recommended lubricant**
   - Dielectric grease

10. Install:
    - battery cover
CHECKING THE FUSES

The following procedure applies to all of the fuses.

**CAUTION:**

To avoid a short circuit, always turn the main switch to “OFF” when checking or replacing a fuse.

1. Remove:
   - rider’s seat
   - ignitor plate
   - Refer to “FUEL TANK AND SEATS”.
   - tool box cover

2. Check:
   - fuse

   a. Connect the pocket tester to the fuse and check it for continuity.

**NOTE:**

Set the pocket tester selector to “Ω × 1”.

b. If the pocket tester indicates “∞”, replace the fuse.

3. Replace:
   - blown fuse

   a. Turn off the ignition.
   b. Install a new fuse of the correct amperage rating.
   c. Turn on the switches to verify if the electrical circuit is operational.
   d. If the fuse immediately blows again, check the electrical circuit.

<table>
<thead>
<tr>
<th>Fuses</th>
<th>Amperage rating</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main</td>
<td>30A</td>
<td>1</td>
</tr>
<tr>
<td>Headlight</td>
<td>15A</td>
<td>1</td>
</tr>
<tr>
<td>Carburetor heater</td>
<td>15A</td>
<td>1</td>
</tr>
<tr>
<td>Signals</td>
<td>10A</td>
<td>1</td>
</tr>
<tr>
<td>Ignition</td>
<td>10A</td>
<td>1</td>
</tr>
<tr>
<td>Back up</td>
<td>5A</td>
<td>1</td>
</tr>
<tr>
<td>Reserve</td>
<td>30A</td>
<td>1</td>
</tr>
<tr>
<td>Reserve</td>
<td>15A</td>
<td>1</td>
</tr>
<tr>
<td>Reserve</td>
<td>10A</td>
<td>1</td>
</tr>
<tr>
<td>Reserve</td>
<td>5A</td>
<td>1</td>
</tr>
</tbody>
</table>
CHECKING THE FUSES/REPLACING THE HEADLIGHT BULB

**WARNING**

Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.

4. Install:
   - tool box cover
   - ignitor plate
   - rider’s seat

REPLACING THE HEADLIGHT BULB

1. Disconnect:
   - connectors ①
2. Remove
   - headlight bulb cover ②

3. Remove:
   - headlight bulb holder ①
4. Remove:
   - headlight bulb ②

**WARNING**

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

5. Install:
   - headlight bulb (New)
   - Secure the new headlight bulb with the headlight bulb 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
6. Install:
- headlight bulb cover
7. Connect:
- leads

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

   a. Turn the adjusting screw ① in direction ① or ②.


<table>
<thead>
<tr>
<th>Direction ① → Headlight beam is raised.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction ② → Headlight beam is lowered.</td>
</tr>
</tbody>
</table>

2. Adjust:
   - headlight beam (horizontally)

   a. Turn the adjusting knob ② in direction ① or ②.


<table>
<thead>
<tr>
<th>Direction ① → Headlight beam moves to the right.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction ② → Headlight beam moves to the left.</td>
</tr>
</tbody>
</table>
# CHAPTER 4
## ENGINE

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### ENGINE REMOVAL

**MUFFLERS, BRAKE PEDAL AND SIDE COVER**

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Removing the muffler, brake pedal and side cover</strong></td>
<td></td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>WARNING</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Securely support the motorcycle so there is no danger of it falling over.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Refer &amp; “FUEL TANK AND SEATS” in Chapter 3.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Refer to “CARBURETOR” in Chapter 5.</td>
</tr>
<tr>
<td></td>
<td>Fuel tank</td>
<td></td>
<td><strong>23 Nm (2.3 m(\cdot)kg, 17 ft(\cdot)lb)</strong></td>
</tr>
<tr>
<td></td>
<td>Air filter case assembly</td>
<td></td>
<td><strong>64 Nm (6.4 m(\cdot)kg, 46 ft(\cdot)lb)</strong></td>
</tr>
<tr>
<td></td>
<td>Carburetor assembly</td>
<td></td>
<td><strong>25 Nm (2.5 m(\cdot)kg, 18 ft(\cdot)lb)</strong></td>
</tr>
<tr>
<td>1</td>
<td>Muffler assembly</td>
<td>1</td>
<td><strong>20 Nm (2.0 m(\cdot)kg, 14 ft(\cdot)lb)</strong></td>
</tr>
<tr>
<td>2</td>
<td>Cover (emblem)</td>
<td>1</td>
<td><strong>20 Nm (2.0 m(\cdot)kg, 14 ft(\cdot)lb)</strong></td>
</tr>
<tr>
<td>3</td>
<td>Reservoir tank</td>
<td>1</td>
<td><strong>10 Nm (1.0 m(\cdot)kg, 7.2 ft(\cdot)lb)</strong></td>
</tr>
<tr>
<td>4</td>
<td>Exhaust pipes</td>
<td>2</td>
<td><strong>89 Nm (8.9 m(\cdot)kg, 32 ft(\cdot)lb)</strong></td>
</tr>
<tr>
<td>5</td>
<td>Rear brake switch lead</td>
<td>1</td>
<td><strong>298 Nm (29.8 m(\cdot)kg, 100 ft(\cdot)lb)</strong></td>
</tr>
<tr>
<td>6</td>
<td>Footrest /brake pedal</td>
<td>1/1</td>
<td><strong>20 Nm (2.0 m(\cdot)kg, 14 ft(\cdot)lb)</strong></td>
</tr>
</tbody>
</table>

*Refer to the diagram for part numbers.*
<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Rear brake master cylinder/bracket</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Battery cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Battery leads</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Right side cover</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>11</td>
<td>Starter motor</td>
<td>1</td>
<td>For installation, reverse the removal procedure</td>
</tr>
<tr>
<td>12</td>
<td>Cylinder head covers</td>
<td>4</td>
<td>Disconnect the negative lead, then disconnect the positive lead.</td>
</tr>
</tbody>
</table>

**NOTE:**
- 23 Nm (2.3 m.kg, 17 ft.lb)
- 64 Nm (6.4 m.kg, 46 ft.lb)
- 25 Nm (2.5 m.kg, 18 ft.lb)
- 20 Nm (2.0 m.kg, 14 ft.lb)
- 10 Nm (1.0 m.kg, 7.2 ft.lb)
- 20 Nm (2.0 m.kg, 14 ft.lb)
### LEADS, SHIFT PEDL AND CLUTCH CABLE

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'nty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Removing the leads, shift pedal and clutch cable</td>
<td>1</td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>1</td>
<td>Tool box cover</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>2</td>
<td>Left side cover</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>3</td>
<td>AC magneto lead/pickup lead/side stand switch lead/speed sensor lead</td>
<td>1/1/1</td>
<td>Disconnect. Refer to “INSTALLING THE ENGINE”.</td>
</tr>
<tr>
<td>4</td>
<td>Neutral switch lead</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>5</td>
<td>Footrest/shift pedal</td>
<td>1/1</td>
<td>Disconnect. Refer to “INSTALLING THE ENGINE”.</td>
</tr>
<tr>
<td>6</td>
<td>Sidestand</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>7</td>
<td>Clutch adjusting cover</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>8</td>
<td>Clutch cable</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>Fuel tank fitting knobs</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Steering head side covers</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- 64 Nm (6.4 m·kg, 46 ft·lb)
### ENGINE MOUNTING BOLTS

**Order** | **Job name/Part name** | **Q'ty** | **Remarks**
--- | --- | --- | ---
| **Engine mounting bolt removal** | | | Remove the parts in the order below. Place a suitable stand under the frame and engine. Refer to “GENERATOR AND STARTER CLUTCH” Refer to “REAR SHOCK ABSORBER AND SWINGARM” in Chapter 6.
| Left crankcase cover | 1 | | |
| Tool box | 1 | | |
| Horn | 1 | | |
| Engine ground lead connector | 1 | | |
| Engine stay (front-lower) | 1 | | |
| Down tube | 1 | | |
| Engine bracket bolts | 4 | | Refer to “INSTALLING THE ENGINE”.
| Engine mount bolts (rear upper) | 2 | | |
| Engine mount bolt (rear lower) | 1 | For installation, reverse the removal procedure.
| Engine stays (rear upper/lower) | 1/1 | | |
| Engine assembly | 1 | | |
INSTALLING THE ENGINE

1. Tighten the bolts in the following order.

   Bolt ①: 48 Nm (4.8 m\(^2\)kg, 35 ft\(^2\)lb)
   Bolt ②: 48 Nm (4.8 m\(^2\)kg, 35 ft\(^2\)lb)
   Bolt ③: 48 Nm (4.8 m\(^2\)kg, 35 ft\(^2\)lb)
   Bolt ④: 48 Nm (4.8 m\(^2\)kg, 35 ft\(^2\)lb)
   Bolt ⑤: 48 Nm (4.8 m\(^2\)kg, 35 ft\(^2\)lb)

2. Install:
   - Shift arm ①

   **NOTE:**
   - Align the punch mark ③ in the shift shaft with the slot in the shift arm.
   - Adjust the adjusting bolt length ⑥.
   Refer to “ADJUSTING THE SHIFT PEDAL” in chapter 3.

   - Shift arm bolt 10 Nm (1.0 m\(^2\)kg, 7.2 ft\(^2\)lb)
   - Adjusting bolt length 114.7 mm (4.52 in)
Cylinder head removal
Engine assembly
Left crankcase cover

Order | Job name/Part name | Q'ty | Remarks
--- | --- | --- | ---
1 | Tappet cover (exhaust)/O-ring | 1/1 | Remove the parts in the order listed. Refer to “ENGINE REMOVAL”. Refer to “GENERATOR AND STARTER CLUTCH”.
2 | Tappet cover (intake)/O-ring | 1/1 |
3 | Exhaust pipe joint/gasket | 1/1 |
4 | Carburetor joint/O-ring | 1/1 |
5 | Oil delivery pipes | 2 |
6 | Camshaft sprocket cover/O-ring | 1/1 | Refer to “INSTALLING THE CYLINDER HEADS”.
7 | Camshaft sprocket bolt | 1 |
### Order Job name/Part name Q'ty Remarks

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Timing chain tensioner/gasket</td>
<td>1/1</td>
<td>Refer to “REMOVING/INSTALLING THE CYLINDER HEADS”.</td>
</tr>
<tr>
<td>9</td>
<td>Camshaft sprocket</td>
<td>1</td>
<td>Refer to “INSTALLING THE CYLINDER HEADS”.</td>
</tr>
<tr>
<td>10</td>
<td>Cylinder head</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>11</td>
<td>Dowel pins</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Cylinder head gasket</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
### FRONT CYLINDER HEAD

**Order** | **Job name/Part name** | **Q'ty** | **Remarks**
---|---|---|---
1 | **Cylinder head removal**  
Engine assembly  
Oil delivery pipes  
Right crankcase cover | 1/1 | Remove the parts in the order listed.  
Refer to “ENGINE REMOVAL”.  
Refer to “REAR CYLINDER HEAD”.  
Refer to “CLUTCH”.  
Refer to “INSTALLING THE CYLINDER HEADS”.
2 | Tappet cover (exhaust)/O-ring | 1/1 |
3 | Tappet cover (intake)/O-ring | 1/1 |
4 | Carburetor joint/O-ring | 1/1 |
5 | Camshaft sprocket cover/O-ring | 1/1 |
6 | Baffle plate/O-ring | 1/1 |
7 | Camshaft sprocket bolt | 1 |
<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Timing chain tensioner/gasket</td>
<td>1/1</td>
<td>Refer to “REMOVING/INSTALLING THE CYLINDER HEADS”.</td>
</tr>
<tr>
<td>8</td>
<td>Camshaft sprocket plate</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Camshaft sprocket</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Cylinder head</td>
<td>2</td>
<td>Refer to “INSTALLING THE CYLINDER HEADS”.</td>
</tr>
<tr>
<td>11</td>
<td>Dowel pins</td>
<td>1</td>
<td>For installation reverse the removal procedure.</td>
</tr>
<tr>
<td>12</td>
<td>Cylinder head gasket</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Tightening torques:**

- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 20 Nm (2.0 m·kg, 14 ft·lb)
- 35 Nm (3.5 m·kg, 25 ft·lb)
- 50 Nm (5.0 m·kg, 36 ft·lb)
- 55 Nm (5.5 m·kg, 40 ft·lb)
- 35 Nm (3.5 m·kg, 25 ft·lb)
- 50 Nm (5.0 m·kg, 36 ft·lb)
- 55 Nm (5.5 m·kg, 40 ft·lb)
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
REMÖVING THE CYLINDER HEADS

Rear cylinder head

1. Remove:
   ° camshaft sprocket cover
   ° tappet covers

2. Align:
   ° “T” mark ③ (with the stationary pointer ⑤)

- a. Temporarily install the left crankcase cover without the pickup coil and stator coil.
- b. Turn the crankshaft clockwise.
- c. Align the “T” mark ③ with the stationary pointer ⑤ on the crankcase cover (left) when the rear piston is at TDC on the compression stroke.
- d. Check that the rear piston is at TDC in the compression stroke.
- e. The rear piston is at TDC on the compression stroke when there is clearance at both of the rocker arms. If there is no clearance then turn the crankshaft clockwise one full turn.
- f. When the “T” mark is aligned with the stationary pointer the punch mark ⑦ on the camshaft sprocket should be aligned with the stationary pointer ⑧ on the cylinder head.

3. Loosen:
   ° bolt (camshaft sprocket) ①

**NOTE:**

Use the sheave holder ② to hold the rotor.

Sheave holder:
YS-01880, 90890-01701
4. Remove:
   ° timing chain tensioner
   ° gasket
5. Remove:
   ° bolt (camshaft sprocket) ①
   ° camshaft sprocket ②

NOTE: ..............................................................
To prevent the timing chain from falling into the crankcase fasten a wire to it.

6. Remove:
   ° cylinder head

NOTE: ..............................................................
° Loosen the bolts and nuts in the proper sequence.
° Follow the numerical order shown in the illustration. Loosen each bolt 1/4 of a turn at a time until all of the bolts are loose.

Front cylinder head

NOTE: ..............................................................
When removing the front cylinder head, repeat the rear cylinder head removal procedures. However, note the following points.

1. Align:
   ° “I” mark
     (with the stationary pointer)

Removal steps:
° Turn the crankshaft clockwise 290°.
° Align the “I” mark ③ with the stationary pointer ⑤ on the crankcase cover (left) when the front piston is at TDC on the compression stroke.
° When the “I” mark is aligned with the stationary pointer the punch mark ⑩ on the camshaft sprocket should be aligned with the stationary pointer ③ on the cylinder head.
° The front piston is at TDC on the compression stroke when there is clearance at both of the rocker arms.
CHECKING THE CYLINDER HEADS
The following procedure applies to all of the cylinder heads.

1. Eliminate:
   ° combustion chamber carbon deposits
   (with a rounded scraper)

   **NOTE:**
   Do not use a sharp instrument to avoid damaging or scratching:
   ° spark plug threads
   ° valve seats

2. Check:
   ° cylinder head
     Damage/scratches → Replace.

3. Measure:
   ° cylinder head warpage
     Out of specification → Resurface the cylinder head.

     **Cylinder head warpage**
     Less than 0.03 mm (0.0012 in)

   a. Place a straightedge ① and a thickness gauge ② across the cylinder head.
   b. Measure the warpage.
   c. If the limited is exceeded, resurface the cylinder head as follows.
   d. Place 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.
CHECKING THE TIMING CHAIN TENSIONER

1. Check:
   - timing chain tensioner
     
     Cracks/damage/rough movement → Replace.

   a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.

   **NOTE:**
   
   While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver until it stops.

   b. Remove the screwdriver and slowly release the timing chain tensioner rod.

   c. Make sure that the timing chain tensioner rod comes out of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.

INSTALLING THE CYLINDER HEADS

Rear cylinder head

1. Install:
   - dowel pins
   - gasket

   **NOTE:**
   
   The “5EL” mark on the gasket must face up side of the cylinder.

2. Install:
   - nuts (cylinder head) (M12: 1 – 4)
     - 50 Nm (5.0 m·kg, 3.6 ft·lb)
   - cap nut (cylinder head) (M10: 5)
     - 35 Nm (3.5 m·kg, 25 ft·lb)
   - bolts (cylinder head) (M8: 6 – 7)
     - 20 Nm (2.0 m·kg, 14 ft·lb)

   **NOTE:**
   
   - Tighten the bolts and nuts in the proper sequence.
   - Follow the numerical order shown in the illustration. Tighten the bolts and nuts in two stages.
3. Install:
   ◊ camshaft sprocket

⚠️ Temporarily install the rotor nut and left crankcase cover without the pickup coil and stator coil.

b. Turn the crankshaft clockwise.

c. Align the “T” mark ◊ with the stationary pointer ◊ on the crankcase cover (left).

d. Install the camshaft sprocket with the timing mark ◊ facing out.

e. Turn the camshaft just enough to remove any slack from the intake side of the timing chain.

f. Insert your finger into the hole and timing chain tensioner hole and push the timing chain guide inward.

g. While pushing the timing chain guide, be sure that the timing mark ◊ and the stationary pointer ◊ are properly aligned at TDC.

4. Install:
   ◊ timing chain tensioner

⚠️ Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.

b. While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver ① until it stops.

c. With the screwdriver still inserted into the timing chain tensioner, install the timing chain tensioner ③, and gasket.

Then, tighten the timing chain tensioner bolts ③ to the specified torque.

⚠️ WARNING

Always use a new gasket.

NOTE:

The “UP” mark on the timing chain tensioner should face up.

Timing chain tensioner bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)
d. Remove the screwdriver, make sure that the timing chain tensioner rod releases, and tighten the cap bolt to the specified torque.

<table>
<thead>
<tr>
<th>Cap bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Nm (0.8 m·kg, 5.8 ft·lb)</td>
</tr>
</tbody>
</table>

NOTE:

- Be sure the projection on the camshaft sprocket plate is aligned with the hole in the sprocket.
- Use the sheave holder 2 to hold the rotor.

Sheave holder:
YS-01880, 90890-01701

6. Check:

- alignment marks
  If the marks do not align → Adjust.

7. Measure:

- valve clearance
  Out of specification → Adjust.
  Refer to “ADJUSTING THE VALVE CLEARANCE” in CHAPTER 3.

Front cylinder head

NOTE:
When installing the front cylinder head, repeat the rear cylinder head installation procedure. However, note the following points.

1. Install:

- camshaft sprocket

a. Turn the crankshaft clockwise 290°.
b. Align the “I” mark 3 with the stationary pointer 6 on the crankcase cover (left).
c. Install the camshaft sprocket with the timing mark 4 facing out.
d. Turn the camshaft just enough to remove any slack from the intake side of the timing chain.
e. Insert your finger into the hole and timing chain tensioner hole and push the timing chain guide inward.
f. While pushing the timing chain guide, be sure that the timing mark 4 and the stationary pointer 5 are properly aligned at TDC.
### Removing the rocker arm and camshaft

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cylinder heads</td>
<td>1</td>
<td>Remove the parts in the order listed. Refer to “CYLINDER HEAD”.</td>
</tr>
<tr>
<td>2</td>
<td>Stopper plate</td>
<td>1</td>
<td>Refer to “REMOVING/INSTALLING THE ROCKER ARM AND CAMSHAFT”.</td>
</tr>
<tr>
<td>3</td>
<td>Camshaft bushing</td>
<td>1/1</td>
<td>Refer to “REMOVING/INSTALLING THE ROCKER ARM AND CAMSHAFT”.</td>
</tr>
<tr>
<td>4</td>
<td>Camshaft/dowel pin</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Union bolt/gasket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Rocker arm shafts</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rocker arms</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Locknuts</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Valve adjusters</td>
<td>2</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

### Torque Specifications
- 37.5 Nm (3.75 m·kg, 27 ft·lb)
- 27 Nm (2.7 m·kg, 20 ft·lb)
- 20 Nm (2.0 m·kg, 14 ft·lb)
REMOVING THE ROCKER ARMS AND CAMSHAFT

1. Remove:
   - rocker arm shafts (intake and exhaust) ①
   - rocker arms ②

**NOTE:**
Use a slide hammer ③ and weight ④ to remove the rocker arm shafts.

**Slide hammer bolt (M8):**
YU-1083-2, 90890-01085
Weight:
YU-1083-3, 90890-01084

2. Remove:
   - camshaft bushing ①
   - camshaft ②

**NOTE:**
Screw a 10 mm (0.39 in) bolt ③ into the threaded end of the camshaft and pull out the camshaft.

CHECKING THE CAMSHAFTS

1. Check:
   - camshaft bushings
     Damage/wear → Replace.

2. Check:
   - camshaft lobes
     Blue discoloration/pitting/scratches → Replace the camshaft.

3. Measure:
   - camshaft lobe dimensions ③ and ⑤
     Out of specification → Replace the camshaft.

**Camshaft lobe dimension limit**

**Intake**

- ③ 39.012 mm (1.5359 in)
- ⑤ #1: 31.993 mm (1.2596 in)
  #2: 32.027 mm (1.2609 in)

**Exhaust**

- ③ 39.045 mm (1.5372 in)
- ⑤ 32.100 mm (1.2638 in)

4. Check:
   - camshaft oil passage
     Obstruction → Blow out with compressed air.
CHECKING THE ROCKER ARMS AND ROCKER ARM SHAFTS

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

1. Check:
   - rocker arm
     - Damage/wear → Replace.
   - rocker arm lobe
     - Valves adjust (1)
   - Valve adjuster (2)
     - Excessive wear → Replace.

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

3. Measure:
   - Rocker arm inside diameter (a)
     - Out of specification → Replace.

   **Rocker arm inside diameter**
   - **<Limit>:** 14.036 mm (0.5526 in)

4. Measure:
   - Rocker arm shaft outside diameter (b)
     - Out of specification → Replace.

   **Rocker arm shaft outside diameter**
   - **<Limit>:** 13.95 mm (0.5492 in)

5. Calculate:
   - Rocker-arm-to-rocker-arm-shaft clearance

   **NOTE:**
   Calculate the clearance by subtracting the rocker arm shaft outside diameter from the rocker arm inside diameter.

   Above 0.086 mm (0.0034 in) → Replace the defective part(-s).

   **Rocker-arm-to-rocker-arm-shaft clearance**
   - 0.009 / 0.033 mm
     (0.0006 / 0.0013 in)
   - **<Limit>:** 0.086 mm (0.0034 in)
INSTALLING THE CAMSHAFT AND ROCKER ARMS

1. Lubricate:
   ° camshaft

   | Recommend lubricant |
   | Camshaft/Bushing     |
   | Molybdenum disulfide oil |

2. Install:
   ° camshaft ①
   ° camshaft bushing ②

   **NOTE:**
   ° The dowel pin ③ on the end of the camshaft must align with the timing mark ⑤ on the cylinder head.
   ° Make sure that the No.1 camshaft ③ is installed in the rear cylinder head and the No.2 camshaft ④ is installed in the front cylinder head.

3. Install:
   ° stopper plate ①

   | Stopper plate bolt ② |
   | 20 Nm (2.0 m•kg, 14 ft•lb) |

4. Lubricate:
   ° rocker arm shafts

   | Recommended lubricant |
   | Engine oil |

---

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5. Install:
- rocker arms
- rocker arm shafts

**NOTE:**
Make sure that the rocker arm shafts is completely pushed into the cylinder head.
<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Valve cotters</td>
<td>4</td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Valve spring retainers</td>
<td>2</td>
<td>Refer to “CYLINDER HEADS”.</td>
</tr>
<tr>
<td>3</td>
<td>Valve springs</td>
<td>2</td>
<td>Refer to “ROCKER ARMS AND CAMSHAFT”.</td>
</tr>
<tr>
<td>4</td>
<td>Valve (intake)</td>
<td>1</td>
<td>Refer to “REMOVING/INSTALLING THE VALVES”.</td>
</tr>
<tr>
<td>5</td>
<td>Valve (exhaust)</td>
<td>1</td>
<td>Refer to “INSTALLING THE VALVES”.</td>
</tr>
<tr>
<td>6</td>
<td>Valve stem seals</td>
<td>2</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>7</td>
<td>Valve spring seats</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

- Removing the valves and valve springs.
- Cylinder heads
- Rocker arms and camshafts

Refer to "CYLINDER HEADS".
Refer to "ROCKER ARMS AND CAMSHAFT".
Refer to "REMOVING/INSTALLING THE VALVES".
Refer to "INSTALLING THE VALVES".

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 that the valves properly seal.

1. Check:
   - valve sealing
   Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.
   Refer to “CHECKING THE VALVE SEATS”.

       a. Pour a clean solvent ① into the intake and exhaust ports.
       b. Check that the valves properly seal.
       There should be no leakage at the valve seat ②.

2. Remove:
   - valve cotters

   NOTE:
   Remove the valve cotters by compressing the valve spring with the valve spring compressor ①.

   Valve spring compressor
   YM-04019, 90890-04019

CHECKING THE VALVES AND VALVE GUIDES
The following procedure applies to all of the valve and valve guides.

1. Measure:
   - valve-stem-to-valve-guide clearance

   Valve-stem-to-valve-guide clearance =
   Valve guide inside diameter ② – Valve stem diameter ⑥
Valve-stem-to-valve-guide clearance

<table>
<thead>
<tr>
<th>Component</th>
<th>Intake</th>
<th>Exhaust</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.010</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>0.037</td>
<td>0.052</td>
</tr>
<tr>
<td>Limit</td>
<td>0.08</td>
<td>0.10</td>
</tr>
<tr>
<td>(unit)</td>
<td>mm</td>
<td>mm</td>
</tr>
<tr>
<td>(in)</td>
<td>0.0031</td>
<td>0.0040</td>
</tr>
</tbody>
</table>

Out of specification → Replace the valve guide.

2. Replace.

° valve guide

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

- Remove the valve guide with a valve guide remover ①.
- Install the new valve guide with a valve guide installer ② and valve guide remover ①.
- After installing the valve guide, bore the valve guide with a 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 reamer, remover and installer

<table>
<thead>
<tr>
<th>Size</th>
<th>Reamer</th>
<th>Remover</th>
<th>Installer</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 mm (0.31 in)</td>
<td>YM-01211</td>
<td>90890-01211</td>
<td>YM-01201, 90890-04013</td>
</tr>
<tr>
<td></td>
<td>YM-01200</td>
<td>90890-01200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>YM-01201</td>
<td>90890-04013</td>
<td></td>
</tr>
</tbody>
</table>

3. Eliminate:

° carbon deposits
(from the valve face and valve seat)

4. Check:

° valve face
Pitting/wear → Grind the valve face.
° valve stem end
Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
5. Measure:
   °valve margin thickness \( a \)
   Out of specification → Replace the valve.

   **Valve margin thickness limit**
   0.8 mm (0.031 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 valve stem seal.

   **Valve stem runout**
   0.03 mm (0.0021 in)

---

**CHECKING THE VALVE SEATS**

The following procedure applies to all of the valves and valve seats.

1. Eliminate:
   °carbon deposits
      (from the valve face and valve seat)

2. Check:
   °valve seat
      Pitting/wear → Replace the cylinder head.

3. Measure:
   °valve seat width \( a \)
   Out of specification → Replace the cylinder head.

   **Valve seat width limit**
   Intake: 1.8 mm (0.071 in)
   Exhaust: 1.8 mm (0.071 in)

---

a. Apply Mechanic's blueing dye (Dykem) \( b \) onto the valve face.

b. Install the valve into the cylinder head.

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

d. Measure the valve seat width. Where the valve seat and valve face contacted one another, the blueing will have been removed.
4. Lap:
   a. valve face
   b. valve seat

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

---

CAUTION:

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

**CAUTION:**

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

---

b. Apply molybdenum disulfide oil onto the valve stem.

c. Install the valve into the cylinder head.

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

**NOTE:**
For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hand.

---

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

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

g. Apply Mechanic's blueing dye (Dyken) onto the valve face.

h. Install the valve into the cylinder head.

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

j. Measure the valve seat width again. If the valve seat width is out of specification, reface and lap the valve seat.
CHECKING THE VALVE SPRINGS
The following procedure applies to all of the valve springs.
1. Measure:
   - valve spring free length \( a \)
     Out of specification → Replace the valve spring.

   **Valve spring free length (intake and exhaust)**
   44.6 mm (1.76 in)
   <Limit>: 43.5 mm (1.71 in)

2. Measure:
   - compressed spring force \( b \)
     Out of specification → Replace the valve spring.

   **Compressed spring force**
   Intake and exhaust spring
   160.7 N (16.4 kg, 36.16 lb)
   at 40 mm (1.57 in)

3. Measure:
   - valve spring tilt \( c \)
     Out of specification → Replace the valve spring.

   **Spring tilt limit**
   Intake and exhaust valve spring
   2.5°/1.9 mm (0.075 in)

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
   - oil seal **New**
     (with the recommended lubricant)

3. Install:
   - valve
   - lower spring seat
   - oil seal **New**
   - valve spring
   - upper spring seat
     (into the cylinder head)
NOTE: Install the valve spring with the larger pitch \( \text{a} \) facing up.

\( \text{b} \) Smaller pitch

4. Install: valve cotters

**NOTE:** Install the valve cotters by compressing the valve spring with the valve spring compressor \( \text{i} \).

Valve spring compressor
YM-04019, 90890-04019

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.
Remove the parts in the order listed.
Refer to "CYLINDER HEADS".
The “5EL” mark should face towards the cylinder head.

For installation, reverse the removal procedure.

### Order Job name/Part name Q'ty Remarks
1 Removing the cylinders and pistons Cylinder heads 1 Remove the parts in the order listed. Refer to “CYLINDER HEADS”.
2 Timing chain guide 1 The “5EL” mark should face towards the cylinder head.
3 Cylinder 1 Refer to “INSTALLING THE PISTONS AND CYLINDERS”.
4 Dowel pins 2
5 Cylinder gasket 1
6 Piston pin clips 2
7 Piston pin 1
8 Piston 1
9 Piston ring set 1

**10 Nm (1.0 m·kg, 7.2 ft‘lb)**

Refer to “REMOVING/INSTALLING THE CYLINDERS AND PISTONS”.

For installation, reverse the removal procedure.
REMOVING THE PISTONS
The following procedure applies to all of the pistons.
1. Remove:
   ° piston pin clip
   ° piston pin
   ° piston

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.
° For reference during installation, put an identification mark on each piston crown.
° Before removing the piston pin, deburr the piston pin clip’s groove and the piston’s pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller.

Piston pin puller
YU-01304, 90890-01304

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 CYLINDERS AND PISTONS
The following procedure applies to all of the cylinders and pistons.
1. Check:
   ° piston wall
   ° cylinder wall
   Vertical scratches → Rebore or replace the cylinder, and replace the piston and piston rings as a set.
2. Measure:
   "piston-to-cylinder clearance"

   a. Measure cylinder bore “C” with the cylinder bore gauge.

   @ 40 mm (1.57 in) from the top of the cylinder

   **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.

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

   c. Measure piston skirt diameter “P” with the micrometer.

   ① 5 mm (0.20 in) from the bottom edge of the piston.

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

   e. Calculate the piston-to-cylinder clearance with the following formula.

   \[
   \text{Piston-to-cylinder clearance} = \frac{X + Y}{2}
   \]

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

   \[
   \text{Piston-to-cylinder clearance} = 0.025 \text{ mm (0.0010 in)}
   \]

   \[
   \text{<Limit>: 0.15 mm (0.0060 in)}
   \]
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.

Piston ring side clearance

<table>
<thead>
<tr>
<th>Type</th>
<th>Oil Ring Expansion Spacing</th>
<th>Limit</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>0.04 / 0.08 mm</td>
<td>&lt;Limit&gt;: 0.1 mm (0.004 in)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.002 / 0.003 in)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>0.03 / 0.07 mm</td>
<td>&lt;Limit&gt;: 0.1 mm (0.004 in)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.001 / 0.003 in)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Install:
   ° piston ring
   (into the cylinder)

NOTE: 
Using the piston crown pash the ring into the cylinder so that the ring will be at a right angle to the cylinder bore.

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 end gap

<table>
<thead>
<tr>
<th>Type</th>
<th>Oil Ring Expansion Spacing</th>
<th>Limit</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>0.3 / 0.5 mm</td>
<td>&lt;Limit&gt;: 0.8 mm (0.031 in)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.012 / 0.020 in)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>0.3 / 0.45 mm</td>
<td>&lt;Limit&gt;: 0.8 mm (0.31 in)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.012 / 0.018 in)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil</td>
<td>0.2 / 0.7 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.008 / 0.03 in)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CHECKING THE PISTON PINS

The following procedure applies to all of the piston pins.

1. Check:
   ° piston pin
   Blue discoloration/grooves → Replace, then inspect the lubrication system.

2. Measure:
   ° piston pin outside diameter (a)
   Out of specification → Replace the piston pin.

<table>
<thead>
<tr>
<th>Piston pin outside diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.991 mm / 22.000 mm</td>
</tr>
<tr>
<td>(0.8658 in / 0.8661 in)</td>
</tr>
</tbody>
</table>

3. Measure:
   ° piston pin bore inside diameter (b)
   Out of specification → Replace the piston

<table>
<thead>
<tr>
<th>Piston pin bore inside diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.004 mm / 22.015 mm</td>
</tr>
<tr>
<td>(0.8663 in / 0.8667 in)</td>
</tr>
</tbody>
</table>

4. Calculate:
   ° piston-pin-to-piston clearance
   Out of specification → Replace the piston pin.

<table>
<thead>
<tr>
<th>Piston-pin-to-piston clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.004 mm / 0.024 mm</td>
</tr>
<tr>
<td>(0.0001 in / 0.0009 in)</td>
</tr>
</tbody>
</table>

INSTALLING THE PISTONS AND CYLINDERS

The following procedure applies to all of the pistons and cylinders.

1. Install:
   ° oil ring expander
   ° lower oil ring rail
   ° upper oil ring rail
   ° 2nd ring
   ° top ring

NOTE:
Be sure to install the piston rings so that the manufacturer’s marks or numbers face up.
2. Install:
- piston ①
- piston pin ②
- piston pin clip (New) ③

**NOTE:**
- Apply engine oil onto the piston pin.
- Make sure that the “EX” mark ④ on the piston faces towards the exhaust side of the engine.
- Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the clip from falling into the crankcase.

3. Install:
- gasket (New)
- dowel pins

4. Lubricate:
- piston
- piston rings
- cylinder
  (with the recommended lubricant)

5. Offset:
- piston ring end gaps
  - Top ring
  - Lower oil ring rail
  - Upper oil ring rail
  - 2nd ring

6. Install:
- cylinder

**NOTE:**
- While compressing the piston rings with one hand, install the cylinder with the other hand.
- Pass the timing chain and timing chain guide (exhaust side) through the timing chain cavity.

**Recommended lubricant**

**Engine oil**

**Cylinder bolt**

10 Nm (1.0 m·kg, 7.2 ft·lb)
Removing the timing gears
Cylinder heads
Cylinders
Clutch assembly
1. Primary drive gear nut
2. Timing drive gear
3. Dowel pins
4. Springs
5. Timing chain drive gear shaft
6. Timing chain drive gear sprocket/
Timing chain
7. Primary drive gear
8. Straight key
9. Timing chain guide

Remove the parts in the order listed. Refer to “CYLINDER HEAD”. Refer to “CYLINDERS AND PISTONS”. Refer to “CLUTCH”.

Refer to “REMOVING/INSTALLING THE TIMING DRIVE GEARS”.

Refer to “INSTALLING THE TIMING DRIVE GEARS”.

For installation, reverse the removal procedure.

10 Nm (1.0 m·kg, 7.2 ft·lb)

110 Nm (11.0 m·kg, 80 ft·lb)
REMOVING THE TIMING DRIVE GEARS

Front cylinder
1. Straighten the lock washer tab.
2. Remove:
   ° primary drive gear nut (1)

NOTE:
While holding the generator rotor with the sheave holder, loosen the primary drive gear nut.

3. Remove:
   ° timing drive gear (2)
   ° dowel pins
   ° springs

NOTE:
When removing the timing drive gear, the dowel pins and springs are scatter and dropping down. Do not missing them.

Rear cylinder
NOTE:
When removing the rear cylinder timing gear, repeat the front cylinder timing gear removal procedure. However, note the following points.

1. Remove:
   ° rotor assembly
   ° dowel pins
   ° springs
   ° timing drive gear
   Refer to “GENERATOR AND STARTER CLUTCH”.

CHECKING THE TIMING CHAINS, CAMSHAFT SPROCKETS, AND TIMING CHAIN GUIDES
The following procedure applies to all of the timing chains, camshaft sprockets, and timing chain guides.

1. Check:
   ° timing chain (1)
   Damage/sitffness → Replace the timing chain and its respective camshaft sprockets as a set.

2. Check:
   ° camshaft sprocket
   Damage/wear → Replace the respective camshaft sprockets and the respective timing chain as a set.

3. Check:
   ° timing chain guide (exhaust side) (1)
   ° timing chain guide (intake side) (2)
   ° Damage/wear → Replace the defective part(-s).
CHECKING THE PRIMARY DRIVE
1. Check:
   ° primary drive gear
   ° primary driven gear
   Damage/wear → Replace the primary drive and primary driven gears as a set.
   Excessive noise during operation → Replace the primary drive and primary driven gears as a set.
2. Check:
   ° primary-drive-gear-to-primary-driven-gear free play
   Free play exists → Replace the primary drive and primary driven gears as a set.

INSTALLING THE TIMING DRIVE GEARS
1. Install:
   ° timing chain
   (onto the timing chain drive gear sprocket)
   NOTE: To prevent the timing chain from falling into the crankcase, fasten it with a wire.

2. Install:
   ° timing chain drive gear sprocket
   ° timing chain drive gear shaft
   NOTE: Make sure that the “2” mark on the timing chain drive gear sprocket is installed in the rear cylinder and the “3” mark on the timing chain drive gear sprocket is installed in the front cylinder.

3. Install:
   ° stopper plate (1)
   ° stopper plate bolt
   10 Nm (1.0 m·kg, 7.2 ft·lb)
   NOTE: Turn the timing chain drive gear shaft so that the stopper plate fits correctly into the slot and then fasten the stopper plate with the bolt.
Front cylinder
1. Install:
   ° springs ①
   ° dowel pins
   ° timing drive gear ②

NOTE:
° Insert the suitable pin ③ into the hole of timing chain drive gear sprocket and match the gear teeth.
° Push the projections ④ on the timing drive gear into the spaces ⑤.
° Align the punch mark ⑥ on the timing drive gear, the punch mark ⑦ on the timing chain drive gear sprocket and the key position ⑧ as shown.

2. Install:
   ° claw washer
   ° lock washer ① New
   ° primary drive gear nut ②

NOTE: __________
While holding the generator retor with the sheave holder, tighten the primary drive gear nut.

3. Bend the lock washer tab along a flat side of the nut.

Rear cylinder

NOTE: __________
When installing the rear cylinder timing gear, repeat the front cylinder timing gear installation procedure. However, note the following points.

1. Install:
   ° springs
   ° dowel pins
   ° timing drive gear
   ° rotor assembly
   Refer to “GENERATOR AND STARTER CLUTCH”.

110 Nm (11.0 m·kg, 80 ft·lb)
Removing the right crankcase cover

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engine oil</td>
<td>1</td>
<td>Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td>2</td>
<td>Muffler assembly</td>
<td>1</td>
<td>Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td>3</td>
<td>Exhaust pipes</td>
<td>1</td>
<td>Securely support the motorcycle so there is no danger of it falling over.</td>
</tr>
<tr>
<td>4</td>
<td>Brake pedal/Footrest</td>
<td>1</td>
<td>Refer to “ENGINE OIL REPLACEMENT” in CHAPTER 3.</td>
</tr>
<tr>
<td>5</td>
<td>Rear brake master cylinder/bracket</td>
<td>1</td>
<td>Refer to “ENGINE REMOVAL”.</td>
</tr>
<tr>
<td>6</td>
<td>Oil filter cover plate</td>
<td>1</td>
<td>Refer to “ENGINE REMOVAL”.</td>
</tr>
<tr>
<td>7</td>
<td>Oil filter</td>
<td>1</td>
<td>Refer to “ENGINE REMOVAL”.</td>
</tr>
<tr>
<td>8</td>
<td>O-rings</td>
<td>3</td>
<td>Refer to “ENGINE REMOVAL”.</td>
</tr>
<tr>
<td>9</td>
<td>Oil filter</td>
<td>1</td>
<td>Refer to “ENGINE REMOVAL”.</td>
</tr>
<tr>
<td>10</td>
<td>Right crankcase cover</td>
<td>1</td>
<td>Refer to “ENGINE REMOVAL”.</td>
</tr>
</tbody>
</table>

**WARNING**

Securely support the motorcycle so there is no danger of it falling over.
<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Dowel pins</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Crankcase cover gasket</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)
### Removing the clutch

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clutch spring bolts</td>
<td>6</td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Clutch spring plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Clutch spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Clutch spring seat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Clutch pressure plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bearing/short clutch push rod</td>
<td>1/1</td>
<td>Refer to “INSTALLING THE CLUTCH”.</td>
</tr>
<tr>
<td>7</td>
<td>Friction plates</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Clutch plates</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Wire circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Clutch plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Damper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Clutch damper plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Nut/lock washer</td>
<td>1/1</td>
<td>Refer to “REMOVING/INSTALLING THE CLUTCH.”</td>
</tr>
<tr>
<td>14</td>
<td>Clutch boss</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- **Removing the parts in the order listed.**
- **Refer to “INSTALLING THE CLUTCH”.**
- **Refer to “REMOVING/INSTALLING THE CLUTCH.”**
<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Thrust washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Clutch housing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Long clutch push rod</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For installation, reverse the removal</td>
<td></td>
<td>procedure.</td>
</tr>
<tr>
<td></td>
<td>70 Nm (7.0 m\text{&quot;kg}, 51 ft\text{&quot;lb})</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 Nm (0.8 m\text{&quot;kg}, 5.8 ft\text{&quot;lb})</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**REMOVING THE CLUTCH**

1. Straighten the lock washer tab.
2. Loosen:
   - clutch boss nut ①

**NOTE:**

While holding the clutch boss ② with the clutch holding tool ③, loosen the clutch boss nut.

3. Remove:
   - clutch boss nut ①
   - lock washer ②
   - clutch boss ③

**NOTE:**

There is a built-in damper between the clutch boss ③ and the clutch plate ④. It is not necessary to remove the wire circlip ⑤ and disassemble the built-in damper unless there is serious clutch chattering.

---

**CHECKING THE FRICTION PLATES**

The following procedure applies to all of the friction plates.

1. Check:
   -摩擦片
     - Damage/wear → Replace the friction plates as a set.

2. Measure:
   -摩擦片厚度
     - Out of specification → Replace the friction plates as a set.

**NOTE:**

Measure the friction plate at four places.

**Friction plate thickness**

2.9 / 3.1 mm (0.114 / 0.122 in)

<Limit>: 2.8 mm (0.11 in)
CHECKING THE PRESSURE PLATE
1. Check:
   ° pressure plate
     Cracks/damage → Replace.
   ° bearing
     Damage/wear → Replace.

CHECKING THE CLUTCH BOSS
1. Check:
   ° clutch boss splines
     Damage/pitting/wear → Replace the clutch boss.

NOTE: Pitting on the clutch boss splines will cause erratic clutch operation.

CHECKING THE CLUTCH PUSH RODS
1. Check:
   ° short clutch push rod ①
   ° long clutch push rod ②
     Cracks/damage/wear → Replace the defective part(-s).
2. Measure:
   ° long clutch push rod bending limit
     Out of specification → Replace the long clutch push rod.

Long clutch push rod bending limit
0.5 mm (0.02 in)
CHECKING THE CLUTCH PLATES
The following procedure applies to all of the clutch plates.

1. Check:
   - clutch plate
     Damage → Replace the clutch plates as a set.

2. Measure:
   - clutch plate warpage
     (with a surface plate and thickness gauge)
     Out of specification → Replace the clutch plates as a set.

   Clutch plate warpage limit
   Less than 0.1 mm (0.004 in)

CHECKING THE CLUTCH SPRING AND CLUTCH SPRING SEAT PLATE

1. Check:
   - clutch spring plate
     Damage → Replace.

2. Check:
   - clutch spring plate seat
     Damage → Replace.

3. Measure:
   - clutch spring free height
     Out of specification → Replace the clutch spring

   Clutch spring free height
   7.2 mm (0.283 in)
   <Limit>: 6.5 mm (0.256 in)

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.
INSTALLING THE CLUTCH

1. Install:
   ° clutch housing ①

NOTE:
° If the wire circlip ② has been removed, carefully install a new one as shown.

2. Tighten:
   ° lock washer New
   ° clutch boss nut ①

NOTE:
While holding the clutch boss with the clutch holding tool ②, tighten the clutch boss nut.

3. Bend the lock washer tab along a flat side of the nut.

4. Lubricate:
   ° long clutch push rod
   ° short clutch push rod
   (with the recommended lubricant)

Recommended lubricant
Lithium soap base grease

5. Lubricate:
   ° friction plates
   ° clutch plates
   (with the recommended lubricant)

Recommended lubricant
Engine oil

6. Install:
   ° friction plates
   ° clutch plates
   ° long clutch push rod
   ° short clutch push rod
   ° bearing
   ° washer

295x14
4-45
NOTE: Make sure that the semicircular slot (a) in the friction plate is aligned with the mark (b) on the clutch housing.

7. Install:
   ° clutch pressure plate
   ° clutch spring plate seat
   ° clutch spring ①
   ° clutch spring plate ②
   ° clutch spring bolts ③

NOTE: Tighten the clutch spring bolts in stages and in a crisscross pattern.

<table>
<thead>
<tr>
<th>Clutch spring bolt</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Nm (0.8 m(^2)kg, 5.8 ft(^2)lb)</td>
</tr>
<tr>
<td>Order</td>
</tr>
<tr>
<td>-------</td>
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<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

Refer to “ENGINE REMOVAL”.

10 Nm (1 m·kg, 7.2 ft·lb)
7 Nm (0.7 m·kg, 5.1 ft·lb)
## Removing the generator and starter clutch.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rotor</td>
<td>1</td>
<td>Remove the parts in the order listed</td>
</tr>
<tr>
<td>2</td>
<td>Dowel pins</td>
<td>6</td>
<td>Refer to “REMOVING/INSTALLING THE GENERATOR.”</td>
</tr>
<tr>
<td>3</td>
<td>Springs</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Woodruff key</td>
<td>1</td>
<td>Refer to “INSTALLING THE GENERATOR.”</td>
</tr>
<tr>
<td>5</td>
<td>Shaft</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>6</td>
<td>Starter idler gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Starter clutch drive gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Starter clutch assembly</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- **12 Nm (1.2 m·kg, 8.7 ft·lb)**
- **175 Nm (17.5 m·kg, 127 ft·lb)**
REMOVING THE GENERATOR

1. Remove:
   - camshaft sprocket cover
   - tappet covers
   Refer to “REAR CYLINDER HEAD.”

2. Align:
   - “T” mark (a) (with the stationary pointer (b))

   a. Temporarily install the AC magneto cover without the pickup coil and stator coil.
   b. Turn the crankshaft clockwise.
   c. Align the “T” mark (a) with the stationary pointer (b) on the crankcase cover (left) when the rear piston is at TDC on the compression stroke.
   d. Check that the rear piston is at TDC in the compression stroke.
   e. The rear piston is at TDC on the compression stroke when there is clearance at both of the rocker arms. If there is no clearance then turn the crankshaft clockwise one full turn.
   f. When the “T” mark is aligned with the stationary pointer the punch mark (c) on the camshaft sprocket should be aligned with the stationary pointer (d) on the cylinder head.

3. Remove:
   - generator rotor nut (1)
   - washer

   **NOTE:**
   - While holding the generator rotor (2) with the sheave holder (3), loosen the generator rotor nut.
   - Do not allow the sheave holder to touch the projection on the generator rotor.

   **Sheave holder**
   - YS-01880, 90890-01701

4. Remove:
   - generator rotor (1)
     (with the flywheel puller set (2) and adapter (3))
   - woodruff key
NOTE:

- Remove the rotor by pushing back the rotor, the flywheel puller ② and the adapter ③.
- Install the flywheel puller bolts and tighten the center bolt, making sure that the tool body stays parallel to the rotor. If necessary, one holding bolt may be backed out slightly for realignment of the tool.
- When rotor is removed, the dowel pins and springs are scatter and dropping down. Do not missing them.

Sheave holder:
YS-01880, 90890-01701

Flywheel puller:
YU-33270, 90890-01362

Adapter:
YM-38145, 90890-04131

CHECKING THE STARTER CLUTCH

1. Check:
   - starter clutch idle gear ①
   - starter clutch drive gear ②
   - Burrs/chips/roughness/wear → Replace the defective part(-s).

2. Check:
   - starter clutch operation

   a. When turning the starter clutch drive gear counter clockwise ④, the starter clutch and the starter clutch drive gear should engage. If the starter clutch drive gear and starter clutch do not engage, the starter clutch is faulty and must be replaced.

   b. When turning the starter clutch drive gear clockwise ③, it should turn freely. If the starter clutch drive gear does not turn freely, the starter clutch is faulty and must be replaced.
INSTALLING THE GENERATOR

1. Install:
° starter clutch assembly

**NOTE:**
Align the hole (a) on the starter clutch housing with the hole (b) on the rotor.

![Starter clutch bolt:](image)
12 Nm (1.2 m·kg, 8.7 ft·lb)
LOCTITE ®

2. Install:
° timing drive gear (1)
° springs (2)
° dowel pins (3)

**NOTE:**
° Align the punch mark (a) on the timing drive gear with the key slide (b).
° Push the projections (c) on the timing drive gear into the space (d).

3. Install:
° rotor assembly

**NOTE:**
° Insert the suitable pin (1) into the hole of timing chain drive gear sprocket and match the gear teeth.
° Align the punch mark (a) on the timing drive gear (2), the punch mark (b) on the timing chain drive gear sprocket and the key position (c) as shown.
° When installing the rotor, make sure the wood-ruff key is properly seated in the key way of the crankshaft.

4. Tighten:
° nut (rotor) (1)

**NOTE:**
Tighten the rotor nut (1) while holding the magneto rotor with a sheave holder (2).

![Sheave holder:](image)
YS-01880, 90890-01701
4. Check:
TDC on the compression stroke
If the marks do not align → Adjust.

.................................................................................................................................
a. Align the “T” mark (a) with the stationary pointer (b) on the left crankcase cover.
b. When the “T” mark is aligned with the stationary pointer, the punch mark (c) on the camshaft sprocket should be aligned with the stationary pointer (d) on the cylinder head.
.................................................................................................................................
### Removing the shift shaft and stopper lever

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Removing the shift shaft and stopper lever.</td>
<td>1</td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Engine oil</td>
<td>1</td>
<td>Refer to “ENGINE OIL REPLACEMENT” in CHAPTER 3.</td>
</tr>
<tr>
<td>3</td>
<td>Left crankcase cover</td>
<td>1</td>
<td>Refer to “GENERATOR AND STARTER CLUTCH”.</td>
</tr>
<tr>
<td>4</td>
<td>Rotor assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Shift shaft</td>
<td>1</td>
<td>Refer to “INSTALLING THE SHIFT SHAFT”.</td>
</tr>
<tr>
<td>6</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Torsion spring (stopper lever)</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>8</td>
<td>Stopper lever</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Torsion spring (shift shaft)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
CHECKING THE SHIFT SHAFT
1. Check:
   ° shift shaft ①
   ° shift lever ②
   Bends/damage/wear → Replace.
   ° shift lever spring ③
   Damage/wear → Replace.

CHECKING THE STOPPER LEVER
1. Check:
   ° stopper lever
   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 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 pump

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Removing the oil pump&lt;br&gt;Rotor assembly</td>
<td>1</td>
<td>Remove the parts in the order listed. Refer to “GENERATOR AND STARTER CLUTCH”. Refer to “CLUTCH”.</td>
</tr>
<tr>
<td>2</td>
<td>Crankcase cover (right)</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Driven gear cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Driven gear (oil pump)/Oil pump drive chain</td>
<td>2/1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Oil pump assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>O-rings/dowel pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oil delivery pipe</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Torque Specifications**

- 10 Nm (1.0 m·kg, 8.7 ft·lb)
- 7 Nm (0.7 m·kg, 5.1 ft·lb)
- 12 Nm (1.2 m·kg, 8.7 ft·lb)
### Disassembling the oil pump

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oil pump cover</td>
<td>1</td>
<td>Disassembly the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Oil pump body</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oil pump rotor (inner)</td>
<td>1</td>
<td>Refer to “ASSEMBLING THE OIL PUMP”.</td>
</tr>
<tr>
<td>4</td>
<td>Oil pump rotor (outer)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oil pump body</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oil pump rotor (inner)</td>
<td>1</td>
<td>Refer to “ASSEMBLING THE OIL PUMP”.</td>
</tr>
<tr>
<td>8</td>
<td>Oil pump rotor (outer)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Pin</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Dowel pins</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Oil pump shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Oil strainer</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.

**Note:**
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
CHECKING THE OIL PUMP

1. Check:
   - oil pump driven gear
   - oil pump body
   - oil pump driven gear cover
   - Cracks/damage/wear → Replace the defective part(-s).

2. Measure:
   - inner-rotor-to-outer-rotor-tip clearance \( a \)
   - outer-rotor-to-oil-pump-body-side clearance \( b \)
   - oil-pump-body-to-inner-rotor-and-outer-rotor clearance \( c \)
   - Out of specification → Replace the oil pump.

1. Inner rotor
2. Outer rotor
3. Oil pump body

- **Inner-rotor-to-outer-rotor-tip clearance**
  - 0.03 / 0.09 mm
  - (0.001 / 0.004 in)
  - **Limit**: 0.15 mm (0.006 in)

- **Outer-rotor-to-oil-pump-body-side clearance**
  - 0.03 / 0.08 mm
  - (0.001 / 0.003 in)
  - **Limit**: 0.15 mm (0.006 in)

- **Oil-pump-body-to-inner-rotor and outer-rotor clearance**
  - 0.03 / 0.08 mm
  - (0.001 / 0.003 in)
  - **Limit**: 0.15 mm (0.006 in)

CHECKING THE OIL DELIVERY PIPES

The following procedure applies to all of the oil delivery pipes.

1. Check:
   - oil delivery pipes \( 1 \)
     - Damage → Replace.
     - Obstruction → Wash and blow out with compressed air.

CHECKING THE OIL STRAINER

1. Check:
   - oil strainer \( 1 \)
     - Damage → Replace.
     - Contaminants → Clean with engine oil.
ASSEMBLING THE OIL PUMP

1. Assemble:
   - Oil pump

   \[10 \text{ Nm (1.0 m\text{kg}, 7.2 ft\text{lb})}\]

**CAUTION:**

After tightening the bolts, make sure that the oil pump turns smoothly.

**NOTE:**

Align the pin \(a\) with the slots \(b\) on the inner rotor.
## Removing the crankcase assembly

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Removing the crankcase assembly</td>
<td>1</td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Engine assembly</td>
<td></td>
<td>Refer to “ENGINE REMOVAL”.</td>
</tr>
<tr>
<td>3</td>
<td>Cylinder head</td>
<td></td>
<td>Refer to “CYLINDER HEADS”.</td>
</tr>
<tr>
<td>4</td>
<td>Cylinder and piston</td>
<td></td>
<td>Refer to “CYLINDERS AND PISTONS”.</td>
</tr>
<tr>
<td>5</td>
<td>Clutch assembly</td>
<td></td>
<td>Refer to “CLUTCH”.</td>
</tr>
<tr>
<td>6</td>
<td>AC magneto and starter clutch</td>
<td></td>
<td>Refer to “GENERATOR AND STARTER CLUTCH”.</td>
</tr>
<tr>
<td>7</td>
<td>Shift shaft</td>
<td></td>
<td>Refer to “SHIFT SHAFT”.</td>
</tr>
<tr>
<td>8</td>
<td>Oil pump assembly</td>
<td></td>
<td>Refer to “OIL PUMP”.</td>
</tr>
<tr>
<td>9</td>
<td>Oil level gauge</td>
<td>1</td>
<td>Refer to “ASSEMBLING THE CRANKCASE”.</td>
</tr>
<tr>
<td>10</td>
<td>Neutral switch</td>
<td>1</td>
<td>Refer to “DISASSEMBLING/ASSEMBLING THE CRANKCASE”.</td>
</tr>
<tr>
<td>11</td>
<td>Shift shaft stopper plate</td>
<td>3</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>12</td>
<td>Crankcase (right)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Dowel pins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Relief valve</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

*Torque values in Nm (kg·m, lb·ft)*
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 20 Nm (2.0 m·kg, 14 ft·lb)
- 38.5 Nm (3.85 m·kg, 28 ft·lb)
### Removing the crankshaft and connecting rod

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Crankshaft assembly</td>
<td>1</td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Oil pump drive sprocket</td>
<td>1</td>
<td><strong>Refer to “REMOVING/INSTALLING THE CRANKSHAFT”.</strong></td>
</tr>
<tr>
<td>3</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Nuts (connecting rod caps)</td>
<td>4</td>
<td><strong>Refer to “INSTALLING THE CRANKSHAFT”.</strong></td>
</tr>
<tr>
<td>5</td>
<td>Connecting rod bolts</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Connecting rods</td>
<td>2</td>
<td><strong>Refer to “REMOVING THE CONNECTING RODS/INSTALLING THE CRANKSHAFT”.</strong> For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>7</td>
<td>Connecting rod caps</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Plain bearings</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

- **48 Nm (4.8 m·kg, 35 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 the numbers in the illustration.)

   ![A Right crankcase](image1)
   ![B Left crankcase](image2)

2. Remove:
   - right crankcase

   **NOTE:**
   - For this removal, slits a in the crankcase can be use as shown.

   ![Slits in crankcase](image3)

   **CAUTION:**
   - Use a soft hammer to tap on one side of the crankcase. Tap only on reinforced portions of the crankcase. Do not tap on the crankcase mating surfaces. Work slowly and carefully. Make sure that the crankcase halves separate evenly.
CRANKSHAFT AND CONNECTING RODS

REMOVING THE CRANKSHAFT ASSEMBLY
1. Remove:
   ° crankshaft assembly

NOTE:
° Remove the crankshaft assembly with the crankcase separating tool (2).
° Make sure that the crankcase separating tool is centered over the crankshaft assembly.

REMOVING THE CONNECTING RODS
1. Remove:
   ° connecting rods
   ° 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
   Less than 0.02 mm (0.009 in)

2. Check:
   ° crankshaft journal surfaces
   ° crankshaft pin surfaces
   ° bearing surfaces
     Scratches/wear → Replace the crankshaft.

3. Measure:
   ° crankshaft-pin-to-big-end-bearing clearance
     Out of specification → Replace the big end bearings.

Crankshaft-pin-to-big-end-bearing clearance
0.044 / 0.073 mm
(0.0017 / 0.0029 in)

The following procedure applies to all of the connecting rods.
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 rod 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 \( \text{a} \) on the big end bearings with the notches \( \text{b} \) in the connecting rod and connecting rod cap.

c. Put a piece of Plastigauge\( ^\text{\textregistered} \) \( \text{1} \) on the crankshaft pin.
d. Assemble the connecting rod halves.

NOTE: 
° Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
° Apply molybdenum disulfide grease onto the bolts, threads, and nut seats.
° Make sure that the “Y” mark \( \text{2} \) on the connecting rod faces towards the left side of the crankshaft.
° Make sure that the characters \( \text{3} \) 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. Apply continuous torque between 43 and 48 Nm (4.3 \( \sqrt{\text{4.8 m} \cdot \text{kg, 31 \( \sqrt{\text{35 ft} \cdot \text{lb}}} \)). Once you reach 43 Nm (4.3 m\( \cdot \text{kg, 31 ft} \cdot \text{lb}), \text{DO NOT STOP TIGHTENING until the specified torque is reached.}

If the tightening is interrupted between 43 and 48 Nm (4.3 \( \sqrt{\text{4.8 m} \cdot \text{kg, 31 \( \sqrt{\text{35 ft} \cdot \text{lb}}} \)), loosen the connecting rod nut to less than 43 Nm (4.3 m\( \cdot \text{kg, 31 ft} \cdot \text{lb}) and start again.
CRANKSHAFT AND CONNECTING RODS

Refer to “INSTALLING THE CONNECTING RODS”.

**Connecting rod nut**

48 Nm (4.8 m·kg, 35 ft·lb)

f. Remove the connecting rod and big end bearings.
   Refer to “REMOVING THE CONNECTING RODS”.

g. Measure the compressed Plastigauge® width ① on each crankshaft pin.
   If the clearance is out of specification, select replacement big end bearings.

4. Select:
   "big end bearings (P₁,P₂)

**NOTE:**

○ The numbers ① stamped into the crankshaft web and the numbers ② on the connecting rods are used to determine the replacement big end bearing sizes.

○ “P₁,P₂” 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:

**Bearing size for “P₁”:**

“P₁” (connecting rod) – “P₁” (crankshaft web) =

4 – 1 = 3 (brown)

Rear cylinder lower bearing/Front cylinder upper and lower bearing.

<table>
<thead>
<tr>
<th>BEARING COLOR CODE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>blue</td>
<td>black</td>
<td>brown</td>
<td>green</td>
<td>yellow</td>
</tr>
</tbody>
</table>

Rear cylinder upper bearing

<table>
<thead>
<tr>
<th>BEARING COLOR CODE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>black</td>
<td>brown</td>
<td>green</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4-64
CHECKING THE BEARINGS AND OIL SEALS
1. Check:
   ° bearings
   Clean and lubricate the bearings, then rotate the inner race with your finger
   Rough movement → Replace.
2. Check:
   ° oil seals
   Damage/wear → Replace.

INSTALLING THE CRANKSHAFT
1. Install:
   ° connecting rod bearings ①
   
   **NOTE:**
   ° Align the projection ③ of the bearings with the notches ⑤ in the connecting rod cap.
   ° Install each bearing in its original place.

2. Install:
   ° connecting rods ①
   
   **NOTE:**
   ° The stamped “Y” mark ③ on the connecting rods should face towards the left side of the crankcase.
   ° Install each connecting rod in its original place.

3. Install:
   ° connecting rod cap ①
   
   **NOTE:**
   Be sure that the characters ③ on the side of the cap and connecting rod are aligned.

4. Tighten:
   ° nuts (connecting rod cap)
   
   **NOTE:**
   Apply molybdenum disulfide grease to the rod cap bolt threads and nut surfaces.
CAUTION:

- When tightening the nuts be sure to use an F-type torque wrench.
- Without pausing tighten to full torque specification. Apply continuous torque between 43 and 48 Nm (4.3 \( \times \) 4.8 m\( \cdot \)kg, 31 \( \times \) 35 ft\( \cdot \)lb). Once you reach 43 Nm (4.3 m\( \cdot \)kg, 31 ft\( \cdot \)lb) DO NOT STOP TIGHTENING until final torque is reached. If the tightening is interrupted between 43 and 48 Nm (4.3 \( \times \) 4.8 m\( \cdot \)kg, 31 \( \times \) 35 ft\( \cdot \)lb), loosen the nut to less than 43 Nm (4.3 m\( \cdot \)kg, 31 ft\( \cdot \)lb) and start again.

5. Install:
- crankshaft installing tool

NOTE: Attach the spacer to the bearing inner race.

<table>
<thead>
<tr>
<th>Crankshaft installer pot ①</th>
<th>YU-90058</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90890-01274</td>
</tr>
<tr>
<td>Crankshaft installer bolt ②</td>
<td>YU-90060</td>
</tr>
<tr>
<td></td>
<td>90890-01275</td>
</tr>
<tr>
<td>Adapter ③</td>
<td>YM-4059</td>
</tr>
<tr>
<td></td>
<td>90890-04130</td>
</tr>
<tr>
<td>Spacer ④</td>
<td>YU-90070</td>
</tr>
<tr>
<td></td>
<td>90890-04060</td>
</tr>
</tbody>
</table>

6. Install:
- crankshaft ①

NOTE: Align the left connecting rod with the rear cylinder sleeve hole.

ASSEMBLING THE CRANKCASE
1. Apply:
- engine oil (onto the main journal bearings)
- sealant (onto the crankcase mating surfaces)

Quick gasket®
Yamaha Bond No. 1215:
ACC-1100-15-01, 90890-85505
2. Tighten:
° crankcase bolts
(follow the proper tightening sequence)

NOTE: The numbers embossed on the crankcase indicate the crankcase tightening sequence.

<table>
<thead>
<tr>
<th>M6 × 30 mm</th>
<th>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>M6 × 30 mm (Chromium plated bolt)</td>
<td>5 6 7 8 9 10 11 12 13 14 15 16 17 18 19</td>
</tr>
<tr>
<td>M6 × 55 mm</td>
<td>8</td>
</tr>
<tr>
<td>M6 × 80 mm</td>
<td>7 9</td>
</tr>
<tr>
<td>M10 × 60 mm</td>
<td>5</td>
</tr>
<tr>
<td>M10 × 70 mm</td>
<td>4</td>
</tr>
<tr>
<td>M10 × 100 mm</td>
<td>6</td>
</tr>
</tbody>
</table>

° Lubricate the bolt threads with engine oil.
° Tighten the bolts in increasing numerical order.

3. Install:
° shift shaft stopper plate 1

NOTE: Install the shift shaft stopper plate as shown.
<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transmission removal</td>
<td>1</td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td></td>
<td>Crankcase separation</td>
<td></td>
<td>Refer to “CRANKSHAFT”.</td>
</tr>
<tr>
<td>2</td>
<td>Guide bar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Shift fork 1 “R”</td>
<td>1</td>
<td>Refer to “INSTALLING THE TRANSMISSION”.</td>
</tr>
<tr>
<td>4</td>
<td>Shift fork 2 “C”</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Shift fork 3 “L”</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Main axle assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Drive axle assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Middle driven gear</td>
<td>1</td>
<td>For installation, reverse the removal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>procedure.</td>
</tr>
</tbody>
</table>
CHECKING THE SHIFT FORKS

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

1. Check:
   - shift fork cam follower
   - shift fork pawl
     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
     (on the shift fork guide bar)
     Rough movement → Replace the shift forks and shift fork guide bar as a set.

CHECKING THE SHIFT DRUM ASSEMBLY

1. Check:
   - shift drum grooves
     Damage/scratches/wear → Replace the shift drum.
   - shift drum segment
     Damage/wear → Replace.
   - shift drum bearing
     Damage/pitting → Replace.
CHECKING THE TRANSMISSION

1. Measure:
   - main axle runout
   (with a centering device and dial gauge)
   Out of specification → Replace the main axle.

   Main axle runout limit
   0.08 mm (0.003 in)

2. Measure:
   - drive axle runout
   (with a centering device and dial gauge)
   Out of specification → Replace the drive axle.

   Drive axle runout limit
   0.08 mm (0.003 in)

3. Check:
   - transmission gears
     Blue discoloration/pitting/wear → Replace the defective gear(-s).
   - transmission gear dogs
     Cracks/damage/rounded edges → Replace the defective gear(-s).

4. Check:
   - transmission gear movement
     Rough movement → Replace the defective part(-s).

5. Check:
   - washers
     Damage/bends/looseness → Replace.

6. Check:
   - bearings
     Un smooth → Replace.
INSTALLING THE TRANSMISSION

1. Install:
   - shift drum assembly

   **NOTE:**
   Turn the shift drum assembly to the neutral position.

2. Install:
   - main axle assembly ①
   - drive axle assembly ②
   - shift fork “L” ③
   - shift fork “C” ④
   - shift fork “R” ⑤
   - shift fork guide bars ⑥

   **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”, “L”.
   - When installing the middle drive gear ⑦, align the slit ⑧ on the guide bar with the middle drive gear.

   **WARNING**
   Always use new circlips.

3. Check:
   - transmission
     Rough movement → Repair.

   **NOTE:**
   Oil each gear, shaft, and bearing thoroughly.
### Removing the middle drive pinion gear

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bearing retainer</td>
<td>1</td>
<td>Remove the parts in the order listed. Refer to “CRANKSHAFT AND CONNECTING ROD.” Refer to “REMOVING THE MIDDLE DRIVE SHAFT ASSEMBLY/INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH”.</td>
</tr>
<tr>
<td>2</td>
<td>Spring retainers</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Spring seat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Damper spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Damper cams</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Shim(s)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Middle drive pinion shaft</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

**Note:**
- Spring retainers: 2 pieces
- Spring seat: 1 piece
- Damper spring: 1 piece
- Damper cams: 2 pieces
- Nut: 1 piece
- Bearing: 1 piece
- Shim(s): 1 piece
- Middle drive pinion shaft: 1 piece

**Torque Specifications:**
- 110 Nm (11.0 kgf, 80 ft lb)
## MIDDLE DRIVEN PINION GEAR

### Removing the middle driven pinion gear.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bolts</td>
<td>3</td>
<td>Refer to “REMOVING THE MIDDLE DRIVEN SHAFT ASSEMBLY/INSTALLING THE UNIVERSAL JOINT”</td>
</tr>
<tr>
<td>2</td>
<td>Circlips</td>
<td>2</td>
<td>Refer to “REMOVING THE MIDDLE DRIVEN SHAFT ASSEMBLY/INSTALING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH”</td>
</tr>
<tr>
<td>3</td>
<td>Bearings</td>
<td>2</td>
<td>Refer to “REMOVING THE MIDDLE DRIVEN SHAFT ASSEMBLY/INSTALING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH”</td>
</tr>
<tr>
<td>4</td>
<td>Driven yoke</td>
<td>1</td>
<td>Refer to “INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH”</td>
</tr>
<tr>
<td>5</td>
<td>Nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Drive yoke</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Bearing housing/O-ring</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Washers</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Collar</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Remove the parts in the order listed.
<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Collapsible collar</td>
<td>1</td>
<td>Refer to “INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH”.</td>
</tr>
<tr>
<td>11</td>
<td>Middle driven shaft</td>
<td>1</td>
<td>Refer to “ASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY”.</td>
</tr>
<tr>
<td>12</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Bearing</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>14</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
REMOVING THE MIDDLE DRIVE SHAFT ASSEMBLY
1. Remove:
   - bearing retainer
   - middle drive shaft assembly

   a. Straighten the thread on the bearing retainer.
   b. Attach the bearing retainer wrench ①.

   ![Bearing retainer wrench: YM-04137, 90890-04137](image)

   c. Remove the bearing retainer and middle drive shaft assembly.

DISASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY
1. Remove:
   - spring retainers ①

   NOTE:
   While compressing the spring with a damper spring compressor ②, remove the spring retainers.

   ![Damper spring compressor YM-33286, 90890-04090](image)

2. Straighten the thread on the middle drive shaft nut.
3. Remove:
   - middle drive shaft nut ①
   - bearing ②
   - middle drive shaft ③

   a. Attach the middle drive shaft holder ④ onto the middle drive shaft as shown.

   ![Middle drive shaft holder YM-04055, 90890-04055](image)

   b. Secure the middle drive shaft holder in a vice.
   c. Loosen the middle drive shaft nut with the middle drive shaft nut wrench ⑤.

   ![Middle drive shaft nut wrench YM-04054, 90890-04138](image)

   d. Remove the middle drive shaft nut and bearing.
REMOVING THE MIDDLE DRIVEN SHAFT ASSEMBLY
1. Remove:
   universal joint
   a. Remove the circlips ①.
   b. Place the universal joint in a press.
   c. With a pipe of the proper diameter positioned beneath the universal joint driven yoke as shown, press the bearing into the pipe.

   NOTE: It may be necessary to lightly tap the universal joint driven yoke.

   d. Repeat the above steps to remove the opposite side’s bearing.
   e. Separate the universal joint yokes.

2. Loosen:
   middle driven shaft nut ①

   NOTE: While holding the universal joint driven yoke ② with the universal joint holder ③, loosen the middle driven shaft nut.

CHECKING THE MIDDLE DRIVE SHAFT ASSEMBLY
1. Check:
   damper cam surface
   Scratches/wear → Replace the damper cam.

2. Check:
   spring
   Cracks/damage → Replace.

CHECKING THE MIDDLE DRIVEN SHAFT ASSEMBLY
1. Check:
   middle drive gear ①
middle driven gear ②
   Galling/pitting/wear → Replace the middle driven shaft assembly.

2. Check:
   bearings
   Damage/pitting → Replace the middle drive shaft bearing housing assembly.
3. Check:
   - O-ring
   - Oil seal
   Damage → Replace the defective part(-s).

4. Check:
   - Universal joint movement
   Rough movement → Replace the universal joint.

NOTE:

3. Check:
   - O-ring
   - Oil seal
   Damage → Replace the defective part(-s).

4. Check:
   - Universal joint movement
   Rough movement → Replace the universal joint.

---

**ASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY**

1. Tighten:
   - Middle drive shaft nut
     - 110 Nm (11.0 kg·m, 80 ft·lb)

   **NOTE:**
   - Set the torque wrench at a right angle to the middle drive shaft nut wrench.
   - Lock the threads on the middle drive shaft nut by staking them with a center punch.

   Middle drive shaft nut wrench
   YM-04054, 90890-04138
   Middle drive shaft holder
   YM-04055, 90890-04055

2. Install:
   - Spring retainers

   **NOTE:**
   While compress the spring with the damper spring compressor, and then install the spring retainers.

   Damper spring compressor
   YM-33268, 90890-04090
ASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY

NOTE: The following points are critical when assembling the middle gears:
° The collapsible collar must be replaced whenever the middle driven shaft assembly is removed from the middle driven shaft bearing housing.
° When performing this procedure for the first time, be sure to have at least one extra collapsible collar on hand.

1. Install:
° bearing outer race
  (into the middle driven shaft bearing housing)

WARNING

Do not press the bearing outer race. During installation, always press the bearing inner race carefully.

2. Install:
° middle driven shaft nut

NOTE: Finger tighten the middle driven shaft nut.

INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH

NOTE: When installing the middle gear assembly, be sure to replace the following parts:
- collapsible collar

1. Install:
° middle driven shaft assembly

\[25 \text{ Nm} \ (2.5 \text{ m·kg}, \ 18 \text{ ft·lb})\]
2. Install:
   ° shim
   ° middle drive shaft assembly

3. Install:
   ° bearing retainer

   ![Image of bearing retainer]

   **Install steps:**
   ° Attach the bearing retainer wrench ①.

   **Bearing retainer wrench:**
   YM-04137, 90890-04137

   ° Tighten the bearing retainer.

   **Bearing retainer:**
   110 Nm (11.0 m·kg, 80 ft·lb)

   ° Lock the threads on the bearing retainer by staking them with a center punch.

4. Adjust:
   ° middle gear backlash

   ![Image of dial gauge and universal joint holder]

   **Middle gear backlash:**
   0.1 mm to 0.2 mm (0.72 in to 1.45 in)

   a. Install the universal joint holder ① and middle gear backlash band ② as shown.

   **Universal joint holder**
   YM-04062, 90890-04062

   **Middle gear backlash band**
   YM-01231, 90890-01231

   b. Make sure that the dial gauge plunger on the middle gear backlash band as shown.

   **Dial-gauge-plunger contact point:**
   68.2 mm (2.69 in)

   **Dial gauge**
   YU-03097, 90890-03097

   c. Remove the middle driven pinion gear nut and apply the LOCKTITE® on it.
   d. Reinstall the middle driven pinion gear nut.
   e. While measure the middle gear backlash, tighten the middle driven pinion gear nut until specific backlash.
CAUTION:

Do not over tighten the middle driven pinion gear nut. If over tighten the middle driven pinion gear nut, replace the collapsible collar and adjust the backlash.

f. Stake the middle driven pinion gear shaft thread.

INSTALING THE UNIVERSAL JOINT

4. Install:
   ⁶universal joint driven yoke/cross joint¹
   (into the universal joint drive yoke)

CAUTION:

Do not hammer the universal joint drive yoke or the collapsible collar may be distorted. This will result in a change in the standard spinning torque, requiring replacement of the collapsible collar and reassembly of the middle driven shaft assembly.

2. Install:
   ⁶bearings ²
   (onto the universal joint driven yoke/cross joint)

CAUTION:

The needles can easily fall out of their races, so check each bearing carefully. Slide the universal joint driven yoke assembly back and forth on the bearings. If a needle is out of place, the yoke will not go all the way onto the bearings.

3. Press each bearing into the universal joint driven yoke assembly with a socket of the proper size.

NOTE:

The bearings must be inserted far enough into the universal joint driven yoke assembly so that circlips ³ can be installed.
ALIGNING THE MIDDLE GEAR

NOTE:
Aligning the middle gear is necessary when any of the following parts are replaced:
¬ Crankcase
¬ Middle drive shaft

1. Select:
¬ middle drive gear shim(s) ①

NOTE:
Select the middle drive gear shim(s) ① by calculating the middle drive gear shim thickness and then measuring the middle gear backlash.

a. Position the middle drive gear with the appropriate shim(s) ① that has had its respective thickness calculated from information marked on the crankcase and the end of the middle drive gear.

b. To find middle drive gear shim thickness “A”, use the following formula.

Middle drive gear shim thickness
“A” = ① – ②

① = “43.00”
② = a numeral on the upper crankcase near the main bearing selection numbers and which is added to the nominal size “42”

Example:
① is 43.00
If the upper crankcase is marked “46” ②
③ is 42.46 (i.e., 42.00 + 0.46 = 42.46)
“A” = 43.00 – 42.46 = 0.54
Round off to the hundredths digit and select the appropriate shim(s).

NOTE:
In the above example, the calculated number is 0.54. The chart instructs you to round off the 4 to 5. Thus, the shim thickness is 0.55 mm.
**Middle drive pinion gear shim:**

| Thickness (mm) | 0.10, 0.15, 0.20 |

Shims are supplied in the following thickness:

<table>
<thead>
<tr>
<th>Hundredths</th>
<th>Rounded value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 1, 2</td>
<td>0</td>
</tr>
<tr>
<td>3, 4, 5, 6,</td>
<td>5</td>
</tr>
<tr>
<td>7, 8, 9</td>
<td>10</td>
</tr>
</tbody>
</table>
CHAPTER 5
CARBURETION

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  ASSEMBLING THE CARBURETORS ................................. 5-6
  INSTALLING THE CARBURETORS .................................. 5-6
  MEASURING AND ADJUSTING THE FUEL LEVEL ............... 5-7
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## Removing the Carburetors

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fuel tank</td>
<td>1</td>
<td><strong>Removing the carburetors</strong> Remove the parts in the order listed. Refer to “FUEL TANK AND SEATS” in CHAPTER 3.</td>
</tr>
<tr>
<td>2</td>
<td>Air filter case assembly</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>3</td>
<td>Air ducts</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>4</td>
<td>Cylinder head breather hose</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>5</td>
<td>Air chamber</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>6</td>
<td>Cover</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>7</td>
<td>Throttle position sensor lead</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>8</td>
<td>Carburetor heater lead</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>9</td>
<td>Fuel hoses</td>
<td>2</td>
<td>Disconnect</td>
</tr>
<tr>
<td>10</td>
<td>Carburetor assembly</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>11</td>
<td>Starter cable</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>12</td>
<td>Throttle cables</td>
<td>2</td>
<td>Disconnect</td>
</tr>
</tbody>
</table>

**NOTE:**

After removing the carburetor assembly, remove the starter cable and throttle cables.

For installation, reverse the removal procedure.
<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Disassembling the carburetor.</td>
<td></td>
<td>Disassemble the parts in the order listed.</td>
</tr>
<tr>
<td>②</td>
<td>Carburetor heater leads</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>Carburetor heaters</td>
<td>2</td>
<td>12V 30W</td>
</tr>
<tr>
<td>④</td>
<td>Float chamber/gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>Float</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>⑥</td>
<td>Needle valve set</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>⑦</td>
<td>Main jet</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>⑧</td>
<td>Jet holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>⑨</td>
<td>Pilot jet</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>⑩</td>
<td>Starter jet</td>
<td>1</td>
<td>Refer to “CARBURETOR ASSEMBLY”.</td>
</tr>
<tr>
<td>⑪</td>
<td>Jet needle set</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>⑫</td>
<td>Starter plunger set</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Refer to “CARBURETOR ASSEMBLY”.
<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Diaphragm set</td>
<td>1</td>
<td>Refer to “ASSEMBLING THE CARBURETORS”.</td>
</tr>
<tr>
<td>13</td>
<td>Throttle position sensor</td>
<td>1</td>
<td>Refer to “CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR (TPS)”.</td>
</tr>
<tr>
<td>14</td>
<td>Main air jet</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Pilot air jet 1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Pilot air jet 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Throttle stop screw set</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>

Refer to "ASSEMBLING THE CARBURETORS".
Refer to "CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR (TPS)".

For assembly, reverse the disassembly procedure.
CHECKING THE CARBURETORS

The following procedure applies to all of the carburetors.

1. Check:
   - carburetor body
   - float chamber
   - jet housing
     Cracks/damage → Replace.

2. Check:
   - fuel passages
     Obstruction → Clean.

   a. Wash the carburetor in a petroleum-based solvent. Do not use any caustic-carburetor-cleaning solution.
   b. Blow out all of the passages and jets with compressed air.

3. Check:
   - float chamber body
     Dirt → Clean.

4. Check:
   - float chamber rubber gasket
     Cracks/damage/wear → Replace.

5. Check:
   - float
     Damage → Replace.

6. Check:
   - needle valve ①
   - needle valve seat ②
   - O-ring ③
     Damage/obstruction/wear → Replace the needle valve, needle valve seat and O-ring as a set.

7. Check:
   - piston valve ①
     Damage/scratches/wear → Replace.
   - rubber diaphragm ②
     Cracks/tears → Replace.
8. Check:
- vacuum chamber cover ①
- piston valve spring ②
- plastic cap ③
- O-ring ④
- spring ⑤
Cracks/damage → Replace.

9. Check:
- jet needle ①
- needle jet ②
- main jet ③
- pilot jet ④
- main air jet ⑤
- starter jet ⑥
Bends/damage/wear → Replace.
Obstruction → Clean.
Blow out the jets with compressed air.

10. Check:
- piston valve movement
Insert the piston valve into the carburetor body and move it up and down.
Tightness → Replace the piston valve.

11. Check.
- fuel feed pipes
- hose joint
Cracks/damage → Replace.
Obstruction → Clean.
Blow out the pipes with compressed air.

12. Check:
- fuel feed hoses
- fuel hoses
Cracks/damage/wear → Replace.
Obstruction → Clean.
Blow out the hoses with compressed air.
ASSEMBLING THE CARBURETORS
The following procedure applies to both of the carburetors.

CAUTION:
° Before assembling the carburetors, wash all of the parts in a petroleum-based solvent.
° Always use a new gasket.

1. Install:
   ° coasting enricher diaphragm
   ° coasting enricher spring
   ° coasting enricher cover

NOTE:
° Align the holes ③ on the coasting enricher diaphragm with the projections ④ in the carburetor body.
° When installing the coasting enricher, position the throttle connecting arm ① as shown.

2. Install:
   ° connecting bolts

NOTE:
After installing the connecting bolts, check that the throttle cable lever and starter plunger link operate smoothly.

INSTALLING THE CARBURETORS
1. Adjust:
   ° carburetor synchronization
   Refer to “SYNCHRONIZING THE CARBURETORS” in chapter 3.

2. Adjust:
   ° engine idling speed

| Engine idling speed | 950 \( \sqrt{950} \) / 1,050 r/min |

Refer to “ADJUSTING THE ENGINE IDLING SPEED” in chapter 3.

3. Adjust:
   ° throttle cable free play

<table>
<thead>
<tr>
<th>Throttle cable free play</th>
</tr>
</thead>
<tbody>
<tr>
<td>(at the flange of the throttle grip)</td>
</tr>
<tr>
<td>4 ( \sqrt{4} ) / 6 mm (0.16 ( \sqrt{0.16} ) / 0.24 in)</td>
</tr>
</tbody>
</table>

Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” in chapter 3.
MEASURING AND ADJUSTING THE FUEL LEVEL

1. Measure:

- Fuel level (a)

  Out of specification → Adjust.

**Fuel level (above the line on the float chamber)**

4 / 5 mm (0.16 / 0.20 in)

- Stand the motorcycle on a level surface.
- Place the motorcycle on a suitable stand to ensure that the motorcycle is standing straight up.
- Install the fuel level gauge ① to the fuel drain pipe ②.

**Fuel level gauge**

YM-01312-A, 90890-01312

- Loosen the fuel drain screw ③.
- Hold the fuel level gauge vertically next to the upper face of the float chamber ④.
- Measure the fuel level (a).

**NOTE:**

Fuel level readings should be equal on both sides of the carburetor assembly.

2. Adjust:

- Fuel level

**NOTE:**

- Remove the carburetor assembly.
- Check the needle valve seat and needle valve.
- If either is worn, replace them as a set.
- If both are fine, adjust the float level by slightly bending the float tang ①.
- Install the carburetor assembly.
- Measure the fuel level again.
- Repeat steps (a) to (f) until the fuel level is within specification.
CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR

NOTE:
° Before adjusting the throttle position sensor, the engine idling speed should be properly adjusted.

1. Inspect:
° throttle position sensor

a. Disconnect the throttle position sensor coupler.
b. Connect the pocket tester (Ω × 1k) to the throttle position sensor.

c. Check the throttle position sensor resistance “R1”.
   Out of specification → Replace the throttle position sensor.

<table>
<thead>
<tr>
<th>Throttle position sensor resistance “R1”</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 ~ 6 kΩ at 20°C (68°F)</td>
</tr>
<tr>
<td>(blue – black)</td>
</tr>
</tbody>
</table>

d. Connect the pocket tester (Ω × 1k) to the throttle position sensor.

| Tester positive lead → yellow 3       |
| Tester negative lead → black 2        |

e. While slowly opening the throttle, check that the throttle position sensor resistance “R2” is within the specified range.
   Out of specification → Replace the throttle position sensor.

<table>
<thead>
<tr>
<th>Throttle position sensor resistance “R2”</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.56 ~ 0.84 kΩ to 3.01 ~ 4.51 kΩ at 20°C (68°F)</td>
</tr>
<tr>
<td>(yellow – black)</td>
</tr>
</tbody>
</table>

2. Adjust:
° throttle position sensor angle

a. Loosen the throttle position sensor screws 1.
b. Turn the throttle position sensor in direction ① or ② until the specified closed-throttle resistance is indicated on the pocket tester.
Closed-throttle resistance
0.56 \sqrt{\text{0.84 k}\Omega \text{ at } 20^\circ\text{C (68°F)}}
(yellow – black)

c. Tighten the throttle position sensor screws.

NOTE: 
Remove the pocket tester leads and connect the throttle position sensor coupler.
AIR INDUCTION SYSTEM (AIS) CARB

AIR INDUCTION
This system burns the unburned exhaust gases by injecting fresh air (secondary air) at the exhaust port. This is to reduce the output of the hydrocarbons.

When there is negative pressure around the exhaust port, the reed valve opens and the secondary air flows into the exhaust port.

The required temperature for burning the unburned exhaust gases is approximately 600° (1112°F) to 700°C (1292°F).

AIR CUT-OFF VALVE
The air cut-off valve is operated by intake gas pressure through the diaphragm. Normally, this valve is opened in order to allow fresh air to flow into the exhaust port.

When the throttle is rapidly closed, negative pressure is generated and the valve closes in order to prevent after-burning.

VIEW 1. (NO FLOW)
When decelerating (the throttle closes), the valve will close.

VIEW 2. (FLOW)
During normal operation the valve is open.

A From the air filter
B To the cylinder heads
C To the carburetor joint
1 Reed valve
AIR INDUCTION SYSTEM INSPECTION

1. Inspect:
   - Hose connections
   - Poor connections → Properly connect.
   - Hoses
   - Reed valves
   - Air cut-off valve
   - Air filter
     Cracks/damage → Replace.
     Clogged → Clean.

NOTE:

The orifice (3) should be installed with the arrow mark facing the AIS valve side.
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CHASSIS

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<td>Checking the Handlebar</td>
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<td>Installing the Drive Shaft</td>
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**Removing the front wheel and brake discs**

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brake calipers</td>
<td>2</td>
<td>Remove the parts in the order listed. Stand the motorcycle on a level surface.</td>
</tr>
</tbody>
</table>
| 2     | Front wheel axle pinch bolt                | 1    | **WARNING**
| 3     | Front wheel axle                          | 1    | Securely support the motorcycle so there is no danger of it falling over.                     |
| 4     | Front wheel assembly                       | 1    | Refer to “REMOVING/INSTALLING THE FRONT WHEEL”.                                              |
| 5     | Collars                                   | 2    | Refer to “INSTALLING THE FRONT WHEEL”.                                                      |
| 6     | Brake discs                                | 2    | For installation, reverse the removal procedure.                                            |
Disassembling the front wheel

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Oil seals</td>
<td>2</td>
<td>Disassemble the parts in the order listed.</td>
</tr>
<tr>
<td>②</td>
<td>Bearings</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>Collar</td>
<td>1</td>
<td>For assembly, reverse the disassembly</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>procedure.</td>
</tr>
</tbody>
</table>

Disassemble the parts in the order listed.

For assembly, reverse the disassembly procedure.
REMOVING THE FRONT WHEEL
1. Stand the motorcycle on a level surface.

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

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

2. Remove:
   ° brake calipers ① (left and right)

**NOTE:**
Do not squeeze the brake lever when removing the brake calipers.

3. Loosen:
   ° pinch bolt (front wheel axle) ①
   ° front wheel axle ②
4. Elevate:
   ° front wheel

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

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” and “CHECKING THE WHEELS” in chapter 3.
3. Check:
   ° spokes
   Bends/damage → Replace.
   Loose → Tighten.
   Tap the spokes with a screwdriver.
NOTE: A tight spoke will emit a clear, ringing tone, a loose spoke will sound flat.

4. Tighten:
   ° spokes
   \( 3 \text{ Nm (0.3 m·kg, 22 ft·lb)} \)

NOTE: After tightening the spokes, measure the front wheel runout.

5. Measure:
   ° front wheel radial runout \( 1 \)
   ° front wheel lateral runout \( 2 \)
   Over the specified limits → Replace.

   Front wheel radial runout limit 1.0 mm (0.04 in)
   Front wheel lateral runout limit 0.5 mm (0.02 in)

6. Check:
   ° collars
   Damage/wear → Replace.

WARNING
° New tires have a relatively low grip on the road surface until they have been slightly worn.
Therefore, approximately 100 km (62 mi) should be traveled at normal speed before any highspeed riding is done.

7. Check
   ° wheel bearings
   Front wheel turns roughly or is loose → Replace the wheel bearings.
   ° oil seals
   Damage/wear → Replace.

8. Replace:
   ° wheel bearings (New)
   ° oil seals (New)
FRONT WHEEL AND BRAKE DISCS

a. Clean the outside of the front wheel hub.
b. Remove the oil seals ① with a flat-head screwdriver.

NOTE: To prevent damaging the wheel, place a rag between the screwdriver and the wheel surface.

c. Remove the wheel bearings with a general bearing puller ②.
d. Install the new wheel bearings and oil seals in the reverse order of disassembly.

CAUTION: Do not contact the wheel bearing center race ④ or balls ⑤. Contact should be made only with the outer race ⑥.

NOTE: Use a socket ③ that matches the diameter of the wheel bearing outer race and oil seal.

CHECKING THE BRAKE DISCS
The following procedure applies to all of the brake discs.
1. Check:
   ○ brake disc
     Damage/galling → Replace.
2. Measure:
   ○ brake disc deflection ①
     Out of specification → Correct the brake disc deflection or replace the brake disc.

Brake disc deflection limit (maximum)
Front: 0.15 mm (0.006 in)
Rear: 0.15 mm (0.006 in)

a. Place the motorcycle on a suitable stand so that the wheel is elevated.
b. Before measuring the front brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.
c. Remove the brake caliper.
d. Hold the dial gauge at a right angle against the brake disc surface.
e. Measure the deflection 2 \( \div \) 3 mm (0.078 \( \div \) 0.12 in) below the edge of the brake disc.

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

   | Brake disc thickness limit (minimum) |
   | Front: 4.5 mm (0.18 in) |
   | Rear: 5.5 mm (0.22 in) |

4. Adjust:
   - brake disc deflection

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

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

   | Brake disc bolt |
   | 23 Nm (2.3 m\(^{\circ}\)kg, 17 ft\(^{\circ}\)lb) |
   | LOCTITE\(^{\circ}\) |

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.
INSTALLING THE FRONT WHEEL
The following procedure applies to both brake discs.
1. Lubricate:
   ° wheel axle
   ° oil seal lips

   **NOTE:**
   59 Nm (5.9 m·kg, 29 ft·lb)
   20 Nm (2.0 m·kg, 14 ft·lb)

   **CAUTION:**
   40 Nm (4.0 m·kg, 29 ft·lb)

   **WARNING**
   Make sure that the brake hose is routed properly.

2. Install:
   ° front wheel assembly

   **NOTE:**
   The arrow mark ③ on the tire must point in the direction of the wheel.

3. Tighten:
   ° wheel axle ①
   ° wheel axle pinch bolt ②

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

4. Install:
   ° brake caliper

   **WARNING**
   Make sure that the brake hose is routed properly.
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 discs installed.

1. Remove:
° balancing weight (-s)

NOTE: ____________________________________________________________________________

Place the front wheel on a suitable balancing stand.

2. Find:
° front wheel’s heavy spot

a. Spin the front wheel.
b. When the front wheel stops, put an “X1” mark at the bottom of the wheel.
c. Turn the front wheel 90° so that the “X1” mark is positioned as shown.
d. Release the front wheel.
e. When the wheel stops, put an “X2” mark at the bottom of the wheel.
f. Repeat steps (b) through (d) 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 that it stays at each position shown.
b. If the front wheel does not remain stationary at all of the positions, rebalance it.
### Removing the Muffler and Brake Caliper

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Removing the muffler and brake caliper</td>
<td>1</td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Muffler</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>3</td>
<td>Muffler stay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake hose holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake caliper</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- **Removing the Muffler and Brake Caliper**
- **Muffler**
- **Muffler stay**
- **Brake hose holder**
- **Brake caliper**

**Torque Specifications**

- 20 Nm (2.0 m·kg, 14 ft·lb)
- 30 Nm (3.0 m·kg, 22 ft·lb)
- 40 Nm (4.0 m·kg, 29 ft·lb)
- 25 Nm (2.5 m·kg, 18 ft·lb)
REAR WHEEL

Order | Job name/Part name | Q'ty | Remarks
--- | --- | --- | ---
1 | Removing the rear wheel
2 | Final gear oil
3 | Fuel tank and seats
4 | Rear fender assembly
5 | Brake caliper bracket bolt
6 | Washers
7 | Bolts
8 | Rear axle nut/washer
9 | Rear axle end nuts/axle holder
10 | Rear wheel assembly
11 | Collar

**WARNING**

Remove the parts in the order listed.

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

Drain
Refer to “FINAL GEAR OIL REPLACEMENT” in CHAPTER 3.

Refer to “FUEL TANK AND SEATS” in CHAPTER 3.
Loosen

Refer to “REMOVING/INSTALLING THE REAR WHEEL”.

For installation, reverse the removal procedure.
### Rear Wheel Disassembly

<table>
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<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
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<td>Rear wheel disassembly</td>
<td>2</td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Disassembling the rear wheel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lock washers</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Clutch hub</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dampers</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>O-rings</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Bearing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bearings</td>
<td>2</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>

**Torque Specification:**

62 Nm (6.2 kg, 45 ft lb)
REAR WHEEL AND BRAKE DISC

REMOVING THE REAR WHEEL

1. Stand the motorcycle on a level surface.

**WARNING**

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

**NOTE:**

Place the motorcycle on a suitable stand so that the rear wheel is elevated.

2. Remove:
   - rear gear case fitting bolts
3. Remove:
   - brake caliper
   - brake caliper bracket bolt

**NOTE:**

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

4. Remove:
   - wheel axle nut
   - washer
5. Remove:
   - rear axle end nut
6. Remove:
   - rear axle holder
7. Remove:
   - rear wheel

CHECKING THE REAR WHEEL

1. Check:
   - wheel axle
   - rear wheel
   - wheel bearings
   - oil seals
   Refer to “FRONT WHEEL AND BRAKE DISCS”.
2. Check:
   - tire
   Damage/wear → Replace.
   Refer to “CHECKING THE TIRES” in chapter 3.
3. Check:
   - spokes
   Refer to “FRONT WHEEL AND BRAKE DISCS”.
4. Measure:
   - rear wheel radial runout
   - rear wheel lateral runout
   Refer to “FRONT WHEEL AND BRAKE DISCS”.

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

INSTALLING THE REAR WHEEL
1. Lubricate:
   - drive shaft splines
     Recommended lubricant
     Molydenum disulfide grease

2. Lubricate:
   - wheel axle
   - wheel bearings
   - oil seal lips
     Recommended lubricant
     Lithium soap base grease

3. Install:
   - rear wheel assembly
     a. Install the rear wheel assembly ① with the rear brake caliper bracket ② and hold the bracket to keep the specified position.
     b. After installation of the rear axle shaft ③, slide the wheel assembly to forward direction.
     c. To make sure the caliper bracket mounts on the swingarm and then, fix the holder of swingarm temporarily.

NOTE:
The holder should be installed with the punch mark ③ facing upper.

d. Tighten the rear gear housing bolts, with specified tightening torque.
   - Rear gear housing bolt
     90 Nm (9.0 m·kg, 65 ft·lb)

e. Tighten the nut of rear axle shaft with specified torque.
   - Wheel axle nut
     107 Nm (10.7 m·kg, 77 ft·lb)
f. Tighten the rear axle holder with specified torque.

**Rear axle end nut**
23 Nm (2.3 m·kg, 17 ft·lb)

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

h. Install the rear brake caliper on the bracket and tighten the bolts with specified tightening torque.

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

**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 “FRONT WHEEL AND BRAKE CISCS”.
### FRONT AND REAR BRAKES

#### FRONT BRAKE PADS

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Removing the front brake pads</strong></td>
<td>1</td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Retaining bolt</td>
<td>1</td>
<td>Refer to “REPLACING THE FRONT BRAKE PADS”.</td>
</tr>
<tr>
<td>3</td>
<td>Brake caliper</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake pads</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>5</td>
<td>Pad spring</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*23 Nm (2.3 m·kg, 17 ft·lb)*

![Diagram of front brake pads removal and tightening](image)
**REAR BRAKE PADS**

<table>
<thead>
<tr>
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<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Removing the rear brake pads</strong></td>
<td></td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td></td>
<td>Muffler</td>
<td>1</td>
<td>Refer to “REAR WHEEL AND BRAKE DISC”.</td>
</tr>
<tr>
<td></td>
<td>Muffler stay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Brake hose holder</td>
<td>1</td>
<td>Refer to “REPLACING THE REAR BRAKE PADS”.</td>
</tr>
<tr>
<td>2</td>
<td>Caliper</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>Clips</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Pad pins</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake pads</td>
<td>2</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>7</td>
<td>Pad spring</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**40 Nm (4.0 m·kg, 29 ft·lb)**
CAUTION:
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 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.

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

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

1. Remove:
   - brake hose holder
   - retaining bolt \(\text{\textcircled{1}}\)
2. Remove:
   ◊ brake pads ①
   (along with the brake pad shims)

3. Measure:
   ◊ brake pad wear limit ②
   Out of specification → Replace the brake pads as a set.

   ![Brake pad wear limit 0.8 mm (0.031 in)]

4. Install:
   ◊ brake pad shims
   (onto the brake pads)
   ◊ brake pads
   ◊ brake pad spring

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

   ![Bleed screw 6 Nm (0.6 m\(\cdot\)kg, 4.3 ft\(\cdot\)lb)]

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

5. Install:
   ◊ brake caliper
   ◊ retaining bolt
   
   ![23 Nm (2.3 m\(\cdot\)kg, 17 ft\(\cdot\)lb)
6. Check:
   ° brake fluid level
   Below the minimum lever mark \( @ \) → Add the recommended brake fluid to the proper level.
   Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.

7. Check:
   ° brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.

---

**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 hose holder ①
   ° brake caliper ②

2. Remove:
   ° brake pad cover
   ° brake pad clips
   ° brake pad pins
   ° brake pad spring

3. Remove:
   ° brake pads
   (along with the brake pad shims)

4. Measure:
   ° brake pad wear limit ③
   Out of specification → Replace the brake pads as a set.

**Brake pad wear limit**

0.5 mm (0.02 in)
5. Install:
  ° brake pad shims  
  (onto the brake pads)  
  ° brake pads  
  ° brake pad spring

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

![Image](image1)

- **Bleed screw**  
  6 Nm (0.6 m\(\text{kg}\), 4.3 ft\(^{\text{lb}}\))

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

![Image](image2)

d. Install new brake pad shims onto the new brake pads.
e. Install new brake pads and a new brake pad spring.

**NOTE:**
The longer tangs ③ on the brake pad spring must point in the direction of disc rotation.

![Image](image3)

6. Install:
  ° brake pad pins  
  ° brake pad clips  
  ° brake pad cover  
  ° brake caliper  

![Image](image4)

7. Check:
  ° brake fluid level  
  Below the minimum level mark ③ → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.

8. Check:
  ° brake pedal operation  
  Soft or spongy feeling → Bleed the brake system. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.
## FRONT BRAKE MASTER CYLINDER

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| 1     | Removing the front brake master cylinder.  
Brake fluid | 1 | Remove the parts in the order listed.  
Drain |
| 2     | Rear view mirror (right) | 1/1 |  |
| 3     | Brake lever/compression spring | 1 |  |
| 4     | Front brake switch | 1 |  |
| 5     | Union bolt | 1 |  |
| 6     | Copper washers | 2 | Refer to “REMOVING/INSTALLING THE FRONT BRAKE MASTER CYLINDER”.  
Refer to “INSTALLING THE FRONT BRAKE MASTER CYLINDER”.
For installation, reverse the removal procedure. |
| 7     | Brake hose | 1 |  |
| 8     | Master cylinder bracket | 1 |  |
| 9     | Master cylinder | 1 |  |

- **10 Nm (1.0 m·kg, 7.2 ft·lb)**
- **30 Nm (3.0 m·kg, 22 ft·lb)**
<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Disassembling the front brake master cylinder</strong></td>
<td></td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Dust boot</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Circlip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Master cylinder cup</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spring</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>

Remove the parts in the order listed. For assembly, reverse the disassembly procedure.
# REAR BRAKE MASTER CYLINDER

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brake fluid</td>
<td>1</td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Brake switch connector</td>
<td>1/1</td>
<td>Drain</td>
</tr>
<tr>
<td>3</td>
<td>Cotter pin/washer</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>4</td>
<td>Pin</td>
<td>1</td>
<td>Refer to “REMOVING/INSTALLING THE REAR BRAKE MASTER CYLINDER”.</td>
</tr>
<tr>
<td>5</td>
<td>Bolts</td>
<td>2</td>
<td>For installation, reverse removal procedure.</td>
</tr>
<tr>
<td>6</td>
<td>Brake pedal assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Union bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Copper washers/brake hose</td>
<td>2/1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Clips/reservoir hose</td>
<td>2/1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Master cylinder assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Reservoir tank</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

64 Nm (6.4 m·kg, 46 ft·lb)

30 Nm (3.0 m·kg, 22 ft·lb)

23 Nm (2.3 m·kg, 17 ft·lb)
### Disassembling the Rear Brake Master Cylinder

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Master cylinder boot</td>
<td>1</td>
<td>Disassembly the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Circlip</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
<tr>
<td>3</td>
<td>Master cylinder cup</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spring</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

1. Disassembly the parts in the order listed.
2. For assembly, reverse the disassembly procedure.
REMOVING THE FRONT BRAKE MASTER CYLINDER

**NOTE:**
Before removing the front brake master cylinder, drain the brake fluid from the entire brake system.

1. Remove:
   - rear view mirror (right)
   - brake lever/compression spring
   - brake switch 1

2. Remove:
   - union bolt 2
   - copper washers
   - brake hose 3

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

3. Remove:
   - master cylinder bracket
   - master cylinder

REMOVING THE REAR BRAKE MASTER CYLINDER

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

1. Remove:
   - brake switch connector
   - cotter pin/washer
   - pin
   - bolt/brake pedal assembly

2. Remove:
   - union bolt 1
   - copper washers 2
   - brake hose 3

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

3. Remove:
   - clips/reservoir hose
   - master cylinder assembly
CHECKING THE FRONT AND REAR BRAKE MASTER CYLINDER

The following procedure applies to both of the brake master cylinders.

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.
INSTALLING 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.

### NOTE:

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

1. Install:
   - brake master cylinder
   - brake master cylinder bracket
   - Recommended brake fluid DOT 4
   - 10 Nm (1.0 m·kg, 7.2 ft·lb)

### NOTE:

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

2. Install:
   - copper washers (New)
   - brake hose
   - union bolt
   - Recommended brake fluid DOT 4
   - 30 Nm (3.0 m·kg, 22 ft·lb)

**WARNING**

Proper brake hose routing is essential to ensure safe motorcycle operation. Refer to “CABLE ROUTING”.

### NOTE:

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

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

**Recommended brake fluid**

- DOT 4
WARNING

○ Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
○ Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
○ When refilling, be careful that water does not enter the 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” in chapter 3.

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” in chapter 3.

6. Check:
○ brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.
INSTALLING THE REAR BRAKE MASTER CYLINDER

1. Install:
   - copper washers (New)
   - brake hose
   - Union bolt
     30 Nm (3.0 m\(^2\)kg, 22 ft\(^2\)lb)

**WARNING**

Proper brake hose routing is essential to ensure safe motorcycle operation. Refer to “CABLE ROUTING”.

**CAUTION:**

When installing the brake hose onto the brake master cylinder make sure that the brake pipe touches the projections as shown.

2. Fill:
   - brake fluid reservoir
     (to the maximum level mark)

**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 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” in chapter 3.

4. Check:
   - brake fluid level
   Below the minimum level mark → Add the recommended brake fluid to the proper level.
   Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.
5. Adjust:
   - Brake pedal position (below the top of the rider footrest)
   - Refer to “ADJUSTING THE REAR BRAKE” in chapter 3.

![Brake pedal position](image)

**Brake pedal position (below the top of the rider footrest)**
81.8 mm (3.22 in)

6. Adjust:
   - Rear brake light operation timing
   - Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH” in chapter 3.
# FRONT BRAKE CALIPERS

<table>
<thead>
<tr>
<th>Order</th>
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<th>Q'ty</th>
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<tbody>
<tr>
<td>1</td>
<td>Removing the front brake calipers</td>
<td></td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td></td>
<td>Brake fluid</td>
<td>1</td>
<td>Drain</td>
</tr>
<tr>
<td>2</td>
<td>Brake hose holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Union bolt</td>
<td>1</td>
<td>Refer to “REMOVING/INSTALLING THE FRONT BRAKE CALIPERS”.</td>
</tr>
<tr>
<td>4</td>
<td>Copper washers</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake hose</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>6</td>
<td>Retaining bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake caliper assembly</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

** torques:**
- 30 Nm (3.0 m·kg, 22 ft·lb)
- 23 Nm (2.3 m·kg, 17 ft·lb)
- 6 Nm (0.6 m·kg, 4.3 ft·lb)
<table>
<thead>
<tr>
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<th>Q'ty</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Disassembling the front brake calipers</strong></td>
<td></td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Pad spring</td>
<td>1</td>
<td>Refer to “REMOVING THE FRONT BRAKE CALIPERS”.</td>
</tr>
<tr>
<td>3</td>
<td>Brake caliper pistons</td>
<td>2</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
<tr>
<td>4</td>
<td>Dust seals</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Caliper piston seals</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bleed screw</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
## REAR BRAKE CALIPER

<table>
<thead>
<tr>
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<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Removing the rear brake caliper</td>
<td></td>
<td>Remove the parts in the order listed. Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Muffler</td>
<td>1</td>
<td>Refer to “REAR WHEEL AND BRAKE DISC”.</td>
</tr>
<tr>
<td>3</td>
<td>Muffler stay</td>
<td>1</td>
<td>Refer to “REAR WHEEL AND BRAKE DISC”.</td>
</tr>
<tr>
<td>4</td>
<td>Brake fluid</td>
<td>2</td>
<td>Drain</td>
</tr>
<tr>
<td>5</td>
<td>Brake hose holder</td>
<td>1</td>
<td>Refer to “REMOVING/INSTALLING THE REAR BRAKE CALIPER”.</td>
</tr>
<tr>
<td>6</td>
<td>Union bolt</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>7</td>
<td>Copper washers</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Brake hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Brake caliper assembly</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

###トルクトルク

- 40 Nm (4.0 m·kg, 29 ft·lb)
- 30 Nm (3.0 m·kg, 22 ft·lb)

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**FRONT AND REAR BRAKES**  
**CHAS**
<table>
<thead>
<tr>
<th>Order</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Disassembling the rear brake caliper</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Clips</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Pad pins</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Pad spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brake pads</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Caliper pistons</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Dust seals</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Piston seals</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bleed screw</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Disassembly the parts in the order listed.

Refer to “DISASSEMBLING THE REAR BRAKE CALIPER”.

For assembly, reverse the disassembly procedure.
REMOVING THE FRONT BRAKE CALIPERS
The following procedure applies to both of the brake calipers.

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

1. Remove:
   - brake hose holder
   - 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.

2. Remove:
   - brake caliper pistons ①
   - brake caliper piston seals ②

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

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

   b. Remove the brake caliper piston seals.

REMOVING THE REAR BRAKE CALIPER

NOTE: ____________________________________________________________
Before removing the brake caliper, drain the brake fluid from the entire brake system.
1. Remove:
   ° union bolt ①
   ° copper wachers ②
   ° brake hose

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

2. Remove:
   ° brake caliper pistons ①
   ° brake caliper pistons seals ②

   a. Secure the right side brake caliper piston with a piece of wood ③.
   b. Blow compressed air into the brake hose joint opening ⑤ to force out the left side piston from the brake caliper.

**WARNING**
   ° Never try to pry out the brake caliper pistons.
   ° Do not loosen the bolts.

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

---

**CHECKING THE FRONT AND REAR BRAKE CALIPERS**

<table>
<thead>
<tr>
<th>Recommended brake component replacement schedule:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brake pads</strong></td>
</tr>
<tr>
<td><strong>Piston seals</strong></td>
</tr>
<tr>
<td><strong>Brake hoses</strong></td>
</tr>
<tr>
<td><strong>Brake fluid</strong></td>
</tr>
</tbody>
</table>
1. Check:
   °brake caliper pistons ①
   Rust/scratches/wear → Replace the brake caliper piston assembly.
   °brake caliper cylinders ②
   Scratches/wear → Replace the brake caliper.
   °brake calipers ③
   Cracks/damage → Replace.
   °brake fluid delivery passages
   (brake caliper body)
   Obstruction → Blow out with compressed air.

**WARNING**

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

A Front  
B Rear

2. Check:
   °brake caliper brackets
   Cracks/damage → Replace.

**INSTALLING THE FRONT BRAKE CALIPERS**

The following procedure applies to both of the brake calipers.

**WARNING**

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

Recommended brake fluid
DOT 4
1. Install:
   - brake caliper 1 (temporarily)
   - copper washers (New) 2
   - brake hose 3
   - union bolt 4
   \[30 \text{ Nm (3.0 mkg, 22 ft lb)}\]

**WARNING**

Proper brake hose routing is essential to ensure safe motorcycle operation. Refer to “CABLE ROUTING”.

**CAUTION:**

When installing the brake hose onto the brake caliper 1, make sure that the brake pipe touches the projection 2 on the brake caliper.

2. Install:
   - brake caliper retaining bolt
   \[23 \text{ Nm (2.3 mkg, 17 ft lb)}\]
   - brake hose holder
   Refer to “FRONT BRAKE PADS”.

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

**Recommended brake fluid**

DOT 4

**WARNING**

- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
- When refilling, be careful that water does not enter the 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 splitt brake fluid immediately.

4. Bleed:
   ° brake system
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.

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” in chapter 3.

6. Check:
   ° brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.

INSTALLING THE REAR BRAKE CALIPER

WARNING

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

Recommended brake fluid
DOT 4
1. Install:
   - brake caliper ① (temporarily)
   - copper washers New
   - brake hose ②
   - union bolt ③
   - 30 Nm (3.0 m·kg, 22 ft·lb)

**WARNING**

Proper brake hose routing is essential to ensure safe motorcycle operation. Refer to “CABLE ROUTING”.

**CAUTION:**

When installing the brake hose onto the brake caliper ①, make sure that the brake pipe ③ touches the projection ② on the copper washer.

2. Install:
   - brake caliper ①
   - brake hose holder
   - 40 Nm (4.0 m·kg, 29 ft·lb)
   - Refer to “REAR BRAKE PADS”.

3. Fill:
   - brake fluid reservoir
   - (with the specified amount of the recommended brake fluid)

**Recommended brake fluid**

DOT 4

**WARNING**

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

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

4. **Bleed:** brake system

**NOTE:**
- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.

Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.

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” in chapter 3.

6. **Check:** brake pedal operation

Soft or spongy feeling → bleed the brake system.

Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.
### FRONT FORK

#### Removing the front fork

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brake hose holders</td>
<td>2</td>
<td>Remove the parts in the order listed. Refer to “FRONT WHEEL AND BRAKE DISCS”.</td>
</tr>
<tr>
<td>2</td>
<td>Brake caliper assembly</td>
<td>2</td>
<td>Refer to “REMOVING/INSTALLING THE FRONT FORK LEGS”.</td>
</tr>
<tr>
<td>3</td>
<td>Front fender</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>4</td>
<td>Turn signal light bolts</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Upper bracket bolts</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Cap bolts</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Lower bracket bolts</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Front fork legs</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

#### Torque Specifications

- 20 Nm (2.0 m·kg, 1.4 ft·lb)
- 7 Nm (0.7 m·kg, 5.1 ft·lb)
- 30 Nm (3.0 m·kg, 22 ft·lb)
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 40 Nm (4.0 m·kg, 29 ft·lb)
- 7 Nm (0.7 m·kg, 5.1 ft·lb)
### Disassembling the front fork

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cap bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>O-ring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spring seat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fork spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oil seal clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Damper rod bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Copper washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Damper rod/rebound spring</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Disassemble the parts in the order listed.

Refer to “DISASSEMBLING/ASSEMBLING THE FRONT FORK LEGS”.

23 Nm (2.3 m·kg, 17 ft·lb)

30 Nm (3.0 m·kg, 22 ft·lb)
<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Seal spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Outer tube bushing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Inner tube/inner tube bushing</td>
<td>1/1</td>
<td>Refer to “DISASSEMBLING/ASSEMBLING THE FRONT FORK LEGS”.</td>
</tr>
<tr>
<td>15</td>
<td>Oil lock piece</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Outer tube</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.

23 Nm (2.3 m·kg, 17 ft·lb)

30 Nm (3.0 m·kg, 22 ft·lb)
REMOVING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Stand the motorcycle on a level surface.

**WARNING**

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

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

2. Loosen:
   - upper bracket pinch bolt
   - cap bolt
   - turn signal light bolt
   - lower bracket pinch bolt

**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
   - O-ring
   - spacer
   - spring seat
   - fork spring
2. Drain
   - fork oil
3. Remove:
   - dust seal
   - oil seal clip (with a flat-head screwdriver)

**CAUTION:**
Do not scratch the inner tube.
NOTE:
° Do not remove the front fork leg protector from the outer tube.
° If the front fork leg protector must be removed, always install a new one.

4. Remove:
° damper rod bolt
° copper washer

NOTE:
While holding the damper rod with the T-handle ① and damper rod holder ②, loosen the damper rod bolt ③.

T-handle
YM-01326, 90890-01326
Damper rod holder
YM-1300-1, 90890-01460

6. Remove:
° inner tube

CHECKING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Check:
° inner tube ①
° outer tube ②
Bends/damage/scratches → Replace.

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

2. Measure:
° spring free length ③
Over the specified limit → Replace.

Spring free length limit
350 mm (13.78 in)
3. Check:
- damper rod ①
  Damage/wear → Replace.
- Obstruction → Blow out all of the oil passages with compressed air.
- oil lock piece ②
  Damage → Replace.

**CAUTION:**

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

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

**WARNING**

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

**NOTE:**

- When assembling the front fork leg, be sure to replace the following parts:
  - inner tube bushing
  - outer tube bushing
  - oil seal
  - dust seal
- Before assembling the front fork leg, make sure that all of the components are clean.

1. Install:
- damper rod ①
- oil lock piece ②

**WARNING**

Always use new copper washers.

**CAUTION:**

Allow the damper rod to slide slowly down the inner tube ③ until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.
2. Lubricate:
   "inner tube’s outer surface

   ![Recommended lubricant](image)
   Yamaha fork and shock oil
   10 W or equivalent

3. Tighten:
   ° damper rod bolt ①

   ![NOTE:](image)
   While holding the damper rod with the T-handle ① and damper rod holder ②, tighten the damper rod bolt ③.

   ![T-handle](image)
   YM-01326, 90890-01326
   Damper rod holder
   YM-1300-1, 90890-01460

4. Install:
   ° outer tube bushing ①
   ° seal spacer
   (with the fork seal driver weight ② and adapter ③)

   ![Fork seal driver weight](image)
   YM-33963, 90890-01367
   Adapter
   YM-33968, 90890-01381

5. Install:
   ° oil seal ①
   (with the fork seal driver weight and adapter)

   ![CAUTION:](image)
   Make sure that the numbered side of the oil seal faces up.

   ![NOTE:](image)
   ° Before installing the oil seal, apply lithium soap base grease onto its lips.

6. Install:
   ° oil seal clip ①

   ![NOTE:](image)
   Adjust the oil seal clip so that it fits into the outer tube groove.
7. Install:
   ° dust seal ①  
       (with the fork seal driver weight)
8. Fill:
   ° front fork leg  
       (with the specified amount of the recommended fork oil)

<table>
<thead>
<tr>
<th>Quantity (each front fork leg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.464 L (464 cm³, 16.4 Imp oz, 15.7 US oz)</td>
</tr>
<tr>
<td>Recommended oil</td>
</tr>
<tr>
<td>Yamaha fork and shock oil 10W</td>
</tr>
<tr>
<td>or equivalent</td>
</tr>
</tbody>
</table>

**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 inner tube up and down (at least ten times) to distribute the fork oil.

**NOTE:**

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

10. Measure:
    ° front fork leg oil level ③  
        Out of specification → Correct.

<table>
<thead>
<tr>
<th>Front fork leg oil level (from the top of the inner tube, with the inner tube fully compressed, and without the spring)</th>
</tr>
</thead>
<tbody>
<tr>
<td>108 mm (4.25 in)</td>
</tr>
</tbody>
</table>

**NOTE:**

Hold the fork in an upright position.

11. Install:
    ° fork spring  
    ° spring seat  
    ° spacer  
    ° O-ring  
    ° cap bolt
NOTE:
° Install the fork spring with its smaller pitch upward.
° Before installing the cap bolt, apply grease to the O-ring.
° Temporarily tighten the cap bolt.

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: Make sure that the inner fork tube is flush with the top of the upper bracket.

2. Tighten:
° lower bracket pinch bolt 1
  \[ 30 \text{ Nm (3.0 m\text{kg}, 22 ft\text{lb})} \]
° front turn signal light bolt 2
  \[ 7 \text{ Nm (0.7 m\text{kg}, 5.1 ft\text{lb})} \]
° cap bolt 3
  \[ 23 \text{ Nm (2.3 m\text{kg}, 17 ft\text{lb})} \]
° upper bracket pinch bolt 4
  \[ 20 \text{ Nm (2.0 m\text{kg}, 14 ft\text{lb})} \]

⚠️ WARNING
Make sure that the brake hoses are routed properly.
### ORDER JOB NAME/PART NAME

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plastic locking ties</td>
<td>4</td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Clutch cable</td>
<td>1</td>
<td>Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td>3</td>
<td>Clutch switch lead</td>
<td>1</td>
<td>Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td>4</td>
<td>Starter cable</td>
<td>1</td>
<td>Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td>5</td>
<td>Handlebar switch (left)</td>
<td>1</td>
<td>Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td>6</td>
<td>Grip (left)</td>
<td>1</td>
<td>Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td>7</td>
<td>Clutch lever assembly</td>
<td>1</td>
<td>Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td>8</td>
<td>Master cylinder bracket</td>
<td>1</td>
<td>Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td>9</td>
<td>Master cylinder assembly</td>
<td>1</td>
<td>Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td>10</td>
<td>Handlebar switch (right)</td>
<td>1</td>
<td>Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td>11</td>
<td>Throttle cables</td>
<td>2</td>
<td>Stand the motorcycle on a level surface.</td>
</tr>
</tbody>
</table>

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

Refer to "INSTALLING THE HANDLEBAR". Refer to "REMOVING THE HANDLEBAR".

Refer to "INSTALLING THE HANDLEBAR".
<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Throttle grip assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Handlebar holders (upper)</td>
<td>2</td>
<td>Refer to “INSTALLING THE HANDLEBAR”.</td>
</tr>
<tr>
<td>14</td>
<td>Handlebar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Cable guide</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Handlebar holders (lower)</td>
<td>2</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
REMOVING THE HANDLEBAR
1. Stand the motorcycle on a level surface.

![Diagram of handlebar]

**WARNING**

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

2. Remove:
   - handlebar grip (left) ①

**NOTE:**

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

CHECKING THE HANDLEBAR
1. Stand the motorcycle on a level surface.

![Diagram of handlebar]

**WARNING**

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

2. Check:
   - handlebar ①
     Bends/cracks/damage → Replace.

**WARNING**

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

3. Install:
   - handlebar grip
HANDLEBAR

a. Apply a light 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.

---

INSTALLING THE HANDLEBAR

1. Stand the motorcycle on a level surface.

⚠️ WARNING ⚠️

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

2. Install:
   - handlebar
   - upper handlebar holders

   ⚠️ 28 Nm (2.8 m·kg, 20 ft·lb) ⚠️

CAUTION: ⚠️

- First, tighten the bolts on the front side of the handlebar holder, 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: ⚠️

- The upper handlebar holders should be installed with the punch mark A facing forward A.
Align the match marks ⑥ on the handlebar with the upper surface of the lower handlebar holders.

3. Install:
   ° throttle grip
   ° throttle cable

**WARNING**

Make sure that the pin ③ on the throttle cable housing is aligned with the hole ⑥ in the handlebar.

4. Install:
   ° master cylinder
   Refer to “FRONT AND REAR BRAKES”.

5. Install:
   ° clutch lever holder ①

**NOTE:**

Align the slit in the clutch lever holder with the punch mark ③ in the handlebar.

6. Install:
   ° left handlebar switch ①

**NOTE:**

Align the matching surface on the handlebar switches with the punch mark ③ on the handlebar.

7. Install:
   ° clutch cable

8. Connect:
   ° clutch switch coupler

**NOTE:**

Apply a thin coat of lithium soap base grease onto the end of the clutch cable.
9. Adjust:
   °clutch cable free play
   Refer to “ADJUSTING THE CLUTCH CABLE FREE PLAY” in chapter 3.

   Clutch cable free play (at the end of the clutch lever)
   5 \text{ mm} (0.2 \text{ in})

10. Adjust:
    °throttle cable free play
    Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” in chapter 3.

   Throttle cable free play (at the flange of the throttle grip)
   4 \text{ mm} (0.16 \text{ in})
STEERING HEAD

Removing the lower bracket

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Front fork legs</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Handlebar</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Headlight lens unit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Leads (in the headlight body)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Front turn signal/position light (left/right)</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Headlight body</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Brake hose joint holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Upper bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Lock washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Upper ring nut</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Remove the parts in the order listed. Stand the motorcycle on a level surface.

**WARNING**

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

Refer to “FRONT FORK”.
Refer to “HANDLEBAR”.

Disconnect
<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Rubber washer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Lower ring nut</td>
<td>1</td>
<td>Refer to “REMOVING THE LOWER BRACKET/INSTALLING THE STEERING HEAD”.</td>
</tr>
<tr>
<td>11</td>
<td>Bearing cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Lower bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Bearing (upper)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Rubber seal</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>15</td>
<td>Bearing (lower)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

1st 52 Nm (5.2 m·kg, 38 ft·lb)
2nd 18 Nm (1.8 m·kg, 13 ft·lb)
3rd 110 Nm (11.0 m·kg, 80 ft·lb)
4th 7 Nm (0.7 m·kg, 5.1 ft·lb)
EAS00677

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

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

2. Remove:
- upper ring nut ①
- lower ring nut ②

**NOTE:**
Hold the lower ring nut with the exhaust and steering nut wrench, then remove the upper ring nut with the ring nut wrench.

Exhaust and steering nut wrench
YU-01268, 90890-01268
Ring nut wrench
YU-33975, 90890-01403

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

EAS00681

CHECKING THE STEERING HEAD
1. Wash:
- bearings
- bearing races

**Recommended cleaning solvent**
Kerosine

2. Check
- bearings ①
- bearing races ②
  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 rubber 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 rubber seal.

4. Check:
- upper bracket
- lower bracket (along with the steering stem)
  Bends/cracks/damage → Replace.

**INSTALLING THE STEERING HEAD**

1. Lubricate:
   - upper bearing
   - lower bearing
   - bearing races

   **Recommended lubricant**
   Lithium soap base grease

2. Install:
   - Lower ring nut ①
   - rubber washer ②
   - upper ring nut ③
   - lock washer ④
   Refer to “CHECKING AND ADJUSTING THE STEERING HEAD” in chapter 3.

3. Install:
   - upper bracket
   - steering stem nut
NOTE: 
Temporarily tighten the steering stem nut.

4. Install:
   ° front fork legs
   Refer to “FRONT FORK”

NOTE: 
Temporarily tighten the upper and lower bracket pinch bolts.
### Removing the right side cover and battery box.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Battery cover</td>
<td>1</td>
<td>Remove the parts in the order listed. Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Right side cover</td>
<td>1</td>
<td>Stand the motorcycle on a level surface. Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td>3</td>
<td>Battery</td>
<td>1</td>
<td>Refer to “FUEL TANK AND SEATS” in CHAPTER 3. Refer to “FUEL TANK AND SEATS” in CHAPTER 3.</td>
</tr>
<tr>
<td>4</td>
<td>Battery box</td>
<td>1</td>
<td>Refer to “REMOVING/INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY”. Refer to “REMOVING/INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY”.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
### LEFT SIDE COVER AND TOOL BOX

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Removing the left side cover and tool box</td>
<td>1</td>
<td>Remove the parts in order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Tool box cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Left side cover</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>4</td>
<td>Owner’s tool kit</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Connector’s</td>
<td>–</td>
<td>Disconnect</td>
</tr>
<tr>
<td>6</td>
<td>Fuel hose holder</td>
<td>1</td>
<td>Disconnect</td>
</tr>
<tr>
<td>7</td>
<td>Fuel hoses</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Tool box</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

- 7 Nm (0.7 m·kg, 5.1 ft·lb)
## Removing the rear shock absorber and swingarm

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connecting arm bolts</td>
<td>2</td>
<td>Remove the parts in order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Connecting arms</td>
<td>2</td>
<td>Refer to “REAR WHEEL AND BRAKE DISC”.</td>
</tr>
<tr>
<td>3</td>
<td>Rear shock absorber lower bolt</td>
<td>1</td>
<td>Refer to “REMOVING/INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY”.</td>
</tr>
<tr>
<td>4</td>
<td>Rear shock absorber</td>
<td>1</td>
<td>Refer to “REMOVING/INSTALLING THE SWINGARM”.</td>
</tr>
<tr>
<td>5</td>
<td>Relay arm</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td>6</td>
<td>Pivot shaft</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Swingarm</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
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

a. 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 (0.08 × 0.12 in) hole through the gas cylinder at a point 15 × 20 mm (0.59 × 0.79 in) from its end as shown.

⚠️ WARNING ⚠️

Wear eye protection to prevent eye damage from released gas or metal chips.
REAR SHOCK ABSORBER AND SWINGARM

REMOVING THE REAR SHOCK ABSORBER
1. Stand the motorcycle on a level surface.

**WARNING**

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

**NOTE:**

Place the motorcycle on a suitable stand so that the rear wheel is elevated.

2. Disconnect:

   ° battery leads
   ° (from the battery terminals)

**CAUTION:**

First, disconnect the negative lead ①, then the positive lead ②.

3. Remove:

   ° connecting arm bolt(swingarm side) ①
   ° rear shock absorber assembly lower bolt

**NOTE:**

While removing the connecting arm bolt (swingarm side), hold the swingarm so that it does not drop down.

4. Remove:

   ° rear shock absorber upper bolt
   ° rear shock absorber
REAR SHOCK ABSORBER AND SWINGARM

WARNING

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

NOTE:

Place the motorcycle on a suitable stand so that the rear wheel is elevated.

1. Stand the motorcycle on a level surface.

2. Remove:
   ° rear shock absorber

3. Check:
   ° swingarm side play
   ° swingarm vertical movement

   a. Check the tightening torque of the swingarm pivot bolts and locknut.

      Locknut
      90 Nm (9.0 m·kg, 65 ft·lb)

   b. Check 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)
   0 mm (0 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 REAR SHOCK ABSORBER AND GAS CYLINDER

1. Check:
   - rear shock absorber rod
     Bends/damage → Replace the rear shock absorber assembly.
   - rear shock absorber
     Gas leaks/oil leaks → Replace the rear shock absorber assembly.
   - spring
     Damage/wear → Replace the rear shock absorber assembly.
   - gas cylinder
     Damage/gas leaks → Replace.
   - bushings
     Damage/wear → Replace.
   - dust seals
     Damage/wear → Replace.
   - bolts
     Bends/damage/wear → Replace.

CHECKING THE SWINGARM

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

2. Check:
   - pivot shaft
     Damage/wear → Replace.

3. Check:
   - collars
     Damage/wear → Replace.
INSTALLING THE REAR SHOCK ABSORBER

1. Install:
   ° swingarm
   Refer to “INSTALLING THE SWINGARM”.

2. Lubricate:
   ° spacers
   ° bearings

3. Install:
   ° rear shock absorber assembly

   Recommended lubricant
   Molybdenum disulfide grease

4. Connect:
   ° battery leads
     (to the battery terminals)

   CAUTION:__________________________

   First, connect the positive lead 1, then the negative lead 2.

INSTALLING THE SWINGARM

1. Lubricate:
   ° bearings
   ° spacers
   ° oil seals

   Recommended lubricant
   Molybdenum disulfide grease
2. Install:
- relay arm
- left connecting arm
- right connecting arm

3. Install:
- rear shock absorber
  Refer to “INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY”.

4. Install:
- rear wheel
  Refer to “REAR WHEEL AND BRAKE DISC”.

Rear-shock-absorber-assembly
lower nut ①
48 Nm (4.8 m·kg, 35 ft·lb)
Connecting arm nuts ②
48 Nm (4.8 m·kg, 35 ft·lb)
Relay-arm-to-frame-nut ③
48 Nm (4.8 m·kg, 35 ft·lb)
NOTE: The following conditions may indicate damaged shaft drive components:

<table>
<thead>
<tr>
<th>A</th>
<th>Symptoms</th>
<th>B</th>
<th>Possible causes</th>
</tr>
</thead>
</table>
| 1. | A pronounced hesitation or jerky movement during acceleration, deceleration, or sustained speeds. (not to be confused with engine surging or transmission related movements.) | A. Bearing damage  
B. Improper gear lash  
C. Damaged gear teeth  
D. Broken drive shaft  
E. Broken gear teeth  
F. Seizure due to lack of lubrication  
G. Small foreign objects lodged between moving parts | |
| 2. | A rolling “rumble” noticeable at low speeds, a high-pitched whine, or a “clunk” from a shaft drive component or vicinity of the shaft drive. | |
| 3. | The shaft drive is locked up or no power is transmitted from the engine to the rear wheel | |

Causes A, B and C may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal operating noises. If there is reason to believe these components are damaged, remove them for individual inspection.
Inspection notes
1. Investigate any unusual noises.

**\textbf{WARNING}**

The following noises may indicate a mechanical defect:

a. A rolling “rumble” during coasting, acceleration, or deceleration, (increases with the rear wheel speed, but does not increase with higher engine or transmission speeds).
   Diagnosis: Possible wheel bearing damage.

b. A whining noise that varies with acceleration and deceleration.
   Diagnosis: Possible incorrect reassembly or too little gear lash.

\textbf{WARNING}

Insufficient gear lash is extremely destructive to the gear teeth. If a test ride, following reassembly, indicates these symptoms, stop riding immediately to minimize gear damage.

c. A slight “clunk” evident at low speed operation. (not to be confused with normal motorcycle operation)
   Diagnosis: Possible broken gear teeth

\textbf{WARNING}

Stop riding immediately if broken gear teeth are suspected. This condition could result in the shaft drive assembly locking up, causing a loss of control and possible injury to the rider.
**Troubleshooting chart**

When causes A and B shown in the chart at the beginning of the “TROUBLESHOOTING” section exist, check the following points:

1. **Place the motorcycle on a suitable stand so that the front wheel is elevated and then spin the front wheel. Is the wheel bearing damaged?**
   - **YES** → Replace the wheel bearing. Refer to “FRONT WHEEL AND BRAKE DISC”.
   - **NO** → Place the motorcycle on a suitable stand so that the rear wheel is elevated and then spin the rear wheel. Is the wheel bearing damaged?

2. **Place the motorcycle on a suitable stand so that the rear wheel is elevated and then spin the rear wheel. Is the wheel bearing damaged?**
   - **NO** → Rear wheel bearings and shaft drive bearings are probably not damaged. Repeat the test or remove and check the components.
   - **YES** → Remove the rear wheel. Is the wheel bearing damaged?

3. **Remove the rear wheel. Is the wheel bearing damaged?**
   - **YES** → Replace the rear wheel bearing. Refer to “REAR WHEEL AND BRAKE DISC”.
   - **NO** → Remove and inspect the drive shaft components.
CHECKING THE FINAL DRIVE OIL FOR CONTAMINATION AND INSPECTING THE SHAFT DRIVE FOR LEAKS

1. Drain:
- final drive oil
  (from the final drive housing)
  Refer to “CHARGING THE FINAL DRIVE OIL” in chapter 3.

2. Check:
- final drive oil
  Large amount of metal particles → Check for bearing seizure.

**NOTE:**
A small amount of metal particles in the final drive oil is normal.

3. Check:
- shaft drive housing
  (for oil leaks)

▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲��
MEASURING THE RING GEAR BACKLASH
1. Secure the final drive assembly in a vise.
2. Remove:
   *final drive oil drain bolt
3. Drain:
   *final drive oil
   (from the final drive assembly)
4. Measure:
   *ring gear backlash
   Out of specification → Adjust.

<table>
<thead>
<tr>
<th>Ring gear backlash</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 / 0.2 mm (0.004 / 0.008 in)</td>
</tr>
</tbody>
</table>

a. Install a bolt ① of the specified size, into the final drive oil filler hole.
b. Finger tighten the bolt until it stops the ring gear from moving.

NOTE:
Do not overtighten the bolt.
c. Install the final gear backlash band ② and dial gauge ③
d. Gently rotate the gear coupling from engagement to engagement.
e. Record the reading on the dial gauge.
f. Remove the dial gauge, special tool, and bolt.
g. Rotate the final drive pinion gear 90°.

h. Reinstall the bolt, special tool, and dial gauge.

i. Repeat steps (d) to (h) three more times (for a total of four measurements).

j. If any of the readings are over specification, adjust the ring gear backlash.

---

ADJUSTING THE RING GEAR BACKLASH

1. Remove:
   - ring gear bearing housing nuts
   - ring gear bearing housing bolts

**NOTE:**

Working in a crisscross pattern, loosen each nut 1/4 of a turn. After all of the nuts are fully loosened, remove them and the bolts.

2. Remove:
   - ring gear bearing housing ①
   - ring gear ②
   - thrust washer ③
   - ring gear shim(-s) ④

3. Adjust:
   - ring gear backlash

a. Use the following chart to select the suitable shim(-s) and thrust washer.

<table>
<thead>
<tr>
<th>Thinner shim</th>
<th>Ring gear backlash is increased.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thicker shim</td>
<td>Ring gear backlash is decreased.</td>
</tr>
</tbody>
</table>
b. If it is necessary to increase the ring gear backlash by more than 0.2 mm, reduce the thrust washer thickness by 0.2 mm for every 0.2 mm increase of ring gear shim thickness.

c. If it is necessary to reduce the ring gear backlash by more than 0.2 mm, increase the thrust washer thickness by 0.2 mm for every 0.2 mm decrease of ring gear shim thickness.

<table>
<thead>
<tr>
<th>Rig gear shims</th>
<th>Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.25, 0.30, 0.40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thrust washers</th>
<th>Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.2, 1.4, 1.6, 1.8, 2.0</td>
</tr>
</tbody>
</table>
Removing the final drive assembly and drive shaft.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Collar</td>
<td>1</td>
<td>Remove the parts in the order listed. Stand the motorcycle on a level surface.</td>
</tr>
<tr>
<td>2</td>
<td>Drive shaft assembly</td>
<td>1</td>
<td>Securely support the motorcycle so there is no danger of it falling over.</td>
</tr>
<tr>
<td>3</td>
<td>Final drive pinion gear assembly</td>
<td>1</td>
<td>Refer to “REAR WHEEL AND BRAKE DISC”.</td>
</tr>
<tr>
<td>4</td>
<td>Final gear assembly</td>
<td>1</td>
<td>Refer to “DISASSEMBLING THE FINAL DRIVE ASSEMBLY/ALIGNING THE FINAL DRIVE PINION GEAR AND RING GEAR”.</td>
</tr>
</tbody>
</table>

For installation, reverse the removal procedure.
Disassembling the final gear.

Bolts (bearing housing) 2
Nuts (bearing housing) 6
Bearing housing/O-ring 1
Ring gear 1
Shim(s) 1
Thrust washer 1

Disassemble the parts in the order listed.

Working in a crisscross pattern, loosen each bolt and nut 1/4 of a turn. After all the bolts and nuts are loosened, remove them.

For assembly, reverse the disassembly procedure.

**NOTE:**
DISASSEMBLING THE FINAL DRIVE ASSEMBLY

1. Remove:
   - ring gear bearing housing nuts
   - ring gear bearing housing bolts

NOTE:

Working in a crisscross pattern, loosen each bolts and nuts 1/4 of a turn. After all of the bolts and nuts are fully loosened, and remove them.

2. Remove:
   - self-locking nut
   - gear coupling
     (with the special tool 1)

   **Coupling gear/middle shaft tool**
   YM-01229, 90890-01229

3. Remove:
   - bearing retainer 2
     (with the special tool 3)

   **Bearing retainer wrench**
   YM-33214, 90890-04077

CAUTION:

The bearing retainer has left-hand threads. To loosen the bearing retainer, turn it clockwise.

4. Remove:
   - final drive pinion gear
     (with the special tools)

   **Crankshaft installer bolt adapter** 1
   YM-90069, 90890-01277
   Armature shock puller 2
   YU-1047-3, 90890-01290
   Weight 3
   YU-1047-4, 90890-01291

WARNING

Always use new bearings.

CAUTION:

The final drive pinion gear should only be removed if ring gear replacement is necessary.
REMOVING AND INSTALLING THE RING GEAR BEARINGS

1. Remove:
   °collar ①
   °oil seal ②
   °bearing ③
   (with an appropriate press tool ④ and an appropriate support for the final drive housing)

2. Check:
   °bearing
   Damage → Replace.

3. Remove:
   °bearing ①

   a. Heat the final gear case to approximately 150°C (302°F).
   b. Remove the bearing outer races with an appropriately shaped punch ②.
   c. Remove the inner race from the final drive pinion gear.

NOTE:
The removal of the final drive pinion gear bearing is a difficult procedure and is rarely necessary.

4. Install:
   °bearing (New)

   a. Heat the final gear case to approximately 150°C (302°F).
   b. Install the bearing outer races with a socket or appropriate tool that matches the diameter of the races.
   c. Install the inner race onto the final drive pinion gear.
5. Install:
° collar 1
° oil seal 2 New
° bearing 3
(with an appropriate press tool 4 and press)

**NOTE:**
The bearing can be reused, but Yamaha recommends installing a new one.

---

**ALIGNING THE FINAL DRIVE PINION GEAR AND RING GEAR**

**NOTE:**
Aligning the final drive pinion gear and ring gear is necessary when any of the following parts are replaced:
° Final drive housing
° Any bearing

1. Select:
° final drive pinion gear shim(-s) 1
° ring gear shim(-s) 2

a. Position the final drive pinion gear and the ring gear with shims 1 and 2. Calculate the respective thicknesses from information marked on the final drive housing and the drive pinion gear.

1 Final drive pinion gear shim
2 Ring gear shim
3 Thrust washer

b. To find final drive pinion gear shim thickness “A” use the following formula:

Final drive pinion gear shim thickness

\[ A = \frac{(84 + \alpha)}{100} - b \]
Where:
a = a numeral (positive or negative) on the ring gear, to be divided by 100 and added to “84”
b = a numeral on the final drive housing.

Example:
If the final drive pinion gear is marked “+ 01” and the final drive housing is marked “83.50”:

\[
A = (84 + \frac{1}{100}) - (83.50)
\]

\[
= (84 + 0.01) - (83.50)
\]

\[
= 84.01 - 83.50
\]

\[
= 0.51
\]

Therefore, the calculated final drive pinion gear shim thickness is 0.51 mm.

Shim sizes are supplied in the following thicknesses.

<table>
<thead>
<tr>
<th>Final drive pinion gear shim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness (mm)</td>
</tr>
<tr>
<td>0.30, 0.40, 0.50</td>
</tr>
</tbody>
</table>

Since the final drive pinion gear shims are only available in 0.10 mm increments, round off to the hundredths digit.

<table>
<thead>
<tr>
<th>Hundredths</th>
<th>Rounded value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 1, 2, 3, 4</td>
<td>0</td>
</tr>
<tr>
<td>5, 6, 7, 8, 9</td>
<td>10</td>
</tr>
</tbody>
</table>

In the example above, the calculated final drive pinion gear shim thickness is 0.51 mm. The chart instructs you to round off the 1 to 0. Thus, you should use a 0.50 mm final drive pinion gear shim.

c. To find ring gear shim thickness “B”, use the following formula:

\[
B = \overline{c} + \overline{d} - [(35.40 + \frac{\overline{e}}{100}) + \overline{f}]
\]

Where:

\(\overline{c}\) = a numeral on the final drive housing.
\(\overline{d}\) = a numeral usually on the outside of the ring gear bearing housing.
\(\overline{e}\) = a numeral (positive or negative) on the inside of the ring gear, to be divided by 100 and added to “35.40”.

\(\overline{f}\) = a numeral (positive or negative) on the inside of the ring gear, to be divided by 100 and added to “35.40”.
\( f \) = the ring gear bearing thickness constant

**Ring gear bearing thickness**

\[
13.00 \text{ mm}
\]

**Example:**
If the final drive housing is marked “45.51” the ring gear bearing housing is marked “3.35” the ring gear is marked “-05”, and “f” is 13.00:

\[
B = 45.51 + 3.35 - [(35.40 - 5/100) + 13]
\]

\[
= 48.86 - 48.35
\]

\[
= 0.51
\]

Therefore, the calculated ring gear shim thickness is 0.51 mm.
Shim sizes are supplied in the following thickness.

<table>
<thead>
<tr>
<th>Thickness (mm)</th>
<th>0.30, 0.40, 0.50</th>
</tr>
</thead>
</table>

Since the ring gear shims are only available in 0.10 mm increments, round off the hundredths digit.

<table>
<thead>
<tr>
<th>Hundredths</th>
<th>Rounded value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 1, 2, 3, 4</td>
<td>0</td>
</tr>
<tr>
<td>5, 6, 7, 8, 9</td>
<td>10</td>
</tr>
</tbody>
</table>

In the example above, the calculated final gear shim thickness is 0.51 mm. The chart instructs you to round off the 1 to 0. Thus, you should use a 0.50 mm ring gear shim.

2. Install:
   ◦ shim(s) (as calculated)
   ◦ final drive pinion gear
   ◦ bearing retainer [\(115 \text{ Nm (11.5 m·kg, 83 ft·lb)}\)] (with the bearing retainer wrench)

**CAUTION:**
The bearing retainer has left-hand threads. To tighten the bearing retainer, turn it counterclockwise.
Bearing retainer wrench
YM-33214, 90890-04077

CAUTION:

Apply LOCTITE® to the self-locking nut.

4. Install:
   ° gear coupling
   ° self-locking nut
     (with the special tool ①)

5. Adjust:
   ° ring gear backlash
     Refer to “MEASURING THE RING GEAR BACKLASH” and “ADJUSTING THE RING GEAR BACKLASH”.

6. Measure:
   ° ring-gear-to-thrust-washer clearance

   a. Remove the ring gear bearing housing (along with the ring gear).
   b. Place four pieces of Plastigauge® between the original thrust washer and the ring gear.
   c. Install the ring gear bearing housing and tighten the bolts, and nuts to specification.

Ring gear bearing housing bolt
(M10)
40 Nm (4.0 m·kg, 29 ft·lb)

Ring gear bearing housing
nut (M8)
23 Nm (2.3 m·kg, 17 ft·lb)

NOTE:

Do not turn the final drive pinion gear and ring gear while measuring the ring-gear-to-thrust-washer clearance with Plastigauge®.

d. Remove the ring gear bearing housing.

e. Measure the width of the flattened Plastigauge® ①.

Ring-gear-to-thrust-washer clearance
0.2 mm (0.008 in)

f. If the ring-gear-to-thrust-washer clearance is within specification, install the ring gear bearing housing (along with the ring gear).
g. If the ring-gear-to-thrust-washer clearance is out of specification, select the correct thrust washer as follows.

h. Select the suitable thrust washer from the following chart.

<table>
<thead>
<tr>
<th>Thickness (mm)</th>
<th>1.2, 1.4, 1.6, 1.8, 2.0</th>
</tr>
</thead>
</table>

i. Repeat the measurement steps until the ring-gear-to-thrust-washer clearance is within the specified limits.

**Ring-gear-to-thrust-washer clearance**

0.2 mm (0.008 in)

---

**CHECKING THE DRIVE SHAFT**

1. Check:
   - drive shaft splines
     - Damage/wear → Replace the drive shaft.

**INSTALLING THE DRIVE SHAFT**

1. Lubricate:
   - drive shaft splines

   **Recommended lubricant**
   - Molybdenum disulfide grease

2. Apply:
   - sealant
     - (onto both final drive housing mating surfaces)

   **Quickgasket®**
   - Yamaha bond No. 1215
     - ACC-1100-15-01, 90890-85505

3. Install:
   - drive shaft
     - (to the final drive pinion gear)
4. Tighten:
   ◦ final bearing housing nuts
   42 Nm (4.2 m\*kg, 30 ft\*lb)

5. Install:
   ◦ rear wheel assembly
   Refer to “REAR WHEEL AND BRAKE DISC”.
CHAPTER 7
ELECTRICAL

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ELECTRICAL COMPONENTS

1 Main switch
2 Thermo switch
3 Flasher relay
4 Starting circuit cut off relay
5 Ignition coil
6 Starter relay
7 Fuse
8 Igniter unit
9 Side stand switch
10 Neutral switch
11 Rectifier/regulator
12 Oil lamp relay
13 Battery
14 Rear brake switch
15 Horn
SWITCHES  
CHECKING SWITCH CONTINUITY

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 ①. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.

---

**Pocket tester**  
YU-0312, 90890-03112

---

**NOTE:**
° Before checking for continuity, set the pocket tester to “0” and to the “Ω × 1” range.
° When checking for continuity, switch back and forth between the switch positions a few times.

The 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 ② are shown in the far left column and the switch lead colors ③ 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 blue/red and red when the switch is set to “PRESS”.
There is continuity between blue/red and blue, between brown/blue and red, and between blue/yellow and black when the switch is set to “ON”.

---

---
CHECKING THE SWITCHES

Check each switch for damage or wear, proper connections, and also for continuity between the terminals. Refer to “CHECKING SWITCH CONTINUITY”.

Damage/wear → Repair or replace the switch.
Improperly connected → Properly connect.
Incorrect continuity reading → Replace the switch.
<table>
<thead>
<tr>
<th></th>
<th>Checking the Switches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clutch switch</td>
</tr>
<tr>
<td>2</td>
<td>Horn switch</td>
</tr>
<tr>
<td>3</td>
<td>Dimmer switch</td>
</tr>
<tr>
<td>4</td>
<td>Turn switch</td>
</tr>
<tr>
<td>5</td>
<td>Main switch</td>
</tr>
<tr>
<td>6</td>
<td>Front brake switch</td>
</tr>
<tr>
<td>7</td>
<td>Engine stop switch</td>
</tr>
<tr>
<td>8</td>
<td>Start switch</td>
</tr>
<tr>
<td>9</td>
<td>Fuse</td>
</tr>
<tr>
<td>10</td>
<td>Rear brake switch</td>
</tr>
<tr>
<td>11</td>
<td>Sidestand switch</td>
</tr>
<tr>
<td>12</td>
<td>Neutral switch</td>
</tr>
</tbody>
</table>
CHECKING THE BULBS AND BULB SOCKETS

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.
Damages/wear → Repair or replace the bulb, bulb socket or both.
Improperly connected → Properly connect.
Incorrect continuity reading → Repair or replace the bulb, bulb socket or both.

TYPES OF BULBS

The bulbs used on this motorcycle are shown in the illustration on the left.

- Bulbs A and B are used for headlights and usually use a bulb holder which must be detached before removing the bulb. The majority of these bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulb 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 turning D and pulling E 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:**

- Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.
- Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

2. Check:

   - bulb (for continuity) (with the pocket tester)
   - No continuity → Replace.

   **Pocket tester**
   - YU-03112, 90890-03112

**NOTE:**

Before checking for continuity, set the pocket tester to “0” and to the “Ω √ 1” range.

a. Connect the tester positive probe to terminal ① and the tester negative probe to terminal ②, and check the continuity.

b. Connect the tester positive probe to terminal ① and the tester negative probe to terminal ③, and check the continuity.

c. If either of the readings indicate no continuity, replace the bulb.
CHECKING THE BULBS AND BULB SOCKETS

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.

Pocket tester
YU-03112, 90890-03112

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.
IGNITION SYSTEM

TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

Check:
1. main and ignition fuses
2. battery
3. spark plugs
4. ignition spark gap
5. spark plug cap resistance
6. ignition coil resistance
7. pickup coil resistance
8. main switch
9. engine stop switch
10. neutral switch
11. sidestand switch
12. diode
13. starting circuit cut-off relay (diode)
14. wiring
   (of the entire ignition system)

NOTE:
° Before troubleshooting, remove the following part(-s):
  1) battery cover
  2) rider’s seat
  3) fuel tank
  4) steering head side covers
  5) tool box cover
  6) left side cover
  7) cylinder head covers
° Troubleshoot with the following special tool(-s).

2. Battery

° Check the condition of the battery.
Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

Min. open-circuit voltage
12.8 V or more at 20°C (68°F)

° Is the battery OK?

   YES

   NO

° Clean the battery terminals.
° Recharge or replace the battery.

3. Spark plugs

The following procedure applies to all of the spark plugs.
° Check the condition of the spark plug.
° Check the spark plug type.
° Measure the spark plug gap.
Refer to “CHECKING THE SPARK PLUGS” in chapter 3.

Standard spark plug
BPR7ES
W22EPR-U
Spark plug gap
0.7 – 0.8 mm (0.028 – 0.031 in)

° Is the spark plug in good condition, is it of the correct type, and its gap within specification?

   YES

   NO

Re-gap or replace the spark plug.

1. Main and ignition fuses

° Check the main and ignition fuses for continuity.
Refer to “CHECKING THE FUSES” in chapter 3.
° Are the main and ignition fuses OK?

   YES

   NO

Replace the fuse(-s).
4. Ignition spark gap

The following procedure applies to all of the spark plugs.
- Disconnect the spark plug cap from the spark plug.
- Connect the ignition checker \( \text{(a)} \) as shown.
- Spark plug cap
- Set the main switch to “ON”.
- Measure the ignition spark gap \( \text{(a)} \).
- Crank the engine by pushing the start switch and gradually increase the spark gap until a misfire occurs.

\[ \text{Min. ignition spark gap} \]
\[ 6 \text{ mm (0.24 in)} \]

- Is there a spark and is the spark gap within specification?
  - NO
  - YES

The ignition system is OK.

5. Spark plug cap resistance.

The following procedure applies to all of the spark plug caps.
- Disconnect the spark plug cap from the spark plug.
- Connect the pocket tester \( \text{(Ω 1k)} \) to the spark plug cap as shown.
- Measure the spark plug cap resistance.

\[ \text{Spark plug cap resistance} \]
\[ 10 \text{ kΩ at } 20^\circ\text{C (68°F)} \]

- Is the spark plug cap OK?
  - YES
  - NO

Replace the spark plug cap.

6. Ignition coil resistance

The following procedure applies to all of the ignition coils.
- Disconnect the ignition coil connectors from the ignition coil terminals.
- Connect the pocket tester \( \text{(Ω 1k)} \) to the ignition coil as shown.

\[ \text{Tester positive probe} \rightarrow \text{red/black} \]
\[ \text{Tester negative probe} \rightarrow \text{orange (gray)} \]

- Measure the primary coil resistance.

\[ \text{Primary coil resistance} \]
\[ 3.57 \sim 4.83 \text{ Ω at } 20^\circ\text{C (68°F)} \]

- Connect the pocket tester \( \text{(Ω 1k)} \) to the ignition coil as shown.
- Measure the secondary coil resistance.

\[ \text{Tester positive probe} \rightarrow \text{spark plug lead} \text{ (a)} \]
\[ \text{Tester negative probe} \rightarrow \text{orange (gray) lead} \text{ (b)} \]
10.7 ~ 14.5 kΩ 20°C (68°F)

Is the ignition coil OK?

YES

NO

Replace the ignition coil.

Pickup coil resistance

189 ~ 231 Ω at 20°C (68°F)

(between gray and black/blue)

Is the pickup coil OK?

YES

NO

Replace the pickup coil.

Replace the main switch.

Replace the right handlebar switch.

Replace the neutral switch.

Replace the sidestand switch.
IGNITION SYSTEM

12. Diode

° Remove the diode from the wire harness.
° Check for continuity as follows:

<table>
<thead>
<tr>
<th>Tester (+) lead →</th>
<th>Tester (–) lead →</th>
</tr>
</thead>
<tbody>
<tr>
<td>blue/white ①</td>
<td>blue/yellow ②</td>
</tr>
</tbody>
</table>

Continuity

<table>
<thead>
<tr>
<th>Tester (+) lead →</th>
<th>Tester (–) lead →</th>
</tr>
</thead>
<tbody>
<tr>
<td>blue/yellow ②</td>
<td>blue/white ①</td>
</tr>
</tbody>
</table>

No Continuity

NOTE: When you switch the “–” and “+” leads of the digital pocket tester the readings in the above chart will be reversed.

① Is the diode OK?

↓ YES  ↓ NO

Replace the diode.

13. Starting circuit cut-off relay (diode)

° Remove the relay unit from the wire harness.
° Check for continuity as follows:

<table>
<thead>
<tr>
<th>Tester (+) lead →</th>
<th>Tester (–) lead →</th>
</tr>
</thead>
<tbody>
<tr>
<td>sky blue ①</td>
<td>blue/yellow ②</td>
</tr>
</tbody>
</table>

Continuity

<table>
<thead>
<tr>
<th>Tester (+) lead →</th>
<th>Tester (–) lead →</th>
</tr>
</thead>
<tbody>
<tr>
<td>blue/yellow ②</td>
<td>sky blue ①</td>
</tr>
</tbody>
</table>

No Continuity

NOTE: When you switch the “–” and “+” leads of the digital pocket tester the readings in the above chart will be reversed.

① Is the starting circuit cut-off relay (diode) OK?

↓ YES  ↓ NO

Replace the starting circuit cut-off relay.

14. Wiring

° Check the entire ignition system’s wiring. Refer to “CIRCUIT DIAGRAM”.
° Is the ignition system’s wiring properly connected and without defects?

↓ NO  ↓ YES

Properly connect or repair the ignition system’s wiring. Replace the ignitor unit.
The starting circuit on this model consists of the starter motor, starter relay, and the starting circuit cut-off relay. If the engine stop switch is on “RUN” and the main switch is on “ON” (both switches are closed), the starter motor can operate only if:

- The transmission is in neutral (the neutral switch is closed).
- or if
- 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 from operating when neither of these conditions have 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 have been met however, the starting circuit cut-off relay is closed, and the engine can be started by pressing the starter switch.
ELECTRIC STARTING SYSTEM

TROUBLESHOOTING

The starter motor fails to turn.

Check:
1. main and ignition fuses
2. battery
3. starter motor
4. starting circuit cutoff relay
5. starting circuit cutoff relay (diode)
6. starter relay
7. main switch
8. engine stop switch
9. neutral switch
10. sidestand switch
11. clutch switch
12. start switch
13. diode
14. wiring
   (of the entire starting system)

NOTE: Before troubleshooting, remove the following part(s):
1) battery cover
2) rider’s seat
3) fuel tank
4) steering head side covers
5) left side cover
   Troubleshoot with the following special tool(s).

Pocket tester
YU-03112, 90890-03112

1. Main and ignition fuses
   Check the main and ignition fuses for continuity.
   Refer to “CHECKING THE FUSES” in chapter 3.
   Are the main and ignition fuses OK?
   YES NO
   Replace the fuse(-s).

WARNING
A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.
This check is likely to produce sparks, therefore make sure that no flammable gas or fluid is in the vicinity.

2. Battery
   * Check the condition of the battery.
   Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

   Open-circuit voltage
   12.8 V or more at 20°C (68°F)
   * Is the battery OK?
   YES NO
   Clean the battery terminals.
   Recharge or replace the battery.

3. Starter motor
   * Connect the battery positive terminal ① and starter motor lead ② with a jumper lead ③.

   Repair or replace the starter motor.
4. Starting circuit cutoff relay

- Disconnect the relay unit from the coupler.
- Connect the pocket tester (Ω √ 1) and battery (12 V) to the relay unit terminals as shown.

| Battery positive terminal → red/black ① |
| Battery negative terminal → black/yellow ② |
| Tester positive probe → blue ③ |
| Tester negative probe → blue/white ④ |

Does the starting circuit cutoff relay have continuity between blue and blue/white?

- YES
- NO

Replace the relay unit.

5. Starting circuit cutoff relay (Diode)

- Disconnect the starting circuit cutoff relay from the coupler.
- Connect the pocket tester (Ω √ 1) to the starting circuit cutoff relay terminals as shown.
- Measure the starting circuit cutoff relay for continuity as follows.

| Tester positive probe → sky blue ① |
| Tester negative probe → black/yellow ② |
| Tester positive probe → black/yellow ② |
| Tester negative probe → sky blue ① |

Are the tester readings correct?

- YES
- NO

Replace the relay unit.

**NOTE:**

When you switch the “−” and “+” leads of the digital pocket tester the readings in the above chart will be reversed.

- Are the tester readings correct?
6. Starter relay

- Disconnect the starter relay from the coupler.
- Connect the pocket tester (Ω) and battery (12 V) to the starter relay coupler as shown.

<table>
<thead>
<tr>
<th>Battery positive terminal → red/white</th>
<th>Battery negative terminal → blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tester positive probe → red</td>
<td>Tester negative probe → black</td>
</tr>
</tbody>
</table>

- Does the starter relay have continuity between red and black?

  → YES  
  Replace the starter relay.

  → NO    
  Replace the right handlebar switch.

7. Main switch

- Check the main switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the main switch OK?

  → YES  
  Replace the main switch.

  → NO    
  Replace the sidestand switch.

8. Engine stop switch

- Check the engine stop switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the engine stop switch OK?

  → YES  
  Replace the neutral switch.

  → NO    
  Replace the clutch switch.

9. Neutral switch

- Check the neutral switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the neutral switch OK?

  → YES  
  Replace the neutral switch.

  → NO    
  Replace the sidestand switch.

10. Sidestand switch

- Check the sidestand switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the sidestand switch OK?

  → YES  
  Replace the sidestand switch.

  → NO    
  Replace the clutch switch.

11. Clutch switch

- Check the clutch switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the clutch switch OK?

  → YES  
  Replace the clutch switch.

  → NO    
  Replace the clutch switch.
<table>
<thead>
<tr>
<th>12. Start switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the start switch for continuity. Refer to “CHECKING THE SWITCHES”. Is the start switch OK?</td>
</tr>
<tr>
<td><strong>YES</strong></td>
</tr>
<tr>
<td>Replace the right handlebar switch.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>13. Diode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the diode for continuity. Refer to “IGNITION SYSTEM”. Is the diode OK?</td>
</tr>
<tr>
<td><strong>YES</strong></td>
</tr>
<tr>
<td>Replace the diode.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>14. Wiring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the entire starting system’s wiring. Refer to “CIRCUIT DIAGRAM”. Is the starting system’s wiring properly connected and without defects?</td>
</tr>
<tr>
<td><strong>NO</strong></td>
</tr>
<tr>
<td>Properly connect or repair the starting system’s wiring.</td>
</tr>
</tbody>
</table>
### STARTER MOTOR

**Order** | **Job name/Part name** | **Q'ty** | **Remarks** |
---|---|---|---|
1 | **Removing the starter motor**<br>Starter motor lead<br>Starter motor assembly | 1 | Remove the parts in the order listed. |
2 | | 1 | For installation, reverse the removal procedure. |
| | **Disassembling the starter motor**<br>Circlip<br>Starter motor drive gear<br>Starter motor rear cover<br>Washer set<br>Starter motor front cover<br>Washer set<br>End bracket<br>Planetary gears<br>Armature assembly<br>Brush holder/brush<br>Starter motor yoke | 1 | Disassembly the parts in the order listed. |
| 1 | | 1 | Refer to “Assembling the starter motor.” |
| 2 | | 2 | Refer to “Assembling the starter motor.” |
| 3 | | 1 | Refer to “Assembling the starter motor.” |
| 4 | | 1 | Refer to “Assembling the starter motor.” |
| 5 | | 1 | For assembly, reverse the disassembly procedure |
| 6 | | 1/1 | |

10 Nm (1.0 m kg, 7.2 ft lb)
Checking the starter motor
1. Check:
   ° commutator
   Dirt → Clean with 600 grit sandpaper.
2. Measure:
   ° commutator diameter
   Out of specification → Replace the starter motor.

   Min. commutator diameter
   27 mm (1.06 in)

3. Measure:
   ° mica undercut
   Out of specification → Scrape the mica to the proper measurement with a hacksaw blade which has been grounded to fit the commutator.

   Mica undercut
   0.7 mm (0.03 in)

NOTE:
The mica 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.

   a. Measure the armature assembly resistances with the pocket tester.

   Pocket tester
   YU-0312, 90890-03112

   Armature assembly
   Armature coil resistance
   0.026 ~ 0.034 Ω at
   20°C (68°F)
   Insulation resistance
   Above 1 MΩ at
   20°C (68°F)

   b. If any resistance is out of specification, replace the starter motor.
5. Measure:
°brush length 
Out of specification → Replace the brushes as a set.

\[
\text{Min. brush length} \\
5 \text{ mm (0.20 in)}
\]

6. Measure:
°brush spring force
Out of specification → Replace the brush springs as a set.

\[
\text{Brush spring force} \\
7.65 \sim 10.01 \text{ N (780 \sim 1.020 g, 27.51 \sim 36.01 oz)}
\]

7. Check:
°gear teeth
Damage/wear → Replace the gear.

8. Check:
°oil seal
Damage/wear → Replace the defective part(-s).

Assembling the starter motor
1. Install:
°brush holder ①

**NOTE:**
Align the tab ③ on the brush holder with the slot in the starter motor rear cover.

2. Install:
°starter motor yoke ①
°end bracket ②
°starter motor front cover ③

**NOTE:**
Align the projection ④ on the front cover with the slot ⑥ on the end cover and starter motor yoke.
3. Install:
   °Starter motor rear cover ①

**NOTE:**
Align the match marks ③ on the rear cover with the match marks ⑤ on the front cover.
TROUBLESHOOTING

The battery is not being charged.

Check:
1. main fuses
2. battery
3. charging voltage
4. starter coil assembly resistance
5. wiring
   (of the entire charging system)

NOTE:
° Before troubleshooting, remove the following part(s):
  1) battery cover
  2) rider’s seat
  3) left side cover
° Troubleshoot with the following special tool(s):

Engine tachometer
   YU-08036-A, 90890-03113
Pocket tester
   YU-03112, 90890-03112

1. Main fuse
° Check the main fuse for continuity.
   Refer to “CHECKING THE FUSES” in chapter 3.
° Is the main fuse OK?

YES  NO
Replace the fuse.

2. Battery
° Check the condition of the battery.
   Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

Open-circuit voltage
  12.8 V or more at 20°C (68°F)

° Is the battery OK
  YES  NO
   ° Clean the battery terminals.
   ° Recharge or replace the battery.

3. Charging voltage
° Connect the engine tachometer to the spark plug lead of cylinder #1.
° Connect the pocket tester (DC 20 V) to the battery as shown.

Tester positive probe ➔ battery positive terminal
Tester negative probe ➔ battery negative terminal

° Start the engine and let it run at approximately 5,000 r/min.
° Measure the charging voltage.

Charging voltage
  14 V at 5,000 r/min
NOTE: Make sure that the battery is fully charged.

Is the charging voltage within specification?

NO

YES

The charging circuit is OK.

**4. Stator coil assembly resistances**

- Remove the generator cover.
- Connect the pocket tester (Ω / 1) to the stator coil assembly coupler as shown.

**Tester positive probe → white**

**Tester negative probe → white**

- Measure the stator coil assembly resistances.

**Stator coil resistance**

0.36 ~ 0.44 Ω at 20°C (68°F)

Is the stator coil assembly OK?

NO

YES

Replace the stator coil assembly.

**5. Wiring**

- Check the wiring connections of the entire charging system.
- Refer to “CIRCUIT DIAGRAM”.
- Is the charging system’s wiring properly connected and without defects?

NO

YES

Properly connect or repair the charging system’s wiring.

Replace the rectifier/regulator.
**LIGHTING SYSTEM**

**TROUBLESHOOTING**

Any of the following fail to light: headlight, high beam indicator light, taillight or meter light.

Check:
1. main and headlight fuses
2. battery
3. main switch
4. dimmer switch
5. wiring
   (of the entire charging system)

**NOTE:**

- Before troubleshooting, remove the following part(-s).
  1) battery cover
  2) rider's seat
  3) fuel tank
  4) steering head side covers
  5) headlight lens unit
  6) tool box cover

Troubleshoot with the following special tool(-s).

**Pocket tester**

YU-03112, 90890-03112

---

**2. Battery**

- Check the condition of the battery.
  Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

<table>
<thead>
<tr>
<th>Open-circuit voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.8 V or more at 20°C (68°F)</td>
</tr>
</tbody>
</table>

- Is the battery OK?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>

- Clean the battery terminals.
- Recharge or replace the battery.

---

**3. Main switch**

- Check the main switch for continuity.
  Refer to “CHECKING THE SWITCHES”.

- Is the main switch OK?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>

- Replace the main switch.

---

**4. Dimmer switch**

- Check the dimmer switch for continuity.
  Refer to “CHECKING THE SWITCHES”.

- Is the dimmer switch OK?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>

- The dimmer switch is faulty. Replace the left handlebar switch.
5. Wiring

° Check the entire lighting system’s wiring. Refer to “CIRCUIT DIAGRAM”.
° Is the lighting system’s wiring properly connected and without defects?

\[ \begin{array}{c}
\text{YES} \\
\text{NO}
\end{array} \]

Check the condition of each of the lighting system’s circuits. Refer to “CHECKING THE LIGHTING SYSTEM”.

Properly connect or repair the lighting system’s wiring.

1. Headlight bulb and socket

° Check the headlight bulb and socket for continuity. Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
° Are the headlight bulb and socket OK?

\[ \begin{array}{c}
\text{YES} \\
\text{NO}
\end{array} \]

Replace the headlight bulb, socket or both.

2. Voltage

° Connect the pocket tester (DC 20 V) to the headlight and high beam indicator light couplers as shown.

[A] When the dimmer switch is set to “[ ]”

[B] When the dimmer switch is set to “[ ]”

Headlight

- **Tester positive probe** → yellow ① or green ②
- **Tester negative probe** → black ③

High beam indicator light

- **Tester positive probe** → yellow ④
- **Tester negative probe** → black ⑤

Headlight coupler (wire harness side)
1. Meter light bulb and socket.

- Check the meter light bulb and socket for continuity.
- Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the meter light bulb and socket OK?

![Diagram of wiring]

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>
| Replace the meter light bulb, socket or both. | The wiring circuit from the main switch to the headlight coupler is faulty and must be repaired.

2. Voltage

- Connect the pocket tester (20 V) to the meter assembly coupler (wire harness side) as shown.

**Tester positive probe → blue**
**Tester negative probe → black**

- Set the main switch to “ON”.
- Set the light switch to “ ”.
- Set the dimmer switch to “ ” or “ ”.
- Measure the voltage (12 V) of yellow 1 or green 2 on the headlight coupler (headlight side).
- Measure the voltage (12 V) of yellow on the meter assembly coupler.
- Is the voltage within specification?

![Diagram of wiring]

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>
| This circuit is OK. | The wiring circuit from the main switch to the headlight coupler is faulty and must be repaired.

3. A tail/brake light fails to come on.

1. Tail/brake light bulb and socket

- Check the tail/brake light bulb and socket for continuity.
- Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the tail/brake light bulb and socket OK?

![Diagram of wiring]

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>
| Replace the tail/brake light bulb, socket or both. | The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.
### 2. Voltage

- Connect the pocket tester (DC 20 V) to the tail/brake light coupler (wire harness side) as shown.

<table>
<thead>
<tr>
<th>Tester positive probe → blue</th>
<th>Tester negative probe → black</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

- Set the main switch to “ON”.
- Set the light switch to “ ” or “ ”.
- Measure the voltage (12 V) of blue 1 on the tail/brake light coupler (wire harness side).
- Is the voltage within specification?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

**This circuit is OK.**

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

- The wiring circuit from the main switch to the tail/brake light coupler is faulty and must be repaired.

- Replace the front turn signal/position light bulb, socket or both.

### 4. The front turn signal/position light fails to come on.

#### 1. Front turn signal/position light bulb an socket

- Check the front turn signal/position light bulb and socket for continuity. Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
- Are the front turn signal/position light bulb and socket OK?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

- Replace the front turn signal/position light bulb, socket or both.
SIGNAL SYSTEM
CIRCUIT DIAGRAM
Signal system

1. Main switch
2. Ignition fuse
3. Battery
4. Main fuse
5. Oil level gauge
6. Oil lamp relay
7. Ignitor unit
8. Neutral switch
9. Trip switch
10. Oil level caution light
11. Engine warning light
12. Speedmeter
13. Turn signal indicator light
14. Neutral indicator light
15. Front brake switch
16. Rear brake switch
17. Horn
18. Flasher relay
19. Horn switch
20. Turn signal switch
21. Front turn signal/position light (left)
22. Front turn signal/position light (right)
23. Rear turn signal light (left)
24. Rear turn signal light (right)
25. Tail/brake light
26. Backup fuse
27. Signal fuse
TROUBLESHOOTING

Any of the following fail to light: turn signal light, brake light or an indicator light. The horn fails to sound.

Check:
1. main and signaling system fuses
2. battery
3. main switch
4. wiring
   (of the entire signaling system)

NOTE: Before troubleshooting, remove the following part(-s):
1) battery cover
2) rider’s seat
3) fuel tank
4) steering head side covers
5) headlight lens unit
6) tool box cover
7) left side cover
Troubleshoot with the following special tool(-s).

Pocket tester
YU-03112, 90890-03112

1. Main, ignition and signaling system fuses
   Check the main ignition and signaling system fuses for continuity.
   Refer to “CHECKING AND CHARGING THE FUSES” in chapter 3.
   Are the main ignition and signaling system fuses OK?

   YES
   NO

   Replace the fuse(-s).

2. Battery
   Check the condition of the battery.
   Refer to “CHECKING THE BATTERY” in chapter 3.
   Open-circuit voltage 12.8 V or more at 20°C (68°F)
   Is the battery OK?

   YES
   NO

   Clean the battery terminals.
   Recharge or replace the battery.

3. Main switch
   Check the main switch for continuity.
   Refer to “CHECKING THE SWITCHES”.
   Is the main switch OK?

   YES
   NO

   Replace the main switch.

4. Wiring
   Check the entire signaling system’s wiring.
   Refer to “CIRCUIT DIAGRAM”.
   Is the signaling system’s wiring properly connected and without defects?

   YES
   NO

   Check the condition of each of the signaling system’s circuits.
   Refer to “CHECKING THE SIGNALING SYSTEM”.
   Properly connect or repair the signaling system’s wiring.
CHECKING THE SIGNALING SYSTEM

1. The horn fails to sound.

1. Horn switch
   - Check the horn switch for continuity.
   - Refer to “CHECKING THE SWITCHES”.
   - Is the horn switch OK?

   ↓ YES
   ↓ NO

   Replace the left handlebar switch.

2. Voltage
   - Connect the pocket tester (DC 20 V) to the horn connector at the horn terminal as shown.

   **Tester positive probe → brown**
   **Tester negative probe → ground**

   - Set the main switch to “ON”.
   - Measure the voltage (12 V) of brown at the horn terminal.
   - Is the voltage within specification?

   ↓ YES
   ↓ NO

   The wiring circuit from the main switch to the horn connector is faulty and must be repaired.

3. Horn
   - Disconnect the pink connector at the horn terminal.
   - Connect a jumper lead to the horn terminal and ground the jumper lead.
   - Set the main switch to “ON”.
   - Does the horn sound?

4. Voltage
   - Connect the pocket tester (DC 20 V) to the horn connector at the horn terminal as shown.

   **Tester positive probe → pink**
   **Tester negative probe → ground**

   - Set the main switch to “ON”.
   - Measure the voltage (12 V) of pink at the horn terminal.
   - Is the voltage within specification?

   ↓ YES
   ↓ NO

   Replace the horn.
SIGNALING SYSTEM  ELEC

2. A tail/brake light fails to come on.

1. Tail/brake light bulb and socket
   ° Check the tail/brake light bulb and socket for continuity.
   Refer to "CHECKING THE BULBS AND BULB SOCKETS".
   ° Are the tail/brake light bulb and socket OK?
     
     YES  NO

     Replace the tail/brake light bulb, socket or both.

2. Brake light switches
   ° Check the brake light switches for continuity.
   Refer to "CHECKING THE SWITCHES".
   ° Is the brake light switch OK?
     
     YES  NO

     Replace the brake light switch.

3. Voltage
   ° Connect the pocket tester (DC 20 V) to the tail/brake light coupler (wire harness side) as shown.
   Tester positive probe → yellow ①
   Tester negative probe → black ②

   Set the main switch to "ON".
   Pull in the brake lever or push down on the brake pedal.
   Measure the voltage (12 V) of yellow at the tail/brake light coupler (wire harness side).
   ° Is the voltage within specification?
     
     YES  NO

     This circuit is OK.
     The wiring circuit from the main switch to the tail/brake light coupler is faulty and must be repaired.

3. A turn signal light, turn signal indicator light or both fail to blink.

1. Turn signal light bulb and socket
   ° Check the turn signal light bulb and socket for continuity.
   Refer to "CHECKING THE BULBS AND BULB SOCKETS".
   ° Are the turn signal light bulb and socket OK?
     
     YES  NO

     Replace the turn signal light bulb, socket or both.

2. Turn signal indicator light bulb and socket
   ° Check the turn signal indicator light bulb and socket for continuity.
   Refer to "CHECKING THE BULBS AND BULB SOCKETS".
   ° Is the turn signal indicator light bulb and socket OK?
     
     YES  NO

     Replace the turn signal indicator light bulb, socket or both.
3. Turn signal switch
° Check the turn signal for continuity.
° Refer to “CHECKING THE SWITCHES”.
° Is the turn signal switch OK?

![Diagram]

Replace the left handlebar switch.

4. Voltage
° Connect the pocket tester (DC 20 V) to the flasher relay coupler (wire harness side) as shown.

**Tester positive probe → brown** ①
**Tester negative probe → ground**

![Diagram]

° Set the main switch to “ON”.
° Set the turn signal switch to “←” or “→”.
° Measure the voltage (12 V) or brown/white at the flasher relay coupler (wire harness side).
° Is the voltage within specification?

![Diagram]

The flasher relay is faulty and must be replaced.

5. Voltage
° Connect the tester (DC 20 V) to the flasher relay coupler (wire harness side) as shown.

![Diagram]

The wiring circuit from the main switch to the flasher relay coupler (flasher relay side) is faulty and must be repaired.

6. Voltage
° Connect the pocket tester (DC 20 V) to the turn signal light connectors or the meter assembly coupler (wire harness side) as shown.

**A** Turn signal light
**B** Turn signal indicator light

**Left turn signal light**
**Tester positive probe → chocolate** ①
**Tester negative probe → ground**

**Right turn signal light**
**Tester positive probe → dark green** ②
**Tester negative probe → ground**

![Diagram]
4. The neutral indicator light fails to come on.

1. Neutral indicator light bulb and socket
   - Check the neutral indicator light bulb and socket for continuity. Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
   - Are the neutral indicator light bulb and socket OK?

   YES  NO

   Replace the neutral indicator light bulb, socket or both.

2. Neutral switch
   - Check the neutral switch for continuity. Refer to “CHECKING THE SWITCHES”.
   - Is the neutral switch OK?

   YES  NO

   Replace the neutral switch.

5. The oil level caution light fails to come on.

1. Oil level warning light bulb and socket
   - Check the oil level caution light bulb and socket for continuity. Refer to “CHECKING THE BULBS AND BULB SOCKETS”.
   - Are the oil level caution light bulb and socket OK?

   YES  NO

   Replace the oil level warning light bulb, socket or both.
### 2. Oil level switch

- Drain the engine oil and remove the oil level switch from the oil pan.
- Check the oil level switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the oil level switch OK?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace the oil level switch.</td>
<td></td>
</tr>
</tbody>
</table>

### 3. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler (wire harness side) as shown.

| Tester positive probe → red/white |  |
| Tester negative probe → black/white |  |

- Set the main switch to “ON”.
- Measure the voltage (12 V) of red/white and black/white at the meter assembly coupler.
- Is the voltage within specification?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.</td>
<td></td>
</tr>
</tbody>
</table>

### 4. Oil lamp relay

- Drain the engine oil and remove the oil level switch from the oil pan.
- Connect the oil level switch connectors to the wire harness and turn the oil level switch upside down.
- Turn the main switch to “ON”.
- The oil level warning light comes on for 1.5 seconds, and then goes off.
- Turn the oil level switch right side up.
- After approximately 45 seconds, the oil level warning light comes on.
- Is the oil level relay OK?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>This circuit is OK.</td>
<td>Replace the oil lamp relay.</td>
</tr>
</tbody>
</table>
FUEL PUMP CIRCUIT OPERATION
The fuel pump circuit consists of the fuel pump relay, fuel pump, engine stop switch and ignitor unit.
The ignitor unit includes the control unit for the fuel pump.

1. Battery
2. Main fuse
3. Main switch
4. Ignition fuse
5. Engine stop switch
6. Ignitor unit
7. Fuel pump relay
8. Fuel pump
TRROUBLESHOOTING

The fuel pump fails to operate.

Check:
1. main, and ignition fuses
2. battery
3. main switch
4. engine stop switch
5. starting circuit cutoff relay (fuel pump relay)
6. fuel pump
7. wiring
(of the entire charging system)

NOTE:
* Before troubleshooting, remove the following part (-s):
1) battery cover
2) rider’s seat
3) fuel tank
4) tool box cover
5) left side cover
* Troubleshoot with the following special tool (-s).

1. Main, and ignition fuses
* Check the main, and ignition fuses for continuity.
Refer to “CHECKING THE FUSES” in chapter 3.
* Are the main, and ignition fuses OK?

2. Battery
* Check the condition of the battery.
Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

Open-circuit voltage
12.8 V or more at 20°C (68°F)

* Is the battery OK?

   YES NO

   ° Clean the battery terminals.
   ° Recharge or replace the battery.

3. Main switch
* Check the main switch for continuity.
Refer to “CHECKING THE SWITCHES”.
* Is the main switch OK?

   YES NO

   Replace the main switch.

4. Engine stop switch
* Check the engine stop switch for continuity.
Refer to “CHECKING THE SWITCHES”.
* Is the engine stop switch OK?

   YES NO

   Replace the right handlebar switch.
5. Starting circuit cutoff relay (fuel pump relay)

- Remove the relay unit from the wire harness.
- Connect the pocket tester (Ω / 1) and battery (12 V) to the relay unit terminals.

<table>
<thead>
<tr>
<th>Battery (+) terminal</th>
<th>red/black terminal ①</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery (–) terminal</td>
<td>blue/red terminal ②</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tester (+) lead</th>
<th>red/black terminal ①</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tester (–) lead</td>
<td>blue/black terminal ③</td>
</tr>
</tbody>
</table>

° Does the fuel pump relay have continuity between red/black and blue/black?

- YES
  - Replace the starting circuit cutoff relay.
- NO

6. Fuel pump resistance

- Disconnect the fuel pump coupler from the wire harness.
- Connect the pocket tester (Ω / 1) to the fuel pump coupler terminals.

<table>
<thead>
<tr>
<th>Tester (+) lead</th>
<th>blue/black terminal ①</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tester (–) lead</td>
<td>black terminal ②</td>
</tr>
</tbody>
</table>

° Measure the fuel pump resistance.

**Fuel pump resistance:**
1.6 ~ 2.2 Ω at 20°C (68°F)

° Is the fuel pump OK?

- YES
  - Replace the fuel pump.
- NO

7. Wiring

- Check the entire fuel pump system’s wiring. Refer to “CIRCUIT DIAGRAM”.
- Is the fuel pump system’s wiring properly connected and without defects?

- NO
  - Properly connect or repair the fuel pump system’s wiring.
- YES
  - Replace the ignitor unit.
FUEL PUMP TEST

[WARNING]

Gasoline is extremely flammable and under certain circumstances there can be a danger of an explosion or combustion. Be extremely careful and note the following points:
° Stop the engine before refuelling.
° Do not smoke and keep away from open flames, sparks, or any other source of fire.
° Take care not to spill gasoline. If you do accidentally spill some, wipe it up immediately with dry rags.
° If gasoline touches the engine when the engine is still hot, there is a danger of combustion. Make sure that the engine is completely cool before performing the following test.

1. Check:
° Fuel pump operation

![Diagram]

- Fill up the fuel tank.
- Put the end of the fuel hose into an open container.
- Connect the battery (12 V) to the fuel pump coupler terminals.

**Battery (+) lead → blue/black terminal 1**
**Battery (−) lead → black terminal 2**

d. If fuel flows out from the fuel hose, the fuel pump is good. If not, replace the fuel pump assembly.
TROUBLESHOOTING

The carburetor heater fails to operate.

Check:
1. main, and carburetor heater
2. battery
3. main switch
4. neutral switch
5. carburetor heater relay
6. thermo
7. carburetor heater
8. wiring
   (of the entire charging system)

NOTE:  
°Before troubleshooting, remove the following part (-s):
1) battery cover
2) rider’s seat
3) fuel tank
4) steering head side covers
5) tool box cover
°Troubleshoot with the following special tool (-s).

Pocket tester
YU-03112, 90890-03112

1. Main, and carburetor heater fuses
   °Check the main, and carburetor heater fuses for continuity.
   Refer to “CHECKING THE FUSES” in chapter 3.
   °Are the main, and carburetor heater fuses OK?

   YES
   NO
   Replace the fuse(-s).

2. Battery
   °Check the condition of the battery.
   Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

Open-circuit voltage
12.8 V or more at 20°C (68°F)

°Is the battery OK?

   YES
   NO
   °Clean the battery terminals.
   °Recharge or replace the battery.

3. Main switch
   °Check the main switch for continuity.
   Refer to “CHECKING THE SWITCHES”.
   °Is the main switch OK?

   YES
   NO
   Replace the main switch.

4. Neutral switch
   °Check the neutral switch for continuity.
   Refer to “CHECKING THE SWITCHES”.
   °Is the neutral switch OK?

   YES
   NO
   Replace the neutral switch.
5. Carburetor heater relay

° Remove the carburetor heater relay from the wire harness.
° Connect the pocket tester (Ω√1) and battery (12 V) to the carburetor heater relay terminals.

Battery (+) terminal → brown/yellow ①
Battery (−) terminal → sky blue ②
Tester (+) lead → brown/black ③
Tester (−) lead → black/yellow ④

° Does the carburetor heater relay have continuity between brown/black and black/yellow?

![Diagram of carburetor heater relay](image)

YES NO
Replace the carburetor heater relay.

6. Thermo switch

° Remove the thermo switch from the thermo switch plate.
° Connect the pocket tester to the thermo switch lead.

Tester (+) lead → brown/yellow ①
Tester (−) lead → black/yellow ②

° Immerse the thermo switch in the water ③.
° Check the thermo switch for continuity. Note the temperatures while heating the water with the temperature gauge ④.

<table>
<thead>
<tr>
<th>Test step</th>
<th>Water temperature</th>
<th>Good condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Less than 23 ± 3°C (73.4 ± 5.4°F)</td>
<td>○</td>
</tr>
<tr>
<td>2</td>
<td>More than 23 ± 3°C (73.4 ± 5.4°F)</td>
<td>√</td>
</tr>
<tr>
<td>3</td>
<td>More than 12 ± 4°C (53.6 ± 7.2°F)</td>
<td>√</td>
</tr>
<tr>
<td>4</td>
<td>Less than 12 ± 4°C (53.6 ± 7.2°F)</td>
<td>○</td>
</tr>
</tbody>
</table>

Test 1 & 2: Heat-up test
Test 3 & 4: Cool-down test
○: Continuity √: No continuity

Is the thermo switch OK?

YES NO
Replace the thermo switch.
7. Carburetor heater

- Remove the carburetor heater from the carburetor body.
- Connect the pocket tester to the carburetor heater.

**Tester (+) lead → Heater terminal** ①
**Tester (−) lead → Heater body** ②

- Measure the heater resistance.

<table>
<thead>
<tr>
<th>Carburetor heater resistance:</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 V 30 W : 6 ~ 10 Ω at 20°C (68°F)</td>
</tr>
</tbody>
</table>

- Is the carburetor heater OK?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace the carburetor heater.</td>
<td></td>
</tr>
</tbody>
</table>

---

8. Wiring

- Check the entire carburetor heater system’s wiring.
- Refer to “CIRCUIT DIAGRAM”.
- Is the carburetor heater system’s wiring properly connected and without defects?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>The carburetor heater system circuit is OK.</td>
<td></td>
</tr>
<tr>
<td>Properly connect or repair the carburetor heater system’s wiring.</td>
<td></td>
</tr>
</tbody>
</table>
**TROUBLESHOOTING**

**The solenoid valve fails to operate.**

Check:
1. main, and ignition fuses
2. battery
3. main switch
4. solenoid valve
5. wiring
   (of the evaporative emission control system)

**NOTE:**
° Before troubleshooting, remove the following part(-s):
1) tool box cover
2) left side cover
° Troubleshoot with the following special tool(-s).

**1. Solenoid valve**

**CIRCUIT DIAGRAM**

**Pocket tester**
YU-03112, 90890-03112

---

**1. Main and ignition fuses**

° Check the main and ignition fuses for continuity.
Refer to “CHECKING THE FUSES” in chapter 3.
° Are the main and ignition fuses OK?

- YES
- NO

Replace the fuse (-s).

**2. Battery**

° Check the condition of the battery.
Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

**Open-circuit voltage**
12.8 V or more at 20 °C (68 °F)

° Is the battery OK?

- YES
- NO

° Clean the battery terminals.
° Recharge or replace the battery.

**3. Main switch**

° Check the main switch for continuity.
Refer to “CHECKING THE SWITCHES”.
° Is the main switch OK?

- YES
- NO

Replace the main switch.

---

4) Main switch
5) Ignition fuse
6) Battery
7) Main fuse
49) Solenoid valve
4. Solenoid valve resistance

- Disconnect the solenoid valve coupler from wire harness.
- Connect the pocket tester (Ω / 1) to the solenoid valve coupler terminals.

**Tester (+) lead → brown terminal (1)**
**Tester (−) lead → black terminal (2)**

- Measure the solenoid valve resistance

**Solenoid valve resistance:**
28 ~ 34 Ω at 20°C (68°F)

- Is the solenoid valve OK?

[Diagram with connections labeled 1 and 2]

**YES**
Replace the solenoid valve.

**NO**

5. Wiring

- Check the entire evaporative emission control system’s wiring. Refer to “CIRCUIT DIAGRAM”
- Is the evaporative emission control system’s wiring properly connected and without defects?

[Diagram with connections labeled 1 and 2]

**NO**
Properly connect or repair the evaporative emission control system’s wiring.

**YES**
Replace the solenoid valve.
SELF-DIAGNOSIS

The XVS1100L, XVS1100LC features self-diagnosis. When the main switch is turned to “ON”, the following items are monitored and the condition codes are displayed on the engine indicator light (irrespective of whether the engine is running or not).

**NOTE:**

The XVS1100L, XVS1100LC features a self-diagnosing system. In the XVS1100L, XVS1100LC, when the main switch is turned on the “Engine indicator light” in the speedometer comes on for 1.4 seconds then goes off. However, if there is a malfunction, it comes on for 1.4 seconds, goes off and then begins flashing. (However, it is on while the engine is running.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
<th>Response</th>
<th>Display condition code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throttle position sensor (TPS)</td>
<td>Disconnected</td>
<td>Enables the motorcycle to run so that the ignition timing is fixed when the throttle is fully opened. Displays the condition code on the engine indicator light.</td>
<td>Blinks in Fault code: 3 Light on</td>
</tr>
<tr>
<td></td>
<td>Short-circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Locked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed sensor</td>
<td>Disconnected</td>
<td>Displays the condition code on the engine indicator light.</td>
<td>Blinks in Fault code: 4 Light on</td>
</tr>
<tr>
<td></td>
<td>short-circuit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Display order on the engine indicator light**

1. Light on (seconds) . . . . . . . 0.5 seconds
2. Light off (seconds) . . . . . . . 0.5 seconds
3. Number of blinks . . . . . . . . Fault code
4. Light off (seconds) . . . . . . . 3 seconds

---

7-50
TROUBLESHOOTING

The engine warning light starts to display the self-diagnosis sequence.

Check:
1. throttle position sensor
2. speed sensor

NOTE:
° Before troubleshooting, remove the following part(s):
  1) rider seat
  2) fuel tank
  3) air filter case
  4) left side cover
° Troubleshoot with the following special tool(s).

Pocket tester
YU-03112, 90890-03112

1. Wire harness
   ° Check the wire harness for continuity.
   Refer to “CIRCUIT DIAGRAM”.
   ° Is the wire harness OK?

   YES
   NO

   Repair or replace the wire harness.

2. Throttle position sensor
   ° Check the throttle position sensor for continuity.
   Refer to “CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR” in chapter 6.
   ° Is the throttle position sensor OK?

   YES
   NO

Replace the ignitor unit.
Replace the throttle position sensor.

1. Throttle position sensor

CIRCUIT DIAGRAM

16 Throttle position sensor
17 Ignitor unit
2. Speed sensor

CIRCUIT DIAGRAM

1. Wire harness

- Check the wire harness for continuity. Refer to "CIRCUIT DIAGRAM".
- Is the wire harness OK?

[Diagram showing wire harness] 

Replace or replace the wire harness.

2. Speed sensor

- Place the motorcycle on a suitable stand so that the rear wheel is elevated.
- Connect the pocket tester (DC 20 V) to the speed sensor connector.

**Tester (+) lead → white terminal 1**

**Tester (–) lead → body earth**

- Set the main switch to “ON”.
- Turn the rear wheel slowly.
- Check the tester voltage (0 V - 5 V - 0 V).
- Is the speed sensor OK?

[Diagram showing speed sensor] 

Replace the ignitor unit. Replace the speed sensor.
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TROUBLESHOOTING

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NOTE:
The following guide for troubleshooting does not cover all the possible causes of problems. It should be helpful, however, as a guide to troubleshooting. Refer to the relative procedure in this manual for inspection, adjustment and replacement of parts.

STARTING FAILURE/HARD STARTING
FUEL SYSTEM
Fuel tank
° Empty
° Clogged fuel filter
° Clogged fuel strainer
° Clogged fuel tank drain hose
° Clogged roll-over valve
° Clogged roll-over valve breather hose
° Deteriorated or contaminated fuel
Fuel cock
° Clogged fuel hose

Carburetor
° Deteriorated or contaminated fuel
° Clogged pilot jet
° Clogged pilot air passage
° Sucked-in air
° Deformed float
° Worn needle valve
° Improperly sealed valve seat
° Improperly adjusted fuel level
° Improperly set pilot jet
° Clogged starter jet
° Faulty starter plunger
° Improperly adjusted starter cable

Air filter
° Clogged air filter element

Fuel pump
° Faulty fuel pump
° Faulty relay unit (fuel pump relay)

ELECTRICAL SYSTEM
Spark plug
° Improper plug gap
° Worn electrodes
° Wire between terminals severed
° Improper heat range
° Faulty spark plug cap
Ignition coil
° Broken or shorted primary/secondary
° Faulty spark plug lead
° Broken body

Switch and wiring
° Faulty main switch
° Faulty engine stop switch
° Broken or shorted wiring
° Faulty neutral switch
° Faulty start switch
° Faulty sidestand switch
° Faulty clutch switch

Starter motor
° Faulty starter motor
° Faulty starter relay
° Faulty relay unit (starting circuit cut-off relay)
° Faulty starter clutch
STARTING FAILURE/HARD STARTING/POOR IDLE SPEED PERFORMANCE/POOR MEDIUM-AND-HIGH SPEED PERFORMANCE

COMPRESSION SYSTEM
Cylinder and cylinder head
- Loose spark plug
- Loose cylinder head or cylinder
- Faulty cylinder head gasket
- Worn, damaged or seized cylinder
- Improperly sealed valve
- Improper valve-to-valve seat contact
- Improper valve timing
- Faulty valve spring

Piston and piston ring
- Improperly installed piston ring
- Worn, fatigued or broken piston ring
- Seized piston ring
- Seized or damaged piston

Crankcase and crankshaft
- Improperly seated crankcase
- Seized crankshaft

POOR IDLE SPEED PERFORMANCE

POOR IDLE SPEED PERFORMANCE

Carburetor
- Improperly returned starter plunger
- Loose pilot jet
- Clogged pilot air jet
- Improperly synchronized carburetors
- Improperly adjusted idle speed (throttle stop screw)
- Improper throttle cable free play
- Flooded carburetor

Electrical system
- Faulty battery
- Faulty spark plug
- Faulty ignitor unit
- Faulty pickup coil
- Faulty ignition coil

Valve train
- Improperly adjusted valve clearance

Air filter
- Clogged air filter element

POOR MEDIUM-AND-HIGH SPEED PERFORMANCE

POOR MEDIUM-AND-HIGH SPEED PERFORMANCE

Refer to “STARTING FAILURE/HARD STARTING”. (Fuel system, electrical system, compression system and valve train)

Carburetor
- Faulty diaphragm
- Improperly adjusted fuel level
- Clogged or loose main jet

Air filter
- Clogged air filter element

Fuel pump
- Faulty fuel pump
FAULTY GEAR SHIFTING/HARD SHIFTING
Refer to "CLUTCH DRAGGING".

SHIFT PEDAL DOES NOT MOVE
Shift shaft
° Improperly adjusted shift pedal link
° Bent shift shaft
Shift cam, shift fork
° Groove jammed with impurities
° Seized shift fork
° Bent shift fork guide bar

JUMPS-OUT-OF GEAR
Shift shaft
° Improperly adjusted shift lever position
° Improperly returned stopper lever
Shift fork
° Worn shift fork

CLUTCH SLIPPING/DRAGGING
CLUTCH SLIPPING
Clutch
° Improperly adjusted clutch cable
° Loose clutch spring
° Fatigued clutch spring
° Worn friction plate/clutch plate
° Incorrectly assembled clutch

CLUTCH DRAGGING
Clutch
° Warped pressure plate
° Unevenly tensioned clutch springs
° Bent push rod
° Broken clutch boss
° Burnt primary driven gear bushing
° Bent clutch plate
° Swollen friction plate
° Match marks not aligned

Transmission
° Seized transmission gear
° Jammed impurities
° Incorrectly assembled transmission

Shift cam
° Improper thrust play
° Worn shift cam groove

Engine oil
° Improper oil level
° Improper viscosity (low)
° Deterioration

Engine oil
° Improper oil level
° Improper viscosity (high)
° Deterioration
OVERHEATING

Ignition system
- Improper spark plug gap
- Improper spark plug heat range
- Faulty ignitor unit

Fuel system
- Improper carburetor main jet setting
- Improper fuel level
- Clogged air filter element

Compression system
- Heavy carbon build-up

Engine oil
- Improper oil level
- Improper oil viscosity
- Inferior oil quality

Brake
- Brake drag

FAULTY BRAKE

POOR BRAKING PERFORMANCE

Disc brake
- Worn brake pad
- Worn disc
- Air in brake fluid
- Leaking brake fluid
- Faulty cylinder kit cup
- Faulty caliper kit seal
- Loose union bolt
- Broken brake hose
- Oily or greasy disc/brake pad
- Incorrect brake fluid level

FRONT FORK OIL LEAKAGE AND FRONT FORK MALFUNCTION

MALFUNCTION
- Bent, deformed or damaged inner tube
- Bent or deformed outer tube
- Damaged fork spring
- Worn or damaged slide metal
- Bent or damaged damper rod
- Improper oil viscosity
- Improper oil level

OIL LEAKAGE
- Bent, damaged or rusty inner tube
- Damaged or cracked outer tube
- Damaged oil seal lip
- Improperly installed oil seal
- Improper oil level (too high)
- Loose damper rod holding bolt
- Broken cap bolt O-ring
- Loose drain bolt
- Damaged drain bolt gasket
UNSTABLE HANDLING

Handlebar
- Improperly installed or bent
- Worn bearing or bushing
- Bent or damaged

Steering
- Improperly installed handlebar crown
- Improperly installed steering shaft (improperly tightened ring nut)
- Damaged ball bearing or bearing race
- Bent steering stem
- Improperly installed steering shaft (improperly tightened ring nut)
- Damaged ball bearing or bearing race

Swingarm
- Worn bearing or bushing
- Bent or damaged

Rear Shock Absorber
- Faulty spring
- Oil and gas leakage

Tire
- Uneven tire pressures on both sides
- Incorrect tire pressure
- Uneven tire wear

Wheel
- Incorrect wheel balance
- Deformed cast wheel
- Damaged bearing
- Bent or loose wheel axle
- Excessive wheel runout
- Loosened spoke

Frame
- Bent
- Damaged steering head tube
- Improperly installed bearing race

FAULTY LIGHTING AND SIGNAL SYSTEMS

HEADLIGHT DOES NOT LIGHT
- Improper bulb
- Too many electric accessories
- Hard charging (broken stator coil wire, faulty rectifier/regulator)
- Incorrect connection
- Improperly grounded
- Poor contacts (main switch)
- Bulb life expired

BULB BURNT OUT
- Improper bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded
- Faulty main switch
- Bulb life expired

FLASHER DOES NOT LIGHT
- Improperly grounded
- Discharged battery
- Faulty turn switch
- Faulty flasher relay
- Faulty wire harness
- Loosely connected coupler
- Burnt-out bulb
- Faulty fuse

FLASHER BLINKS QUICKLY
- Improper bulb
- Faulty flasher relay
- Burnt-out bulb

FLASHER REMAINS LIT
- Faulty flasher relay
- Burnt-out bulb

FLASHER BLINKS SLOWLY
- Faulty flasher relay
- Faulty main and/or turn switch
- Improper bulb

HORN DOES NOT SOUND
- Faulty battery
- Faulty fuse
- Faulty main and/or horn switch
- Improperly adjusted horn
- Faulty horn
- Broken wire harness
FOREWORD

This Supplementary Service Manual has been prepared to introduce new service and data for the XVS1100A/XVS1100AC. For complete service information procedures it is necessary to use this Supplementary Service Manual together with the following manual.

XVS1100 SERVICE MANUAL: LIT-11616-12-63 (5EL-28197-E0)
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.

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

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

This Service Manual contains information regarding periodic maintenance to the emission control system. Please read this material carefully.

NOTE: Designs and specifications are subject to change without notice.

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

⚠️ 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 motorcycle operator, a bystander or a person inspecting or repairing the motorcycle.

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

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

MANUAL ORGANIZATION
This manual consists of chapters for the main categories of subjects. (See “Illustrated symbols”)

1st title ①: This is the title of the chapter with its symbol in the upper right corner of each page.

2nd title ②: This title indicates the section of the chapter and only appears on the first page of each section. It is located in the upper right corner of the page.

3rd title ③: This title indicates a sub-section that is followed by step-by-step procedures accompanied by corresponding illustrations.

EXPLODED DIAGRAMS
To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.

1. An easy-to-see exploded diagram ④ is provided for removal and disassembly jobs.

2. Numbers ⑤ are given in the order of the jobs in the exploded diagram. A number that is enclosed by a circle indicates a disassembly step.

3. An explanation of jobs and notes is presented in an easy-to-read way by the use of symbol marks ⑥. The meanings of the symbol marks are given on the next page.

4. A job instruction chart ⑦ accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.

5. For jobs requiring more information, the step-by-step format supplements ⑧ are given in addition to the exploded diagram and the job instruction chart.
ILLUSTRATED SYMBOLS

The following symbols are not relevant to every vehicle.
Symbols ① to ⑧ indicate the subject of each chapter.
① General information
② Specifications
③ Periodic checks and adjustments
④ Engine
⑤ Caburetor
⑥ Chassis
⑦ Electrical system
⑧ Troubleshooting

Symbols ⑨ to ⑮ indicate the following.
⑨ Serviceable with engine mounted
⑩ Filling fluid
⑪ Lubricant
⑫ Special tool
⑬ Tightening torque
⑭ Wear limit, clearance
⑮ Engine speed
⑯ Electrical data

Symbols ⑯ to ⑳ in the exploded diagrams indicate the types of lubricants and lubrication points.
⑯ Engine oil
⑰ Gear oil
⑱ Molybdenum disulfide oil
⑲ Wheel bearing grease
⑳ Lithium soap base grease
㉑ Molybdenum disulfide grease

Symbols ㉒ to ㉔ in the exploded diagrams indicate the following:
㉒ Apply locking agent (LOCTITE®)
㉓ Replace the part
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- Crankshaft
- Main axle
- Drive axle
- Pinion drive
- Middle driveshaft
- Oil filter
- Relief valve
- Oil pump
- Oil pan

Pressure feed
Splashed
Orifice
## MAINTENANCE SPECIFICATIONS

### CHASSIS

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front suspension:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front fork travel</td>
<td>140 mm (5.51 in)</td>
<td></td>
</tr>
<tr>
<td>Fork spring free length</td>
<td>361.9 mm (14.25 in)</td>
<td>350 mm (13.78 in)</td>
</tr>
<tr>
<td>Fitting length</td>
<td>324.4 mm (12.77 in)</td>
<td></td>
</tr>
<tr>
<td>Collar length</td>
<td>183 mm (7.20 in)</td>
<td></td>
</tr>
<tr>
<td>Spring rate (K1)</td>
<td>8.8 N/mm (0.9 kg/mm, 50.40 lb/in)</td>
<td></td>
</tr>
<tr>
<td>Spring rate (K2)</td>
<td>12.7 N/mm (1.3 kg/mm, 72.80 lb/in)</td>
<td></td>
</tr>
<tr>
<td>Stroke (K1)</td>
<td>0 / 77.5 mm (0 / 3.05 in)</td>
<td></td>
</tr>
<tr>
<td>Stroke (K2)</td>
<td>77.5 / 140 mm (3.05 / 5.51 in)</td>
<td></td>
</tr>
<tr>
<td>Optional spring</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Oil capacity</td>
<td>0.464 L (464 cm³, 16.4 Imp OZ, 15.7 US OZ)</td>
<td></td>
</tr>
<tr>
<td>Oil level</td>
<td>108 mm (4.25 in)</td>
<td></td>
</tr>
<tr>
<td>Oil grade</td>
<td>Fork oil 10W or equivalent</td>
<td></td>
</tr>
<tr>
<td>Brake lever &amp; brake pedal:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brake lever free play (at lever end)</td>
<td>5 / 8 mm (0.20 / 0.31 in)</td>
<td></td>
</tr>
<tr>
<td>Brake pedal position</td>
<td>98.5 mm (3.88 in)</td>
<td></td>
</tr>
<tr>
<td>Brake pedal free play</td>
<td>0 mm (0.00 in)</td>
<td></td>
</tr>
<tr>
<td>Clutch lever free play (at lever end)</td>
<td>5 / 10 mm (0.20 / 0.39 in)</td>
<td></td>
</tr>
<tr>
<td>Throttle grip free play</td>
<td>4 / 6 mm (0.16 / 0.24 in)</td>
<td></td>
</tr>
</tbody>
</table>
## Tightening torques

<table>
<thead>
<tr>
<th>Part to be tightened</th>
<th>Thread size</th>
<th>Tightening torque</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake hose holder and lower bracket</td>
<td>M6</td>
<td>7</td>
<td>0.7</td>
</tr>
<tr>
<td>Headlight stay and lower bracket</td>
<td>M8</td>
<td>23</td>
<td>2.3</td>
</tr>
<tr>
<td>Headlight body and headlight unit</td>
<td>M5</td>
<td>4</td>
<td>0.4</td>
</tr>
<tr>
<td>Headlight stay and headlight</td>
<td>M6</td>
<td>7</td>
<td>0.7</td>
</tr>
<tr>
<td>Helmet hanger and frame</td>
<td>M6</td>
<td>7</td>
<td>0.7</td>
</tr>
<tr>
<td>Passenger seat</td>
<td>M8</td>
<td>7</td>
<td>0.7</td>
</tr>
<tr>
<td>Passenger seat bracket</td>
<td>M6</td>
<td>7</td>
<td>0.7</td>
</tr>
<tr>
<td>Lubrication point</td>
<td>Symbol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>--------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive shaft coupling gear oil seal</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LUBRICATION DIAGRAMS

1. Camshaft
2. Crankshaft
3. Main axle
4. Middle drive shaft
5. Drive axle
6. Connecting rod big end
CABLE ROUTING

1. Clutch cable
2. Starter cable
3. Handlebar switch lead (left)
4. Handlebar switch lead (right)
5. High tension code
6. Throttle cable
7. Fuel hose (fuel cock-filter)
8. Fuel breather hose (fuel tank-roll over valve) (for CAL)
9. Fuse box
10. Alarm connector
11. Fuel pump lead
12. Speed sensor lead
13. Sidestand switch lead
14. Neutral switch lead
15. Pickup coil lead
16. To engine
17. A.C. magneto lead
18. Ventilation hose
19. Sensing hose (AIS-carburetor joint)
20. Fuel hose (carburetor-fuel pump)
21. Clip
22. Brake hose
23. Heat protector
24. Speed meter lead
25. Wireharness
26. Purge hose (carburetor-sole-noid valve) (for CAL)
27. Fitting plate
28. Fuel hose (inlet) (fuel filter-fuel pump)
29. Fuel hose (outlet) (carburetor-fuel pump)
30. Alarm connector lead
31. Wireharness

Diagram:

- B-B
- A-A
- C
A Fasten the handlebar switch lead (left and right) to the handlebar with plastic locking tie and cut the end of tie.

B Position the throttle cable and starter cable as shown and clamp them with holder.

C Clamp the wireharness with the hook of frame side.

D When installing the pipe of throttle cable press it inside.

E Clamp the fuel hoses to the frame with the clamp.

F Change the fuel hose (fuel cock side) and fuel hose (carburetor side) between guide of frame and clamp. (carburetor side is upper)

G When connecting the sensing hose (carburetor joint-AIS) with a nozzle.

H Push the wireharness inside of the side cover.

I Push the sensing hose inside of the LID and not bend the sensing hose.
**CABLE ROUTING SPEC**

**J** Through the wireharness of solenoid valve between AIS duct and fuel hose (for CAL).

**K** Fasten the alarm lead with a plastic band on the LID.

**L** Fasten the sidestand switch lead to the bracket of LID with plastic locking tie.

**M** Fasten the lead with locking tie near the side cover.

**N** Position the all connectors inside of the connector cover.

**O** Route the clutch cable through the cable guide.

**P** Fasten the handlebar switch leads (left and right) under the handle crown with a plastic band. Set the band at four notches and install it no slacking.

**Q** Route the each hoses through the frame guide and do not pinch it.

**R** When installing the fitting plate, do not pinch the each hoses and wireharness.

**S** Where install the AIS push the wireharness to space of rearside.
33 Flasher relay
34 Handlebar switch lead (left)
35 Silencer
36 Throttle position sensor lead
37 Carburetor heater lead
38 Thermo switch lead
39 Starting circuit cut-off relay
40 Horn
41 Rectifire/regulator and light (reduce relay) lead

A Clamp the battery positive (+) lead to the battery with battery band.
B Connect the battery negative (–) lead and push it in to the space between battery box and battery.
C Push the wireharness into the space between frame and starter motor relay.
D Route the rectifire/regulator lead, wireharness and starter motor positive (+) lead through the out of frame bracket and fasten them to the frame with a plastic locking tie. The place to fix must be between 0 mm (0 in) and 10 mm (0.4in) from the top of the diverging point of the lead on the harness side which connected the battery negative (–) lead.
E Connect the purge hose (carburetor side-solenoid valve side) with joint, knob is outside of frame.  
F Route the front turn signal/position light lead and headlight lead through the rear of headlight body hole.  
G Connect the ignition coil lead at red tape to the right side.  
H Knob of clip is rear side of body.  
I Fasten the rear brake switch lead to the rear brake switch bracket with a plastic locking tie and cut of the end, inside of frame.  
J Fasten the wire harness, starter motor positive (+) lead and battery negative (–) lead to the frame with a plastic locking tie.  
K From the engine.  
L About 70 mm (2.8 in)  
M Fasten the rear brake switch lead and master cylinder reservoir hose to the down tube with a plastic locking tie, and cut the end of locking tie and position is inside of frame.  
N About 20 mm (0.8 in) from bead end.  
O Locate the band to forward of down tube.  
P Route the rectifier/regulator lead and carburetor heater lead through inside of battery box hole to outside it and connect them.
A Clamp the throttle cables with the holder. Position the end of clip downward.
B Route the rear brake switch lead under the master cylinder reservoir hose.
C Position the band end of right side bracket.
D Position the steel band end to forward.

E Position the steel band end to right side.
F Route the battery positive (+) lead through the slit of the battery box.
G Clamp the igniter unit lead to the frame with a holder.
H To the rear fender.

I Connect the wireharness to the igniter unit through the hole of Lid. 2.
J Route the fuel tank breather hose under the fuel filter and connect it (fuel tank sideroll over valve side) with a joint. Position the end of clip outside.
K Position the mark on the steel band to forward.
L Fasten the wireharness with a band on the tool box plate.
M Fasten the wireharness to the frame with a plastic locking tie. Position the locking tie front of the holder.
N Route the wireharness outside of the guide on the frame.
O Clamp the clutch cable and starter cable with a holder. Position the end of holder downside.
P Route the igniter lead through the igniter plate hole to the wireharness.
Q To the wireharness.
R Clamp the taillight lead with mud guard clamp.
S Clamp the taillight lead with a holder on the mud guard.
T Position the locking tie upward.
U The front direction of the level body.
1 Throttle cable  
2 Starter cable  
3 Clutch cable  
4 Handlebar switch lead (left)  
5 Headlight lead  
6 Brake hose  
7 Handlebar switch lead (right)

A Route the handlebar switch lead (right) rear side of the throttle cable.
## PERIODIC CHECKS AND ADJUSTMENTS

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

### PERIODIC MAINTENANCE CHART FOR EMISSION CONTROL SYSTEM

<table>
<thead>
<tr>
<th>No.</th>
<th>ITEM</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Valve clearance</td>
<td>&quot;Check and adjust valve clearance when engine is cold.&quot;</td>
</tr>
<tr>
<td>2</td>
<td>Spark plugs</td>
<td>&quot;Check condition.          &quot;Adjust gap and clean. &quot;Replace at 8,000 mi (13,000 km) or 12 months and thereafter every 8,000 mi (13,000 km) or 12 months.</td>
</tr>
<tr>
<td>3</td>
<td>Crankcase ventilation system</td>
<td>&quot;Check ventilation hose for cracks or damage. &quot;Replace if necessary.</td>
</tr>
<tr>
<td>4</td>
<td>Fuel line</td>
<td>&quot;Check fuel hose for cracks or damage. &quot;Replace if necessary.</td>
</tr>
<tr>
<td>5</td>
<td>Fuel filter</td>
<td>&quot;Replace initial 20,000 mi (31,000 km) and thereafter every 20,000 mi (31,000 km).&quot;</td>
</tr>
<tr>
<td>6</td>
<td>Exhaust system</td>
<td>&quot;Check for leakage. &quot;Retighten if necessary. &quot;Replace gasket(s) if necessary.</td>
</tr>
<tr>
<td>7</td>
<td>Carburetor synchronization</td>
<td>&quot;Adjust synchronization of carburetors.&quot;</td>
</tr>
<tr>
<td>8</td>
<td>Idle speed</td>
<td>&quot;Check and adjust engine idle speed. &quot;Adjust cable free play.</td>
</tr>
<tr>
<td>9</td>
<td>Evaporative emission control system*</td>
<td>&quot;Check control system for damage. &quot;Replace if necessary.</td>
</tr>
</tbody>
</table>

* Since these items require special tools, data and technical skills, they should be serviced by a Yamaha dealer.

** California only.

### GENERAL MAINTENANCE AND LUBRICATION CHART

<table>
<thead>
<tr>
<th>No.</th>
<th>ITEM</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engine oil</td>
<td>&quot;Replace. &quot;Warm engine before draining.&quot;</td>
</tr>
<tr>
<td>2</td>
<td>Engine oil filter</td>
<td>&quot;Replace.&quot;</td>
</tr>
<tr>
<td>3</td>
<td>Air filter</td>
<td>&quot;Clean or replace if necessary.&quot;</td>
</tr>
<tr>
<td>4</td>
<td>Brake system</td>
<td>&quot;Check operation, fluid level, and fluid leakage. &quot;Correct accordingly. &quot;Replace pads if necessary.</td>
</tr>
<tr>
<td>5</td>
<td>Clutch</td>
<td>&quot;Check operation. &quot;Adjust or replace cable.&quot;</td>
</tr>
<tr>
<td>No.</td>
<td>ITEM</td>
<td>REMARKS</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------</td>
<td>----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>* Final gear oil</td>
<td>* Check oil level and leakage.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Replace at initial 600 mi (1,000 km) or 1 month and thereafter every 16,000 mi (25,000 km) or 24 months.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* SAE 80 API “GL-4” hypoid gear oil.</td>
</tr>
<tr>
<td>7</td>
<td>* Control and meter cable</td>
<td>* Apply chain lube thoroughly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Yamaha chain and cable lube or SAE 10W30 motor oil.</td>
</tr>
<tr>
<td>8</td>
<td>* Swingarm pivot bearing</td>
<td>* Check swingarm pivot for play.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Correct if necessary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Moderately repack every 16,000 mi (25,000 km) or 24 months with lithium soap base grease.</td>
</tr>
<tr>
<td>9</td>
<td>Brake/Clutch lever pivot shaft</td>
<td>* Apply chain lube thoroughly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Yamaha chain and cable lube or SAE 10W30 motor oil.</td>
</tr>
<tr>
<td>10</td>
<td>Brake pedal and shift pedal shaft</td>
<td>* Apply chain lube thoroughly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Yamaha chain and cable lube or SAE 10W30 motor oil.</td>
</tr>
<tr>
<td>11</td>
<td>Sidestand pivots</td>
<td>* Check operation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Lubricate and repair if necessary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Yamaha chain and cable lube or SAE 10W30 motor oil.</td>
</tr>
<tr>
<td>12</td>
<td>* Front fork</td>
<td>* Check operation and for oil leakage.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Correct accordingly.</td>
</tr>
<tr>
<td>13</td>
<td>* Steering bearings</td>
<td>* Check bearing play and steering for smooth operation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Correct if necessary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Moderately repack every 16,000 mi (25,000 km) or 24 months with lithium soap base grease.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Lithium soap base grease.</td>
</tr>
<tr>
<td>14</td>
<td>* Wheel bearings</td>
<td>* Check bearings for looseness and damage.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Replace if necessary.</td>
</tr>
<tr>
<td>15</td>
<td>* Wheels</td>
<td>* Check balance, runout, spoke tightness and for damage.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Tighten spokes and rebalance or replace if necessary.</td>
</tr>
<tr>
<td>16</td>
<td>* Sidestand switch</td>
<td>* Check operation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Replace if necessary.</td>
</tr>
<tr>
<td>17</td>
<td>* Tires</td>
<td>* Check tire tread wear and for damage.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Replace if necessary.</td>
</tr>
<tr>
<td>18</td>
<td>* Rear shock absorber</td>
<td>* Check operation and for oil leakage.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Replace if necessary.</td>
</tr>
<tr>
<td>19</td>
<td>* Chassis fasteners</td>
<td>* Make sure that all nuts, bolts and screws are properly tightened.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Tighten if necessary.</td>
</tr>
</tbody>
</table>

* Since these items require special tools, data and technical skills, they should be serviced by a Yamaha dealer.

**NOTE:**
For odometer readings or time periods higher than 20,000 mi (31,000 km) or 30 months, repeat the same maintenance as listed in the chart from the 4,000 mi (7,000 km) or 6 month interval.

**NOTE:**
° The air filter needs more frequent service if you are riding in unusually wet or dusty areas.
° Hydraulic brake system
° When disassembling the master cylinder or caliper cylinder, always replace the brake fluid. Check the brake fluid level regularly and fill as required.
° Replace the oil seals on the inner parts of the master cylinder and caliper cylinder every two years.
° Replace the brake hoses every four years or if cracked or damaged.
## Fuel Tank and Seats

### Job/Part List

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Part</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Fuel tank and seats removal</strong></td>
<td>1</td>
<td>Remove the parts in the order below.</td>
</tr>
<tr>
<td>2</td>
<td>Passenger seat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Passenger seat bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rider’s seat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fuel hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Ignitor plate</td>
<td>1</td>
<td><strong>NOTE:</strong> Set the fuel cock to “OFF” before disconnecting the fuel hose.</td>
</tr>
<tr>
<td>7</td>
<td>Mud guard</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Meter lead couper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fuel tank assembly</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

**NOTE:**

- Set the fuel cock to “OFF” before disconnecting the fuel hose.
- For installation, reverse the removal procedure.
ADJUSTING THE REAR BRAKE

1. Check:
   "brake pedal position
   (distance \( \text{a} \) from the top of the rider footrest
to the top of the brake pedal)
   Out of specification \( \rightarrow \) Adjust.

   \[ \text{Brake pedal position (below the top of the rider footrest)} \]
   \[ 98.5 \text{ mm (3.88 in)} \]

2. Adjust:
   "brake pedal position

   \[ \begin{array}{c}
   \text{Loosen the locknut} \ 1. \\
   \text{Turn the adjusting bolt} \ 2 \ \text{in direction} \ \text{b or c} \\
   \text{until the specified brake pedal position is obtained.}
   \end{array} \]

   \[ \begin{array}{c}
   \text{Direction} \ \text{b} \ \rightarrow \ \text{Brake pedal is raised.} \\
   \text{Direction} \ \text{c} \ \rightarrow \ \text{Brake pedal is lowered.}
   \end{array} \]

\[ \text{WARNING} \]

After adjusting the brake pedal position, check that the end of the adjusting bolt \( \text{2} \) is visible through the hole \( \text{d} \).

   \[ \text{c. Tighten the locknut} \ 1 \ \text{to specification.} \]

   \[ \text{Locknut} \]
   \[ 16 \text{ Nm (1.6 m}^\circ \text{kg, 12 ft}^\circ \text{lb)} \]

\[ \text{WARNING} \]

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. Air in the brake system will considerably reduce braking performance and could result in loss of control and possibly an accident. Therefore, inspect and, if necessary, bleed the brake system.

\[ \text{CAUTION:} \]

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

3. Adjust:
   "rear brake light switch
   Refer to “ADJUSTING THE REAR BRAKE LIGHT SWITCH”.

---

-21-
ADJUSTING THE SHIFT PEDAL

NOTE: The shift pedal position is determined by the adjusting bolt length ③.

1. Measure:
   a. adjusting the length ③
   Incorrect → Adjust.

   **Adjusting bolt length**
   114.9 mm (4.53 in)

2. Adjust:
   a. Loosen both locknuts ①
   b. Turn the adjusting bolt ② in direction ⑥ or ⑦ to obtain the correct shift pedal position.

   Direction ⑥ → shift pedal is raised.
   Direction ⑦ → shift pedal is lowered.

CHECKING THE TIRES

The following procedure applies to both of the tires.

1. Measure:
   a. tire pressure
   Out of specification → Regulate.

   **WARNING**
   a. The tire pressure should only be checked and regulated when the tire temperature equals the ambient air temperature.
   b. 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.
   c. Operation of an overloaded motorcycle could cause tire damage, an accident or an injury.

   NEVER OVERLOAD THE MOTORCYCLE.
CHECKING THE TIRES

<table>
<thead>
<tr>
<th>Basic weight: (with oil and full fuel tank)</th>
<th>288 kg (635 lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum load*:</td>
<td>200 kg (441 lb)</td>
</tr>
<tr>
<td>Cold tire pressure:</td>
<td>Front</td>
</tr>
<tr>
<td>Up to 90 kg (198 lb) load*</td>
<td>225 kPa (2.25 kg/cm², 32.6 psi)</td>
</tr>
<tr>
<td>90 kg (198 lb) / maximum load*</td>
<td>225 kPa (2.25 kg/cm², 32.6 psi)</td>
</tr>
<tr>
<td>High speed riding</td>
<td>225 kPa (2.25 kg/cm², 32.6 psi)</td>
</tr>
</tbody>
</table>

*: total of cargo, rider, passenger and accessories

**WARNING**

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

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

**Minimum tire tread depth**

1.6 mm (0.06 in)

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

**WARNING**

- Do not use a tubeless tire on a wheel designed only for tube tires to avoid tire failure and personal injury from sudden deflation.
- When using a tube tire, be sure to install the correct tube.
- Always replace a new tube tire and a new tube as a set.
- To avoid pinching the tube, make sure that the wheel rim band and tube are centered in the wheel groove.
CHECKING THE TIRES

Warning

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.

<table>
<thead>
<tr>
<th>Tube wheel</th>
<th>Tubeless wheel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube tire only</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. Then 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 motorcycle.

Front tire:

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUNLOP</td>
<td>130/90-16 67S</td>
<td>D404F</td>
</tr>
</tbody>
</table>

Rear tire:

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUNLOP</td>
<td>170/80-15 M/C 77S</td>
<td>D404G</td>
</tr>
</tbody>
</table>

⚠️ WARNING

New tires have a relatively low grip on the road surface until they have been slightly worn. Therefore, approximately 100 km (62.4 mi) should be traveled at normal speed before any highspeed riding is done.
ADJUSTING THE HEADLIGHT BEAM

1. Adjust:
   ° headlight beam (vertically)
   a. Turn the adjusting screw 1 in direction a or b.

<table>
<thead>
<tr>
<th>Direction a →</th>
<th>Headlight beam is raised.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction b →</td>
<td>Headlight beam is lowered.</td>
</tr>
</tbody>
</table>

2. Adjust:
   ° headlight beam (horizontally)
   a. Turn the adjusting knob 2 in direction a or b.

<table>
<thead>
<tr>
<th>Direction a →</th>
<th>Headlight beam moves to the right.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction b →</td>
<td>Headlight beam moves to the left.</td>
</tr>
</tbody>
</table>
### FRONT AND REAR BRAKES

#### FRONT BRAKE PADS

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Part</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Removing the front brake pads</td>
<td>1</td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Retaining bolt</td>
<td>1</td>
<td>Refer to “REPLACING THE FRONT BRAKE PADS”.</td>
</tr>
<tr>
<td>3</td>
<td>Brake caliper</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Brake pads</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
<tr>
<td></td>
<td>Pad spring</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### REAR BRAKE MASTER CYLINDER

**Order** | **Job/Part** | **Q'ty** | **Remarks**
--- | --- | --- | ---
1 | Removing the rear brake master cylinder | 1 | Remove the parts in the order listed.  
   Brake fluid | 1 | Drain  
   Brake switch connector | 1/1 | Disconnect  
   Cotter pin/washer | 1 |  
   Pin | 2 |  
   Bolts | 1 |  
   Brake pedal assembly | 1 |  
   Union bolt | 2/1 | Refer to “REMOVING/INSTALLING THE REAR BRAKE MASTER CYLINDER”.  
   Copper washers/brake hose | 2/1 |  
   Clips/reservoir hose | 1 |  
   Master cylinder assembly | 1 |  
   Reservoir tank | 1 | For installation, reverse removal procedure.  

---

For installation, reverse removal procedure.
### FRONT BRAKE CALIPERS

**Removing the front brake calipers**

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Part</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brake fluid</td>
<td>1</td>
<td>Remove the parts in the order listed. Drain</td>
</tr>
<tr>
<td>2</td>
<td>Brake hose holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Union bolt</td>
<td>1</td>
<td>Refer to “REMOVING/INSTALLING THE FRONT BRAKE CALIPERS”.</td>
</tr>
<tr>
<td>4</td>
<td>Copper washers</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brake hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Retaining bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Brake caliper assembly</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

**Torques**

- 6 Nm (0.6 m·kg, 4.3 ft·lb)
- 23 Nm (2.3 m·kg, 17 ft·lb)
- 30 Nm (3.0 m·kg, 22 ft·lb)
<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Part</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Disassembling the front brake calipers</strong></td>
<td></td>
<td>Remove the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Pad spring</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
<tr>
<td>3</td>
<td>Brake caliper pistons</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dust seals</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Caliper piston seals</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bleed screw</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For assembly, reverse the disassembly procedure.
FRONT FORK

Order | Job/Part | Q'ty | Remarks
--- | --- | --- | ---
1 | Brake hose holders | 2 | Remove the parts in the order listed. Refer to “FRONT WHEEL AND BRAKE DISCS”.
2 | Brake caliper assembly | 2 |
3 | Front fender | 1 |
4 | Upper bracket bolts | 2 |
5 | Cap bolts | 2 |
6 | Lower bracket bolts | 2 |
7 | Steering stem nut | 1 |
8 | Upper bracket with handle | 1 |

Removing the front fork
Front wheel

- 110 Nm (11.0 m·kg, 80 ft·lb)
- 23 Nm (2.3 m·kg, 17 ft·lb)
- 20 Nm (2.0 m·kg, 1.4 ft·lb)
- 10 Nm (1.0 m·kg, 7.2 ft·lb)
- 7 Nm (0.7 m·kg, 5.1 ft·lb)
- 40 Nm (4.0 m·kg, 29 ft·lb)
- 30 Nm (3.0 m·kg, 22 ft·lb)
- 7 Nm (0.7 m·kg, 5.1 ft·lb)
Order | Job/Part | Q'ty | Remarks
--- | --- | --- | ---
9 | Upper fork covers | 2 | 
10 | Upper fork cover spacers | 2 | 
11 | Upper fork cover washers | 2 | 
12 | Front fork legs | 2 | 
13 | Lower fork covers | 2 | For installation, reverse the removal procedure.

110 Nm (11.0 m·kg, 80 ft·lb) | 23 Nm (2.3 m·kg, 17 ft·lb) | 20 Nm (2.0 m·kg, 1.4 ft·lb) | 30 Nm (3.0 m·kg, 22 ft·lb) | 7 Nm (0.7 m·kg, 5.1 ft·lb) | 40 Nm (4.0 m·kg, 29 ft·lb) | 10 Nm (1.0 m·kg, 7.2 ft·lb)
Disassembling the front fork

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Part</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cap bolt</td>
<td>1</td>
<td>Disassemble the parts in the order listed.</td>
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<td>2</td>
<td>O-ring</td>
<td>1</td>
<td></td>
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<tr>
<td>3</td>
<td>Spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spring seat</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fork spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dust seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oil seal clip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Damper rod bolt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Copper washer</td>
<td>1</td>
<td>Refer to “DISASSEMBLING/ASSEMBLING THE FRONT FORK LEGS”.</td>
</tr>
<tr>
<td>10</td>
<td>Damper rod/rebound spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Oil seal</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

23 Nm (2.3 m·kg, 17 ft·lb)

30 Nm (3.0 m·kg, 22 ft·lb)
<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Part</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Seal spacer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Outer tube bushing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Inner tube/inner tube bushing</td>
<td>1/1</td>
<td>Refer to “DISASSEMBLING/ASSEMBLING THE FRONT FORK LEGS”.</td>
</tr>
<tr>
<td>15</td>
<td>Oil lock piece</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Outer tube</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>

Refer to "DISASSEMBLING/ASSEMBLING THE FRONT FORK LEGS".

For assembly, reverse the disassembly procedure.

23 Nm (2.3 m·kg, 17 ft·lb)

30 Nm (3.0 m·kg, 22 ft·lb)
REMOVING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.

1. Stand the motorcycle on a level surface.

**WARNING**

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

**NOTE:**

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

2. Remove:
   - upper bracket
   Refer to “STEERING HEAD”

3. Loosen:
   - lower bracket pinch bolt

**WARNING**

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

4. Remove:
   - front fork leg

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

1. Remove:
   - cap bolt
   - O-ring
   - spacer
   - spring seat
   - fork spring

2. Drain
   - fork oil

3. Remove:
   - dust seal
     (with a flat-head screwdriver)
   - oil seal clip

**CAUTION:**

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

4. Remove:
  - damper rod bolt
  - copper washer

NOTE:
While holding the damper rod with the T-handle ① and damper rod holder ②, loosen the damper rod bolt ③.

6. Remove:
  - inner tube

Hold the front fork leg horizontally.
- Slowly push A the inner tube into the outer tube and just before it bottoms out, pull B the inner tube back quickly.
- Repeat this step until the inner tube separates from the outer tube.

CHECKING THE FRONT FORK LEGS
The following procedure applies to both of the front fork legs.
1. Check:
  - inner tube ①
  - outer tube ②
  Bends/damage/scratches → Replace.

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

2. Measure:
  - spring free length ③
  Over the specified limit → Replace.

Spring free length limit
361.9 mm (14.25 in)
3. Check:
   - damper rod ①
     Damage/wear → Replace.
     Obstruction → Blow out all of the oil passages with compressed air.
   - oil lock piece ②
     Damage → Replace.

**WARNING**

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

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

**WARNING**

Make sure that the oil levels both front fork legs are equal.

Uneven oil levels can result in poor handling and a loss of stability.

**NOTE:**

When assembling the front fork leg, be sure to replace the following parts:
- inner tube bushing
- outer tube bushing
- oil seal
- dust seal

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

1. Install:
   - damper rod ①
   - oil lock piece ②

**WARNING**

Always use new copper washers.

**CAUTION:**

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

- inner tube’s outer surface

<table>
<thead>
<tr>
<th>Recommended lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yamaha fork and shock oil</td>
</tr>
<tr>
<td>10 W or equivalent</td>
</tr>
</tbody>
</table>

3. Tighten:

- damper rod bolt ①

NOTE: 30 Nm (3.0 m·kg, 22 ft·lb)

While holding the damper rod with the T-handle ① and damper rod holder ②, tighten the damper rod bolt ③.

T-handle
YM-01326, 90890-01326
Damper rod holder
YM-1300-1, 90890-01460

4. Install:

- outer tube bushing ①
- seal spacer
  (with the fork seal driver weight ② and adapter ③)

Fork seal driver weight
YM-33963, 90890-01367
Adapter
YM-33968, 90890-01381

5. Install:

- oil seal ①
  (with the fork seal driver weight and adapter)

**CAUTION:**

Make sure that the numbered side of the oil seal faces up.

NOTE:  

- Before installing the oil seal, apply lithium soap base grease onto its lips.

6. Install:

- oil seal clip ①

NOTE:  

Adjust the oil seal clip so that it fits into the outer tube groove.
7. Install:
   - dust seal ① (with the fork seal driver weight)
8. Fill:
   - front fork leg (with the specified amount of the recommended fork oil)

<table>
<thead>
<tr>
<th>Quantity (each front fork leg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.464 L (464 cm³, 16.4 Imp oz, 15.7 US oz)</td>
</tr>
<tr>
<td>Recommended oil</td>
</tr>
<tr>
<td>Yamaha fork and shock oil 10W or equivalent</td>
</tr>
</tbody>
</table>

**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 inner tube up and down (at least ten times) to distribute the fork oil.

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

10. Measure:
    - front fork leg oil level ③
      Out of specification → Correct.

<table>
<thead>
<tr>
<th>Front fork leg oil level (from the top of the inner tube, with the inner tube fully compressed, and without the spring)</th>
</tr>
</thead>
<tbody>
<tr>
<td>108 mm (4.25 in)</td>
</tr>
</tbody>
</table>

**NOTE:**
Hold the fork in an upright position.

11. Install:
    - fork spring
    - spring seat
    - spacer
    - O-ring
    - cap bolt
NOTE:
- Install the fork spring with its smaller pitch upward.
- Before installing the cap bolt, apply grease to the O-ring.
- Temporarily tighten the cap bolt.

INSTALLING THE FRONT FORK LEGS
1. Install:
   - Lower fork covers ①
   - Front forks
   Temporarily tighten the lower bracket pinch bolts.

2. Tighten:
   - Upper bracket
   - Steering stem nut
   - 110 Nm (11.0 m·kg, 80 ft·lb)

   NOTE:
   - When aligning the fork tubes do not install the upper fork covers.
   - Make sure that the inner tube end is flush with the top of the handlebar crown.

3. Tighten
   - Lower bracket pinch bolts
   - 30 Nm (3.0 m·kg, 22 ft·lb)
   - Cap bolts
   - 23 Nm (2.3 m·kg, 17 ft·lb)

4. Remove:
   - Steering stem nut
   - Upper bracket

5. Install:
   - Upper fork cover washers ①
   - Upper fork cover spacers ②
   - Upper fork covers ③
6. Install:
   ° Upper bracket ①
   ° Steering stem nut ②
   ⇨ 110 Nm (11.0 m·kg, 80 ft·lb)

7. Tighten:
   ° Upper bracket pinch bolts
   ⇨ 20 Nm (2.0 m·kg, 1.4 ft·lb)
### STEERING HEAD

**WARNING**

Remove the parts in the order listed. Stand the motorcycle on a level surface.

**WARNING**

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

**Order** | **Job/Part** | **Q'ty** | **Remarks**
--- | --- | --- | ---
1 | Front fork legs | 1 | Remove the parts in the order listed. Stand the motorcycle on a level surface.
2 | Handlebar | – | Securely support the motorcycle so that there is no danger of it falling over.
3 | Headlight lens unit | 1 | Refer to “FRONT FORK”.
4 | Leads (in the headlight body) | 1 | Refer to “HANDLEBAR”.
5 | Front turn signal/position light | 1 | Disconnect
6 | Headlight body | 1 | Disconnect
7 | Upper bracket | 1 | Disconnect
8 | Lock washer | 1 | Disconnect
9 | Upper ring nut | 1 | Disconnect
### Order Job/Part Q'ty Remarks

<table>
<thead>
<tr>
<th>Order</th>
<th>Job/Part</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Rubber washer</td>
<td>1</td>
<td>Refer to “REMOVING THE LOWER BRACKET/INSTALLING THE STEERING HEAD”.</td>
</tr>
<tr>
<td>9</td>
<td>Lower ring nut</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bearing cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Lower bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Bearing (upper)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Rubber seal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Bearing (lower)</td>
<td>1</td>
<td>For installation, reverse the removal procedure.</td>
</tr>
</tbody>
</table>

1st: 52 Nm (5.2 m·kg, 38 ft·lb)
2nd: 18 Nm (1.8 m·kg, 13 ft·lb)
110 Nm (11.0 m·kg, 80 ft·lb)
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.

1. The manual is divided into chapters. An abbreviation and symbol in the upper right corner of each page indicate the current chapter. Refer to "SYMBOLS".

2. Each chapter is divided into sections. The current section title is shown at the top of each page, except in Chapter 3 ("PERIODIC CHECKS AND ADJUSTMENTS"), where the sub-section title(s) appears.

3. Sub-section titles appear in smaller print than the section title.

4. To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.

5. Numbers are given in the order of the jobs in the exploded diagram. A circled number indicates a disassembly step.

6. Symbols indicate parts to be lubricated or replaced. Refer to "SYMBOLS".

7. A job instruction chart accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.

8. Jobs requiring more information (such as special tools and technical data) are described sequentially.
ILLUSTRATED SYMBOLS

The following symbols are not relevant to every vehicle.

Symbols 1 to 8 indicate the subject of each chapter.

1. General information  
2. Specifications  
3. Periodic checks and adjustments  
4. Engine  
5. Carburetor  
6. Chassis  
7. Electrical system  
8. Troubleshooting

Symbols 9 to 16 indicate the following.

9. Serviceable with engine mounted  
10. Filling fluid  
11. Lubricant  
12. Special tool  
13. Tightening torque  
14. Wear limit, clearance  
15. Engine speed  
16. Electrical data

Symbols 17 to 22 in the exploded diagrams indicate the types of lubricants and lubrication points.

17. Engine oil  
18. Gear oil  
19. Molybdenum-disulfide oil  
20. Wheel-bearing grease  
21. Lithium-soap-based grease  
22. Molybdenum-disulfide grease

Symbols 23 to 24 in the exploded diagrams indicate the following.

23. Apply locking agent (LOCTITE®)  
24. Replace the part
# CONTENTS

## SPECIFICATIONS

<table>
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<tr>
<th>General Specifications</th>
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</tr>
</thead>
<tbody>
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<td>Maintenance Specifications</td>
<td>2</td>
</tr>
<tr>
<td>Engine</td>
<td>2</td>
</tr>
<tr>
<td>Chassis</td>
<td>3</td>
</tr>
<tr>
<td>Electrical</td>
<td>4</td>
</tr>
</tbody>
</table>

## Periodic Checks and Adjustments

| Introduction | 6 |
| Periodic Maintenance Chart for Emission Control System | 6 |
| General Maintenance and Lubrication Chart | 6 |

## Carburetor

| Carburetor | 9 |
| Checking the Fuel Cut Solenoid | 11 |

## Electrical

| Carburetor Heater System | 12 |
| Circuit Diagram | 12 |
| Trouble Shooting | 13 |
| Self-Diagnosis | 16 |
| Trouble Shooting | 18 |

XVS11AWV/XVS11ATV/XVS1100ASC/XVS1100ATSC
Wiring Diagram (for US and CAL)
### GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model code:</td>
<td>XVS1100ASC : 5YS1 (For CAL)</td>
</tr>
<tr>
<td></td>
<td>XVS1100ATSC : 5YS4 (For CAL)</td>
</tr>
<tr>
<td></td>
<td>XVS1100ATTC : 5YSD (For CAL)</td>
</tr>
<tr>
<td></td>
<td>XVS1100AWTC : 5YS9 (For CAL)</td>
</tr>
<tr>
<td></td>
<td>XVS11ATV : 5YSM (For U.S.A.)</td>
</tr>
<tr>
<td></td>
<td>XVS11ATVC : 5YSN (For CAL)</td>
</tr>
<tr>
<td></td>
<td>XVS11AWV : 5YSH (For U.S.A.)</td>
</tr>
<tr>
<td></td>
<td>XVS11AWVC : 5YSJ (For CAL)</td>
</tr>
<tr>
<td>Basic weight</td>
<td>XVS1100ASC/XVS1100ATSC/XVS1100ATTC/XVS1100AWTC/XVS11ATVC/XVS11AWVC : 288.0 kg (635 lb)</td>
</tr>
<tr>
<td></td>
<td>XVS11ATV/XVS11AWV : 285.0 kg (628 lb)</td>
</tr>
<tr>
<td>Maximum load</td>
<td>XVS1100ASC/XVS1100ATSC/XVS1100ATTC/XVS1100AWTC/XVS11ATVC/XVS11AWVC : 200 kg (441 lb)</td>
</tr>
<tr>
<td></td>
<td>XVS11ATV/XVS11AWV : 203 kg (448 lb)</td>
</tr>
</tbody>
</table>
## MAINTENANCE SPECIFICATIONS

### ENGINE

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Final gear oil:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>SAE80 API GL-4 Hypoid gear oil</td>
<td></td>
</tr>
<tr>
<td>Quantity</td>
<td>0.19 L (0.20 US qt) (0.17 Imp.qt)</td>
<td></td>
</tr>
<tr>
<td><strong>Carburetor:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type × quantity</td>
<td>BSR37 × 2</td>
<td></td>
</tr>
<tr>
<td>Manufacturer</td>
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<td></td>
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<tr>
<td>ID mark</td>
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<td>Main jet</td>
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<td></td>
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<tr>
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<td>Pilot air jet 1</td>
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<tr>
<td>Pilot air jet 2</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Pilot jet</td>
<td>#17.5</td>
<td></td>
</tr>
<tr>
<td>Bypass 1</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Bypass 2</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Bypass 3</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Valve seat size</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Starter jet 1</td>
<td>#42.5</td>
<td></td>
</tr>
<tr>
<td>Starter jet 2</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Throttle valve size</td>
<td>#125</td>
<td></td>
</tr>
<tr>
<td>Fuel level</td>
<td>4–5 mm (0.16–0.20 in)</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Standard</td>
<td>Limit</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-----------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Front suspension:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Telescopic fork</td>
<td></td>
</tr>
<tr>
<td>Spring/shock absorber type</td>
<td>Coil spring/oil damper</td>
<td></td>
</tr>
<tr>
<td>Shock absorber travel</td>
<td>140.0 mm (5.51 in)</td>
<td></td>
</tr>
<tr>
<td>Fork spring free length</td>
<td>371.9 mm (14.64 in)</td>
<td></td>
</tr>
<tr>
<td>Collar length</td>
<td>183.0 mm (7.20 in)</td>
<td></td>
</tr>
<tr>
<td>Installed length</td>
<td>334.4 mm (13.17 in)</td>
<td></td>
</tr>
<tr>
<td>Spring rate K1</td>
<td>4.40 N/mm (25.12 lb/in) (0.45 kgf/mm)</td>
<td></td>
</tr>
<tr>
<td>Spring rate K2</td>
<td>6.30 N/mm (35.97 lb/in) (0.64 kgf/mm)</td>
<td></td>
</tr>
<tr>
<td>Spring stroke K1</td>
<td>0.0–77.5 mm (0.00–3.05 in)</td>
<td></td>
</tr>
<tr>
<td>Spring stroke K2</td>
<td>77.5–140.0 mm (3.05–5.51 in)</td>
<td></td>
</tr>
<tr>
<td>Inner tube outer diameter</td>
<td>41.0 mm (1.61 in)</td>
<td></td>
</tr>
<tr>
<td>Optional spring available</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Recommended oil</td>
<td>Yamaha fork oil 10WT</td>
<td></td>
</tr>
<tr>
<td>Quantity</td>
<td>488.0 cm³ (16.50 US oz) (17.21 Imp.oz)</td>
<td></td>
</tr>
<tr>
<td>Level</td>
<td>99.0 mm (3.90 in)</td>
<td></td>
</tr>
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</table>
### Electrical Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TCI:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pickup coil resistance</td>
<td>189–231 Ω Gray–Black</td>
<td></td>
</tr>
<tr>
<td>TCI unit model/manufacturer</td>
<td>J4T145/MITSUBISHI</td>
<td></td>
</tr>
<tr>
<td><strong>Battery:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>GT14B-4</td>
<td></td>
</tr>
<tr>
<td>Voltage, capacity</td>
<td>12 V, 12.0 Ah</td>
<td></td>
</tr>
<tr>
<td>Specific gravity</td>
<td>1.32</td>
<td></td>
</tr>
<tr>
<td>Manufacturer</td>
<td>GS YUASA</td>
<td></td>
</tr>
<tr>
<td>Ten hour rate amperage</td>
<td>1.20 A</td>
<td></td>
</tr>
<tr>
<td><strong>Bulb voltage, wattage × quantity:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headlight</td>
<td>12 V, 60 W/55.0 W × 1</td>
<td></td>
</tr>
<tr>
<td>Tail/brake light</td>
<td>12 V, 8.0 W/27.0 W × 1</td>
<td></td>
</tr>
<tr>
<td>Front turn signal/position light</td>
<td>XVS1100ASC/XVS1100ATSC :</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 V, 27 W/8.0 W × 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>XVS1100ATTC/XVS1100AWTC/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>XVS11ATV/XVS11ATVC/XVS11AWV/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>XVS11AWVC :</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 V, 23 W/8.0 W × 2</td>
<td></td>
</tr>
<tr>
<td>Rear turn signal light</td>
<td>XVS1100ASC/XVS1100ATSC :</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 V, 27.0 W × 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>XVS1100ATTC/XVS1100AWTC/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>XVS11ATV/XVS11ATVC/XVS11AWV/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>XVS11AWVC :</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 V, 21.0 W × 2</td>
<td></td>
</tr>
<tr>
<td>Meter lighting</td>
<td>14 V, 1.4 W × 2</td>
<td></td>
</tr>
<tr>
<td><strong>Starting circuit cut-off relay:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model/manufacturer</td>
<td>G8R-30Y-U0/OMRON</td>
<td></td>
</tr>
<tr>
<td>Coil resistance</td>
<td>162–198 Ω</td>
<td></td>
</tr>
<tr>
<td><strong>Fuel pump relay:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model/manufacturer</td>
<td>G8R-30Y-U0/OMRON</td>
<td></td>
</tr>
<tr>
<td>Coil resistance</td>
<td>162–198 Ω</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Standard</td>
<td>Limit</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------</td>
<td>-------</td>
</tr>
<tr>
<td>Fuses:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main fuse</td>
<td>30.0 A</td>
<td>⋆</td>
</tr>
<tr>
<td>Headlight fuse</td>
<td>15.0 A</td>
<td>⋆</td>
</tr>
<tr>
<td>Signaling system fuse</td>
<td>10.0 A</td>
<td>⋆</td>
</tr>
<tr>
<td>Ignition fuse</td>
<td>10.0 A</td>
<td>⋆</td>
</tr>
<tr>
<td>Backup fuse</td>
<td>5.0 A</td>
<td>⋆</td>
</tr>
<tr>
<td>Carburetor heater fuse</td>
<td>15.0 A</td>
<td>⋆</td>
</tr>
<tr>
<td>Ignitor unit fuse</td>
<td>5.0 A</td>
<td>⋆</td>
</tr>
<tr>
<td>Reserve fuse</td>
<td>30.0 A</td>
<td>⋆</td>
</tr>
<tr>
<td>Reserve fuse</td>
<td>15.0 A</td>
<td>⋆</td>
</tr>
<tr>
<td>Reserve fuse</td>
<td>10.0 A</td>
<td>⋆</td>
</tr>
<tr>
<td>Reserve fuse</td>
<td>5.0 A</td>
<td>⋆</td>
</tr>
</tbody>
</table>
PERIODIC CHECKS AND ADJUSTMENTS

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

PERIODIC MAINTENANCE CHART FOR EMISSION CONTROL SYSTEM

<table>
<thead>
<tr>
<th>No.</th>
<th>ITEM</th>
<th>ROUTINE</th>
<th>INITIAL</th>
<th>ODOMETER READINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>600 mi (1000 km) or 1 month</td>
<td>4000 mi (7000 km) or 6 months</td>
</tr>
</tbody>
</table>
| 1   | Fuel line | • Check fuel hoses for cracks or damage.  
• Replace if necessary. | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| 2   | Fuel filter | • Replace. | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| 3   | Spark plugs | • Check condition.  
• Adjust gap and clean.  
• Replace every 8000 mi (13000 km) or 12 months. | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| 4   | Valve clearance | • Check and adjust valve clearance when engine is cold. | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| 5   | Crankcase breather system | • Check breather hose for cracks or damage.  
• Replace if necessary. | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| 6   | Carburetor synchronization | • Adjust synchronization of carburetors. | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| 7   | Idle speed | • Check and adjust engine idle speed. | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| 8   | Exhaust system | • Check for leakage.  
• Tighten if necessary.  
• Replace gasket(s) if necessary. | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| 9   | Evaporative emission control system (For California only) | • Check control system for damage.  
• Replace if necessary. | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |

* Since these items require special tools, data and technical skills, they should be serviced by a Yamaha dealer.

GENERAL MAINTENANCE AND LUBRICATION CHART

<table>
<thead>
<tr>
<th>No.</th>
<th>ITEM</th>
<th>ROUTINE</th>
<th>INITIAL</th>
<th>ODOMETER READINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>600 mi (1000 km) or 1 month</td>
<td>4000 mi (7000 km) or 6 months</td>
</tr>
</tbody>
</table>
| 1   | Air filter element | • Clean with compressed air.  
• Replace if necessary. | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| 2   | Clutch | • Check operation.  
• Adjust or replace cable. | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| 3   | Front brake | • Check operation, fluid level, and for fluid leakage.  
• Replace brake pads if necessary. | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| 4   | Rear brake | • Check operation, fluid level, and for fluid leakage.  
• Replace brake pads if necessary. | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
<table>
<thead>
<tr>
<th>No.</th>
<th>ITEM ROUTINE</th>
<th>INITIAL</th>
<th>ODOMETER READINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>600 mi (1000 km)</td>
<td>4000 mi (7000 km)</td>
</tr>
<tr>
<td>5</td>
<td>* Brake hoses</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 month</td>
<td>6 months</td>
</tr>
<tr>
<td>6</td>
<td>* Wheels (XVS11V)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Every 4 years</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>* Wheels (XVS11AWV /XVS11ATV)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>8</td>
<td>* Tires</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>9</td>
<td>* Wheel bearings</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>10</td>
<td>* Swingarm pivot bearings</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repack.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>* Steering bearings</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repack.</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>* Chassis fasteners</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>13</td>
<td>Brake and clutch lever pivot shafts</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>14</td>
<td>Brake and shift pedal pivot shafts</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>15</td>
<td>Sidestand pivot</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>16</td>
<td>* Sidestand switch</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>17</td>
<td>* Front fork</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>18</td>
<td>* Shock absorber assembly</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>19</td>
<td>* Rear suspension link pivots</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Engine oil</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>21</td>
<td>* Engine oil filter element</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>22</td>
<td>Final gear oil</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change.</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>* Control cables</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>* Throttle grip housing and cable</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Since these items require special tools, data and technical skills, they should be serviced by a Yamaha dealer.
NOTE:
From 24000 mi (37000 km) or 36 months, repeat the maintenance intervals starting from 8000 mi (13000 km) or 12 months.

NOTE:
• The air filter needs more frequent service if you are riding in unusually wet or dusty areas.
• Hydraulic brake service
  • After disassembling the brake master cylinders and calipers, always change the fluid. Regularly check the brake fluid levels and fill the reservoirs as required.
  • Every two years replace the internal components of the brake master cylinders and calipers, and change the brake fluid.
  • Replace the brake hoses every four years and if cracked or damaged.
### Disassembling the carburetor.

<table>
<thead>
<tr>
<th>Order</th>
<th>Job name/Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Carburetor heater leads</td>
<td>2</td>
<td>Disassemble the parts in the order listed.</td>
</tr>
<tr>
<td>2</td>
<td>Carburetor heaters</td>
<td>2</td>
<td>12V 30W</td>
</tr>
<tr>
<td>3</td>
<td>Fuel cut solenoid valve</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Float chamber/gasket</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Float</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Needle valve set</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Main jet</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Jet holder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Pilot jet</td>
<td>1</td>
<td>Refer to “CARBURETOR ASSEMBLY” in 5EL-28197-E0 Chapter 5.</td>
</tr>
<tr>
<td>10</td>
<td>Starter jet</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Jet needle set</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Starter plunger set</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Order</td>
<td>Job name/Part name</td>
<td>Q’ty</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------------------------</td>
<td>------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>13</td>
<td>Diaphragm set</td>
<td>1</td>
<td>Refer to “ASSEMBLING THE CARBURETORS” in 5EL-28197-E0 Chapter 5.</td>
</tr>
<tr>
<td>14</td>
<td>Throttle position sensor</td>
<td>1</td>
<td>Refer to “CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR (TPS)” in 5EL-28197-E0 Chapter 5.</td>
</tr>
<tr>
<td>15</td>
<td>Main air jet</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Pilot air jet 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Throttle stop screw set</td>
<td>1</td>
<td>For assembly, reverse the disassembly procedure.</td>
</tr>
</tbody>
</table>
CHECKING THE FUEL CUT SOLENOID

1. Check:
   • fuel cut solenoid valve

   a. Disconnect the fuel cut solenoid valve coupler from the wireharness.
   b. Remove the fuel cut solenoid valve from the carburetor.
   c. Connect the pocket tester ($\Omega \times 1k$) to the terminals of the fuel cut solenoid valve coupler and fuel cut solenoid body. (ground)

<table>
<thead>
<tr>
<th>Fuel cut solenoid valve #1</th>
<th>Fuel cut solenoid valve #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive (+) pocket tester probe $\rightarrow$ brown terminal 1</td>
<td>Positive (+) pocket tester probe $\rightarrow$ green terminal 3</td>
</tr>
<tr>
<td>Negative (–) pocket tester probe $\rightarrow$ ground 2</td>
<td>Negative (–) pocket tester probe $\rightarrow$ ground 2</td>
</tr>
</tbody>
</table>

   d. Measure the fuel cut solenoid valve resistance.
   Out of specification $\rightarrow$ Replace the fuel cut solenoid valve.

   Fuel cut solenoid valve resistance
   $12 \Omega$ at $20^\circ C$ ($68^\circ F$)
   (brown – ground)
   (green – ground)
CARBURETOR HEATER SYSTEM

ELECTRICAL

CARBURETOR HEATER SYSTEM
CIRCUIT DIAGRAM

1. Main switch
2. Battery
3. Main fuse
4. Carburetor heater fuse
5. Thermo switch
6. Carburetor heater 1
7. Carburetor heater 2
8. Carburetor heater ground

-12-
TROUBLESHOOTING

The carburetor heater fails to operate.

Check:
1. main, and carburetor heater
2. battery
3. main switch
4. thermo switch
5. carburetor heater
6. wiring
   (of the entire carburetor heater system)

NOTE: 
• Before troubleshooting, remove the following part (-s):
  1. battery cover
  2. rider’s seat
  3. fuel tank
  4. steering head side covers
  5. tool box cover
• Troubleshoot with the following special tool (-s).

Pocket tester:
90890-03112, YU-03112-C

1. Main, and carburetor heater fuses
   • Check the main, and carburetor heater fuses for continuity.
   Refer to “CHECKING THE FUSES” in 5EL-28197-E0 chapter 3.
   • Are the main, and carburetor heater fuses OK?

2. Battery
   • Check the condition of the battery.
   Refer to “CHECKING AND CHARGING THE BATTERY” in 5EL-28197-E0 chapter 3.
   • Open-circuit voltage
     12.8V or more at 20 °C (68 °F)
   • Is the battery OK?

   YES
   NO
   • Clean the battery terminals.
   • Recharge or replace the battery.

3. Main switch
   • Check the main switch for continuity.
   Refer to “CHECKING THE SWITCHES” in 5EL-28197-E0 chapter 7.
   • Is the main switch OK?

   YES
   NO
   Replace the main switch.

Replace the fuse(-s).
4. Thermo switch

- Remove the thermo switch from the thermo switch plate.
- Connect the pocket tester to the thermo switch lead.

| Tester positive lead → black ① |
| Tester negative lead → black ② |

- Immerse the thermo switch in the water ③.
- Check the thermo switch for continuity.

Note the temperatures while heating the water with the temperature gauge ④.

<table>
<thead>
<tr>
<th>Test step</th>
<th>Water temperature</th>
<th>Good condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Less than 16 ± 3°C (60.8 ± 5.4°F)</td>
<td>○</td>
</tr>
<tr>
<td>2</td>
<td>More than 16 ± 3°C (60.8 ± 5.4°F)</td>
<td>×</td>
</tr>
<tr>
<td>3</td>
<td>More than 11 ± 3°C (51.8 ± 5.4°F)</td>
<td>×</td>
</tr>
<tr>
<td>4</td>
<td>Less than 11 ± 3°C (51.8 ± 5.4°F)</td>
<td>○</td>
</tr>
</tbody>
</table>

Test 1 & 2: Heat-up test
Test 3 & 4: Cool-down test
○: Continuity ×: No continuity

Is the thermo switch OK?

Replace the thermo switch.
5. Carburetor heater

- Remove the carburetor heater from the carburetor body.
- Connect the pocket tester to the carburetor heater.

**Tester positive lead → Heater terminal ①**
**Tester negative lead → Heater body ②**

- Measure the heater resistance.

<table>
<thead>
<tr>
<th>Carburetor heater resistance:</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 V 30 W: 3.2–5.8 Ω</td>
</tr>
<tr>
<td>at 20°C (68°F)</td>
</tr>
</tbody>
</table>

- Is the carburetor heater OK?

[Diagram of carburetor heater with leads connected]

Replace the carburetor heater.

6. Wiring

- Check the entire carburetor heater system's wiring.
- Refer to "CIRCUIT DIAGRAM".
- Is the carburetor heater system's wiring properly connected and without defects?

[Diagram of carburetor heater system]

- NO
  - Properly connect or repair the carburetor system’s wiring.

- YES
  - The carburetor heater system circuit is OK.
**SELF-DIAGNOSIS**

The XVS11A features self-diagnosis. When the main switch is turned to “ON”, the following items are monitored and the condition codes are displayed on the engine indicator light (irrespective of whether the engine is running or not).

**NOTE:**

The XVS11A features a self-diagnosing system. In the XVS11A, when the main switch is turned on the “Engine indicator light” in the speedometer comes on for 1.4 seconds then goes off. However, if there is a malfunction, it comes on for 1.4 seconds, goes off and then begins flashing. (However, it is on while the engine is running.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
<th>Fail-safe action</th>
<th>Display condition code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>When engine is</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>stationary</td>
</tr>
<tr>
<td>Throttle position sensor (TPS)</td>
<td>Disconnected or short-circuit</td>
<td>Fixes the throttle position sensor to fully open.</td>
<td>Blinks in Fault code: 15</td>
</tr>
<tr>
<td></td>
<td>Locked</td>
<td></td>
<td>Blinks in Fault code: 16</td>
</tr>
<tr>
<td></td>
<td>When the main switch is turned to ON, a stuck is detected.</td>
<td>—</td>
<td>Light on</td>
</tr>
<tr>
<td>Speed sensor</td>
<td>Defective speed sensor pulse</td>
<td>—</td>
<td>Blinks in Fault code: 42</td>
</tr>
<tr>
<td>Ignition coil #1</td>
<td>Primary coil lead is short-circuit</td>
<td>Fuel cut solenoid valve #1 on.</td>
<td>Blinks in Fault code: 33</td>
</tr>
<tr>
<td>Ignition coil #2</td>
<td>Primary coil lead is short-circuit</td>
<td>Fuel cut solenoid valve #2 on.</td>
<td>Blinks in Fault code: 34</td>
</tr>
<tr>
<td>Fuel cut solenoid valve #1</td>
<td>Disconnected or short-circuit</td>
<td>—</td>
<td>Blinks in Fault code: 57</td>
</tr>
<tr>
<td>Fuel cut solenoid valve #2</td>
<td>Disconnected or short-circuit</td>
<td>—</td>
<td>Blinks in Fault code: 58</td>
</tr>
</tbody>
</table>
Display order on the engine indicator light

<Example> 42

① Light on (second) .............1 second
② Light off (seconds) ..........1.5 seconds
③ Light on (seconds) ..........0.5 seconds
④ Light off (seconds) ..........3 seconds
TROUBLESHOOTING

The engine trouble warning light starts to display the self-diagnosis sequence.

Check:
1. throttle position sensor
2. speed sensor
3. ignition coil
4. fuel cut solenoid

NOTE: 
• Before troubleshooting, remove the following part(-s):
  1. rider seat
  2. fuel tank
  3. air filter case
  4. left side cover
• Troubleshoot with the following special tool(-s).

Pocket tester:
90890-03112, YU-03112-C

1. Wireharness
  • Check the wireharness for continuity.
  Refer to “CIRCUIT DIAGRAM”.
  • Is the wireharness OK?

YES NO

Repair or replace the wireharness.

2. Throttle position sensor
  • Check the throttle position sensor for continuity.
  Refer to “CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR” in 5EL-28197-E0 chapter 6.
  • Is the throttle position sensor OK?

YES NO

Replace the ignitor unit.
Replace the throttle position sensor.

1. Throttle position sensor
CIRCUIT DIAGRAM

Throttle position sensor
Ignitor unit
2. Speed sensor

CIRCUIT DIAGRAM

1. Wireharness

- Check the wireharness for continuity. Refer to “CIRCUIT DIAGRAM”.
- Is the wireharness OK?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repair or replace the wireharness.</td>
<td></td>
</tr>
</tbody>
</table>
3. Ignition coil

1. Wireharness

- Check the wireharness for continuity. Refer to “IGNITION SYSTEM” in 5EL-28197-E0 chapter 7.
- Is the wireharness OK?

YES  NO
Repair or replace the wireharness.

2. Ignition coil resistance

The following procedure applies to all of the ignition coils.
- Disconnect the ignition coil connectors from the ignition coil terminals.
- Connect the pocket tester (Ω x 1) to the ignition coil as shown.

**Tester positive probe → red/black**  
**Tester negative probe → orange (gray)**

- Measure the primary coil resistance.

**Primary coil resistance**  
3.57 ~ 4.83 Ω at 20°C (68°F)

- Connect the pocket tester (Ω x 1k) to the ignition coil as shown.
- Measure the secondary coil resistance.

**Tester positive probe →**  
spark plug lead ①

**Tester negative probe →**  
Orange (gray) lead ②

**Secondary coil resistance**  
10.7 ~ 14.5 kΩ at 20°C (68°F)

- Is the ignition coil OK?

YES  NO
Replace the ignitor unit.  
Replace the ignition coil.
4. Fuel-cut solenoid

**CIRCUIT DIAGRAM**

- Igniter unit
- Fuel-cut solenoid 1 (#1 carburetor) (brown)
- Fuel-cut solenoid 2 (#2 carburetor) (green)

<table>
<thead>
<tr>
<th>1. Wireharness</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Check the wireharness for continuity. Refer to &quot;CIRCUIT DIAGRAM&quot;.</td>
</tr>
<tr>
<td>• Is the wireharness OK?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace the fuel-cut solenoid 1 or 2.</td>
<td>Repair or replace the wireharness.</td>
</tr>
</tbody>
</table>
XVS11AWV/XVS11ATV/XVS1100ASC/XVS1100ATSC WIRING DIAGRAM (for US and CAL)

COLOR CORD
B..............Black
Br..............Brown
Ch..............Chocolate
Dg..............Dark green
G..............Green
Gy..............Gray
L..............Blue
Lg..............Light green
Or..............Orange
P..............Pink
R..............Red
Sb..............Sky blue
W..............White
Br/ L..............Brown/ Black
Br/ Y..............Brown/ Yellow
Br/ W..............Brown/ White
Br/ L..............Brown/ Blue
Br/ Y..............Brown/ Yellow
Br/ W..............Brown/ White
L/ B..............Blue/ Black
L/ R..............Blue/ Red
L/ W..............Blue/ White
R/ B..............Red/ Black
R/ G..............Red/ Green
R/ W..............Red/ White
R/ Y..............Red/ Yellow
Y..............Yellow
Y/ R..............Yellow/ Red

1. Pickup coil
2. A.C. magneto (stator coil)
3. Rectifier/ regulator
4. Main switch
5. Solenoid (for CAL)
6. Battery
7. Main fuse
8. Starter relay
9. Starter motor
10. Starting circuit cut-off relay
11. Oil lamp relay
12. Right handlebar switch
13. Front brake switch
14. Engine stop switch
15. Start switch
16. Oil level gauge
17. Sidestand switch
18. Fuel pump
19. Throttle position sensor
20. Ignitor unit
21. Ignition coil
22. Spark plug
23. Fuel cut solenoid valve
24. Speed sensor
25. Meter assembly
26. Oil level caution light
27. Engine warning light
28. Speedometer
29. Meter light
30. Turn signal indicator light
31. Neutral indicator light
32. High beam indicator light
33. Neutral switch
34. Trip switch
35. Flasher relay
36. Horn
37. Rear brake switch
38. Left handlebar switch
39. Dimmer switch
40. Horn switch
41. Clutch switch
42. Turn signal switch
43. Headlight
44. Rear turn signal light (right)
45. Rear turn signal light (left)
46. Front turn signal/ position light (right)
47. Front turn signal/ position light (left)
48. Tail/ brake light
49. Ignition fuse
50. Backup fuse
51. Headlight fuse
52. Signal fuse
53. Igniter fuse
54. Carburetor heater fuse
55. Thermo switch
56. Carburetor heater 1
57. Carburetor heater 2
58. Carburetor heater ground